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Evidenzbericht

zur

S3-Leitlinie

Prävention und Therapie der Gonarthrose

der

Deutschen Gesellschaft für Orthopädie und Unfallchirurgie e.V.

DGOU
Deutsche Gesellschaft für
Orthopädie und Unfallchirurgie

und

Berufsverband für Orthopädie und Unfallchirurgie e.V. (BVOU)

Deutsche Gesellschaft für Allgemeinmedizin und Familienmedizin e.V. (DEGAM)

Deutsche Gesellschaft für Endoprothetik (AE)

Arzneimittelkommission der deutschen Ärzteschaft (AkdÄ)

Deutsche Gesellschaft für Naturheilkunde (DGNHK)

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Deutsche Gesellschaft für Nuklearmedizin e.V. (DGN)

Deutsche Gesellschaft für Physiotherapiewissenschaft (DGPTW)

Deutsche Gesellschaft für Rheumatologie und klinische Immunologie e.V. (DGRh)

Deutsche Kniegesellschaft e.V. (DKG)

Deutsche Rheuma-Liga Bundesverband e.V. (DRL)

Deutsche Schmerzgesellschaft e.V.

Deutscher Verband Ergotherapie e.V. (DVE)

Deutscher Verband für Physiotherapie e.V. (ZVK)

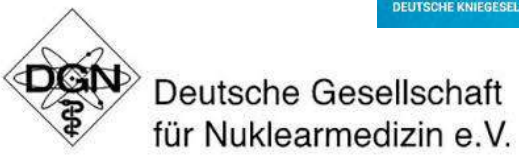
Gesellschaft für Arthroskopie und Gelenkchirurgie (AGA)

Gesellschaft für Orthopädisch-Traumatologische Sportmedizin e.V. (GOTS)

Gesellschaft für Phytotherapie e.V. (GPT)

Interdisziplinäre Gesellschaft für orthopädische und unfallchirurgische Schmerztherapie e.V. (IGOST)

Vereinigung Technische Orthopädie e.V. (VTO)



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Interdisziplinäre Gesellschaft für orthopädische / unfallchirurgische und allgemeine Schmerztherapie

Deutsche Gesellschaft für Naturheilkunde
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Version 5.0

Gefördert durch:
Gemeinsamer Bundesausschuss Innovationsausschuss

Das dieser Veröffentlichung zugrundliegende Projekt wurde mit Mitteln des Innovationsausschusses beim Gemeinsamen Bundesausschuss unter dem Förderkennzeichen 01VSF22006 gefördert.

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1 Informationen zu diesem Evidenzbericht

1.1 Herausgebende

Federführende Fachgesellschaft:

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Dr. Katharina Ortwig

Bitte wie folgt zitieren:

Deutsche Gesellschaft für Orthopädie und Unfallchirurgie e.V.: Prävention und Therapie der Gonarthrose Version 5.0, 15.07.2024: https://register.awmf.org/de/leitlinien/detail/187-050 Zugriff am:

1.2 Autor*innen des Evidenzberichtes:

- Wissenschaftliche Mitarbeiterin Dr. K. Ortwig (DGOU)
- Leitlinienkoordinator Prof. Dr. J. Stöve (Ludwigshafen, Orthopädie und Unfallchirurgie)
- Dr. D. Schrednitzki (Lichtenberg Berlin, Orthopädie und Unfallchirurgie)
- Dr. F. Jonas (Ludwigshafen, Orthopädie und Unfallchirurgie)
- Nektarios Winter (Universität Heidelberg, Medizinische Fakultät Mannheim, Medizinische Statistik, Biomathematik und Informationsverarbeitung)
- Mo Saffarini (ReSurg)
- Jacobus H. Muller (ReSurg)
- Floris van Rooij (ReSurg)
- Luca Nover (ReSurg)

- Chinyelum Agu (ReSurg)
- Bethany Grew (ReSurg)
- Dr. rer. nat. Schoppe (Berlin, Leitliniensekretariat DGOU)

1.3 Methodik:

1.3.1 Zugrundeliegendes Regelwerk

Die Methodik zur Erstellung dieses Evidenzberichtes richtet sich nach dem AWMF-Regelwerk (Version 2.1 vom 05.09.2023) (1).

Quelle: Arbeitsgemeinschaft der Wissenschaftlichen Medizinischen Fachgesellschaften (AWMF)- Ständige Kommission Leitlinien. AWMF-Regelwerk „Leitlinien“. Auflage 2.1 2023. Verfügbar: https://www.awmf.org/regelwerk/

1.3.2 Erstellung klinisch relevanter Schlüsselfragen

Die Erstellung klinisch relevanter Fragestellung für die eigene Recherche orientierte sich an den vorhandenen Fragestellungen der S2k-Leitlinie 4.0 (2) und wurde um neue Fragestellungen ergänzt.

Die Steuerungsgruppe überführte in enger Zusammenarbeit mit externen Methodiker*innen alle klinischen Fragestellungen in ein PICO (Patient Intervention Comparison Outcome) Schema, das mit den jeweiligen klinischen Expert*innen abgestimmt wurde. Ausgewählte Fragestellungen aus dem Themenbereich operative Therapie und Naturheilkunde wurden nach der GRADE Systematik (3) in der MAGICapp bearbeitet. Für diese operativen PICO Fragen wurden vier outcomes ausgewählt und anhand einer Likertskala priorisiert: Schmerz und Funktion (jeweils neun Punkte; Endpunkt bedeutsam für die Empfehlungsbildung), Standzeit der Prothese und Komplikationsrate (jeweils sechs Punkte; Endpunkt wichtig für die Empfehlungsbildung). Für die naturheilkundliche PICO Frage wurden drei outcomes ausgewählt und priorisiert wie folgt: Schmerz und Funktion (jeweils neun Punkte; Endpunkt wichtig für die Empfehlungsbildung), und ernste unerwünschte Ereignisse mit Behandlungsfolge (sechs Punkte; Endpunkt wichtig für die Empfehlungsbildung).

Die klinischen Fragestellungen und dazugehörigen PICO Schemata der Quellleitlinien, die für Adoptionen oder Adaptationen herangezogen wurden, sind in den jeweiligen Evidenzberichten jeder einzelnen Empfehlung dokumentiert (Links zu Anlagen und Appendices).

Die klinischen Fragestellungen der konsensbasierten Empfehlungen orientieren sich an den vorhandenen Fragestellungen der S2k-Leitlinie 4.0 (2) und werden in diesem Evidenzbericht nicht aufgeführt.

1.3.3 Systematische Recherche und Auswahl der Evidenz

Die Datenbankrecherche, Auswahl und Bewertung der Evidenz erfolgten durch erfahrene Methodiker*innen. In Einzelfällen wurden bei inhaltlichen Unsicherheiten klinisch erfahrene medizinische Expert*innen beratend hinzugezogen.

Reihenfolge der systematischen Recherche und Auswahl der Evidenz für Systematische Reviews (SR) mit und ohne Metaanalyse (MA) und randomisiert kontrollierte Studien (RCTs):

1. Definieren spezifischer PICO (Population, Intervention, Comparator und Outcome) Schlüsselwörter.
2. Definieren von Suchstrings.
3. Durchführung der Suche auf PubMed nach systematischen Übersichtsarbeiten mit oder ohne Meta-Analyse und RCTs.
4. Durchführung des Titel- und Abstract-Screenings der SRs mit/ohne MA, RCTs und Auswahl relevanter Veröffentlichungen (nach Prüfung PICO).
5. Volltext-Screening der ausgewählten SRs mit/ohne MA und RCTs nach vordefinierten Einschlusskriterien (veröffentlicht ≥2003, englische Sprache). Ein zusätzliches Kriterium für SRs mit/ohne MA ist, dass mindestens 2/3 der eingeschlossenen Primärstudien in Englisch verfasst sein müssen.
6. Die Auswahl der Studien wurde in der Reihenfolge gemäß einer modifizierten Fast and Frugal-Bewertung (Lorenz et al. 2023 (4)) berücksichtigt
    - SRs und MAs, die einem vordefinierten Protokoll folgen
    - RCTs, die einem vordefinierten Protokoll folgen
    - SRs und MAs, die keinem vordefinierten Protokoll folgen
    - RCTs, die keinem vordefinierten Protokoll folgen

Für die Aufnahme in die Leitlinie wurden die drei aktuellsten Artikel in der in Punkt #6 definierten Reihenfolge ausgewählt. Zuerst wurden 3 SRs und MAs ausgewählt, die einem vordefinierten Protokoll folgen. Bei unzureichenden SRs und MAs, die einem vordefinierten Protokoll folgen, wurden die 3 aktuellsten RCTs, die einem vordefinierten Protokoll folgen, einbezogen und so weiter, bis 3 Artikel ausgewählt wurden.

Bei unzureichenden SRs, MAs oder RCTs, wie in Punkt #6 definiert, wurden zusätzlich Suchen nach nicht-randomisierten vergleichenden Studien durchgeführt, und nach Titel- und Abstract-Screening sowie Volltext-Screening wurden die aktuellsten Artikel einbezogen.

Für die in der MAGICApp bearbeiteten Empfehlungen (Empfehlung #75, #78 und Statement #43) wurden nicht die drei aktuellsten Artikel aufgenommen. Die outcomebasierte Extraktion der Daten erfolgte aus der gesamten Liste der potenziellen Publikationen wie folgt:

<u>43. Statement:</u>

- Aufnahme einzelner RCTs (Extraktion der Einzelstudien aus Systematischen Reviews), die die Zieloutcomes dokumentieren (Schmerz, Funktion und ernste unerwünschte Ereignisse mit Behandlungsfolge)
- Extraktion aller verfügbaren Operationalisierungen (Messungen, Scores und Subscores) der Zieloutcomes (bsp. für Schmerz: VAS Skala, WOMAC Pain Score,...), die in mindestens 2 Publikationen dokumentiert wurden
- Zusammenführen von Zeitrahmen (Baseline, short term ≤ 1 Monat, long term >1 Monat)

<u>75. Empfehlung und 78. Empfehlung:</u>

- Aufnahme einzelner RCTs, die die Zieloutcomes dokumentieren (Schmerz, Funktion, Standzeit der Prothese=Survivorship, Komplikationsrate)
- Extraktion aller verfügbaren Operationalisierungen (Messungen, Scores und Subscores) der Zieloutcomes (bsp. für Funktion: SF-36 physical function, Range of Motion,…), die in mindestens 2 Publikationen dokumentiert wurden
- Zusammenführen von Zeitrahmen (präoperativ, < 1 Jahr, 1-5 Jahre, > 5 Jahre)

Die herangezogenen Quellleitlinien wurden von den Steuergruppenmitgliedern auf Aktualität und inhaltliche Relevanz geprüft und als geeignet angesehen. Eine systematische Recherche nach Quellleitlinien erfolgte nicht.

Herangezogen wurden:

- AAOS Management of Osteoarthritis of the Knee (Non-Arthroplasty), Evidence-Based Clinical Practice Guideline, August 31, 2021 (5)
- AAOS Surgical Management of Osteoarthritis of the Knee, Evidence-Based Clinical Practice Guideline, December 2, 2022 (6)
- NICE Guideline NG226, Osteoarthritis in over 16s: diagnosis and management, October 19, 2022 (7)
- NICE Guideline NG157, Joint replacement (primary): hip, knee and shoulder, June 4, 2020 (8)

Für konsensbasierte Empfehlungen erfolgte eine individuelle orientierende Literaturrecherche und Auswahl der Evidenz von klinischen Expert*innen auf dem jeweiligen Fachgebiet und wird in diesem Evidenzbericht nicht aufgeführt.

1.3.4 Kritische Bewertung der Evidenz

Die identifizierten Publikationen wurden von erfahrenen Methodiker*innen mit folgenden Bewertungsinstrumenten auf Qualität bewertet:

- Systematische Übersichtsarbeiten (mit oder ohne Metaanalyse) mit AMSTAR II (kritische Dömanen: 2,4,7,9,11,13,15) (9)
- Randomisierte kontrollierte Studien mit Cochrane Risk of Bias Tool II (10)
- Nicht Randomisierte Studien mit ROBINS I (11)

Die Vergabe eines Gesamtevidenzgrades erfolgte pro Publikation nach dem Schema der Oxford Centre of Evidence Based Medicine 2011 (OCEBM) (12).

Die in der MAGICapp bearbeiteten Themen (Empfehlung #75, #78 und Statement #43) wurden wie in *Tabelle 1* dargestellt outcome-basiert nach GRADE (Grading of Recommendations, Assessment, Development and Evaluation) (3) bewertet.

Tabelle 1: GRADE Qualität der Evidenz

Qulität	Symbol	Definition
High	⊕⊕⊕⊕	We are very confident that the true effect lies close to that of the estimate of the effect.
Moderate	⊕⊕⊕	We are moderately confident in the effect estimate: The true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different
Low	⊕⊕	Our confidence in the effect estimate is limited: The true effect may be substantially different from the estimate of the effect.
Very Low	⊕	We have very little confidence in the effect estimate: The true effect is likely to be substantially different from the estimate of effect

Dabei konnte das Vertrauen in die Evidenz herabgestuft werden unter Berücksichtigung von:

- Risk of Bias
- Heterogenität
- Indirekte Evidenz
- Fehlende Präzision
- Publikationsbias.

Außerdem konnte das Vertrauen in die Evidenz heraufgestuft werden unter Berücksichtigung von drei Faktoren:

- Großer Effekt
- Dosis-Wirkungsbeziehung
- Residuelles Confounding.

Die Qualitätsbeurteilung der Quellleitlinien wurde von 3 Reviewern (unabhängig voneinander) mit dem AGREE II Instrument (13) über die online Plattform *Login | AGREE Enterprise website (agreetrust.org)* durchgeführt. Zusätzlich erfolgte durch eine*n klinisch erfahrene*n Expert*in (fachbezogen) pro Fragestellung bzw. Empfehlung eine Prüfung der zugrundeliegenden

Literatur, des Evidenzgrades und des Empfehlungsgrades der Quellleitlinie. Dabei erfolgte die Orientierung an den Evidenzbewertungssystemen der Quellleitlinien (NICE Leitlinien NG226 und NG157 siehe Tabelle 1, AAOS Leitlinien Non-Arthroplasty und Surgical Management siehe Tabelle 2). Abweichungen hiervon sind jeweils im Hintergrundtext der Empfehlung/des Statements (siehe Langversion) begründet.

Tabelle 2: "Strength and Quality Descriptions" der AAOS Clinical Practice Guidelines (14)

Statement Strength	Evidence Quality	Statement Description	Strength Visual
Strong	High*	Evidence from two or more "High" quality studies with consistent findings recommending for or against the intervention. Or Rec is upgraded using the EtD framework.	
Moderate	Moderate*	Evidence from two or more "Moderate" quality studies with consistent findings or evidence from a single "High" quality study recommending for or against the intervention. Or Rec is upgraded or downgraded using the EtD framework.	
Limited	Low*	Evidence from two or more "Low" quality studies with consistent findings or evidence from a single "Moderate" quality study recommending for or against the intervention. Or Rec is downgraded using the EtD framework.	
Consensus*	Very Low, or Consensus*	Evidence from one "Low" quality study, no supporting evidence, or Rec is downgraded using the EtD framework. In the absence of sufficient evidence, the guideline work group is making a statement based on their clinical opinion.	

*Unless statement was upgraded or downgraded in strength, using the EtD Framework.

Es erfolgte keine formale Qualitätsbeurteilung für identifizierte Literatur konsensbasierter Empfehlungen. Die Evidenz wurde jeweils im Hintergrundtext der entsprechenden Empfehlung kritisch gewürdigt und wird in diesem Evidenzbericht nicht aufgeführt.

1.3.5 Literaturverzeichnis

Das nachstehende Literaturverzeichnis bildet die Literatur des Abschnittes *1. Informationen des Evidenzberichtes ab*. Die Literaturangaben zu eingeschlossenen Studien sind in den Kapiteln zu jeder Empfehlung bzw. zu jedem Statement aufgeführt.

1. Arbeitsgemeinschaft der Wissenschaftlichen Medizinischen Fachgesellschaften (AWMF)-Ständige Kommission Leitlinien. 2023 (Auflage 2.1). AWMF-Regelwerk "Leitlinien".*https://www.awmf.org/regelwerk/*. [Date Accessed: 05.07.2024]

2. (DGOU), Deutsche Gesellschaft für Orthopädie und Unfallchirurgie e.V. S2k Leitlinie Gonarthrose (AWMF Register Nr. 187-050). Berlin: DGOU; 24.01.2024 (Version 4.0).*https://register.awmf.org/assets/guidelines/187-050l_S2k_Gonarthrose_2024-06.pdf* [Date Accessed: 01.07.2024].

3. Guyatt, Gordon H., Oxman, Andrew D., Vist, Gunn E., et al. GRADE: an emerging consensus on rating quality of evidence and strength of recommendations. BMJ. 2008;336(7650):924-926.

4. Lorenz, RC, Jenny, M, Jacobs, A, et al. Fast and frugal decision tree for the rapid critical appraisal of systematic reviews. BMJ medRxiv. 2023.

5. (AAOS), American Academy of Orthopaedic Surgeons. Management of Osteoarthritis of the Knee (Nonarthroplasty) Evidence-Based Clinical Practice Guideline. Rosemont, Illinois: American Academy of Orthopaedic Surgeons; 2021 [Third Edition].*https://www.aaos.org/globalassets/quality-and-practice-resources/osteoarthritis-of-the-knee/oak3cpg.pdf* [Date Accessed: 02.07.2024].

6. (AAOS), American Academy of Orthopaedic Surgeons. Surgical Management of Osteoarthritis of the Knee Evidence-Based Clinical Practice Guideline. Rosemont, Illinois: American Academy of Orthopaedic Surgeons 2022 [First Edition].*https://www.aaos.org/globalassets/quality-and-practice-resources/surgical-management-knee/smoak2cpg.pdf* [Date Accessed: 02.07.2024].

7. (NICE), National Institute for Health and Care Excellence. Osteoarthritis in over 16s: diagnosis and management (NICE Guideline NG226). London: National Institute for Health and Care Excellence; 2022 Oct 19.*https://www.nice.org.uk/guidance/ng226* [Date Accessed: 02.07.2024].

8. (NICE), National Institute for Health and Care Excellence. Joint replacement (primary): hip, knee and shoulder (NICE Guideline NG157). London: National Institute for Health and Care Excellence; 2020 June 04.*https://www.nice.org.uk/guidance/ng157* [Date Accessed: 02.07.2024].

9. Shea, Beverley J., Reeves, Barnaby C., Wells, George, et al. AMSTAR 2: a critical appraisal tool for systematic reviews that include randomised or non-randomised studies of healthcare interventions, or both. BMJ. 2017;358(j4008).

10. Sterne, Jonathan A. C., Savović, Jelena, Page, Matthew J., et al. RoB 2: a revised tool for assessing risk of bias in randomised trials. BMJ. 2019;366(l4898).

11. Sterne, Jonathan A. C., Hernán, Miguel A., Reeves, Barnaby C., et al. ROBINS-I: a tool for assessing risk of bias in non-randomised studies of interventions. BMJ. 2016;355(i4919).

12. OCEBM Table of Evidence Working Group = Jeremy Howick, Iain Chalmers (James Lind Library), Paul Glasziou, Trish Greenhalgh, Carl Heneghan, Alessandro Liberati, Ivan Moschetti,, Bob Phillips, Hazel Thornton, Olive Goddard and Mary Hodgkinson. The Oxford 2011 Levels of Evidence. In: Evidence, Oxford Centre for Evidence-Based Medicine 2011 Levels of, editor.: Oxford Centre for Evidence-Based Medicine; 2011.

13. Brouwers, Melissa C., Kho, Michelle E., Browman, Geoffrey P., et al. AGREE II: advancing guideline development, reporting and evaluation in healthcare. Canadian Medical Association Journal (CMAJ). 2010;182(18).

14. (AAOS), American Academy of Orthopaedic Surgeons. AAOS Clinical Practice Guideline Methodology: AAOS; 2023 Version 4.0.*https://www.aaos.org/globalassets/quality-and-practice-resources/methodology/cpg-methodology-september-2023.pdf* [Date Accessed: 02.07.2024].

2 Systematisch recherchierte Evidenz

Für folgende Fragestellungen wurde eine systematische Recherche durchgeführt, jedoch weder eine Empfehlung noch ein Statement aufgrund fehlender Daten formuliert:

- **(PICO 41)** In obese (BMI ≥ 30) adult patients with osteoarthritis undergoing PFA, are outcomes diminished and/or complications increased compared with non-obese patients (BMI < 30) undergoing PFA?
- **(PICO 149)** Does isolated or adjuvant lymphatic drainage (manual or device supported) improve outcomes in knees with clinically and/or radiographically confirmed OA?

Für folgende Fragestellung wurden keine Daten gefunden, es wurde entweder ein Statement oder eine Empfehlung (im Expertenkonsens) formuliert:

- **(19. Empfehlung)** Should metamizole (dipyrone) be used in patients with knee OA who have no contraindications to NSAIDs? (comparator is NSAIDs)
- **(61. Empfehlung)** Should hypoallergenic implants be routinely used instead of steel or CoCr implants for knee arthroplasty in patients with metal allergies?
- **(38. Statement)** Does isolated or adjuvant manual traction treatments improve outcomes in knees with clinically and/or radiographically confirmed OA?
- **(47. Statement)** Should cartilage treatments (microfracture, drilling, abrasion arthroplasty, osteochondral autograft transplantation, osteochondral allograft transplantation, autologous chondrocyte implantation) be performed to treat knees with OA?
- **(70. Statement)** In adult patients with osteoarthritis undergoing PFA, does robotic assistance technology improve outcomes and/or decrease complications when compared to other techniques?
- **(70. Statement)** In adult patients with osteoarthritis undergoing lateral UKA, does robotic assistance technology improve outcomes and/or decrease complications when compared to other techniques?

Für die **49. Empfehlung** war die identifizierte Evidenz nicht ausreichend, sodass eine konsensbasierte Empfehlung formuliert wurde.

Beratung, Prophylaxe, allgemeine Maßnahmen

13. Empfehlung	Modifiziert 2024
Empfehlungsgrad ⇓⇓	Wir empfehlen, dass Biomarker aktuell nicht zur Diagnostik, Prognosebestimmung und Therapiekontrolle bei Patient*innen mit Gonarthrose herangezogen werden, sondern speziellen Forschungsfragestellungen bzw. klinischen Studien vorbehalten bleiben.
Level of Evidence (Oxford 2011) 3 4 4	 Lineham B et al. 2022 (9) O'Sullivan O et al. 2023 (10) Abdelnaby R et al. 2023 (11)
Konsensstärke	100 % (starker Konsens)

1. Schlüsselfrage und PICO Format	
Clinical key question	Should biomarkers be used for the diagnosis and /or prognosis of knee OA?
Population	Adults with isolated medial or lateral: • symptomatic knee OA (clinically confirmed), and • K/L stage 2/3/4 (radiographically confirmed)
Intervention	Biomarkers as diagnostic or prognostic tool
Comparison	Other validated diagnostic tools for knee OA
Outcome	Detection of OA

Identifier	*ID Ordinal 147*
PICO(T) question	Should biomarkers be used for the diagnosis and /or prognosis of knee OA?
Search characteristics	
Date of search	02/02/2024
Initials of primary reader	CA
Database(s)	*PubMed*
Keywords	*Knee* *osteoarthritis; arthritis; osteoarthros*; gonitis; gonarthritis; gonarthros** Biomarkers; diagnosis; prognosis
Search strings	*#1 Animals[Title] OR Cadaver[Title] OR animal*[Title] OR dog[Title] OR dogs[Title] OR canine[Title] OR cats[Title] OR feline[Title] OR horse*[Title] OR equine[Title] OR mouse[Title] OR mice[Title] OR rat[Title] OR rats[Title] OR rabbit*[Title] OR sheep[Title] OR porcine[Title] OR pig[Title] OR pigs[Title] OR rodent*[Title] OR monkey*[Title] OR cadaver*[Title/Abstract] OR "in vitro"[Title/Abstract] OR comment[Publication Type] OR editorial[Publication Type] OR letter[Publication Type] OR "historical article"[Publication Type] OR address[Publication Type] OR news[Publication Type] OR "newspaper article" [Publication Type] OR "case reports"[Publication Type] OR case report*[Title] OR abstracts[Title] OR editorial[Title] OR reply[Title] OR comment*[Title] OR commentary[Title] OR letter[Title] OR biomechanic*[Title]* *#2 "randomized-controlled-trial" OR "Randomized-Controlled-Trials" OR "random-allocation" OR random*[Title] OR RCT* *#3 (systematic* AND review*) OR meta-analys*[Title/Abstract] OR meta-analysis OR systematic-review* *#4 (Knee)* *#5 (Osteoarthritis OR arthritis OR osteoarthros* OR gonitis OR gonarthritis OR gonarthros*)* #6 (biomarker* OR "bio-marker*" OR "biological indicator" OR "biological marker" OR "biological-indicator" OR "biological-marker" OR "bio-signature" OR biosignature OR "biological signature" OR "biological-signature")

	#7 (#4 AND #5 AND #6) NOT #1 #8 (#7 AND #2) #9 (#7 AND #3)
Number of hits	
RCTs (#8)	209
SR(+MA) (#9)	78
Studies published before 2003	0 SR/MAs, 5 RCTs
Articles to consider	
DOIs MAs	Puts 2023: 37358362 Abdelnaby 2023 : 10.1016/j.clim.2022.109187 Hao 2019 : 10.1016/j.joca.2018.10.009 Bi 2018: 10.1186/s13018-018-0959-y Cheng 2020: 10.1177/1947603518798884 Zhang 2018: 10.1186/s12891-018-1932-y Kruijf 2014: 10.1002/acr.22320
DOIs SRs	O'Sullivan 2023: 10.1016/j.ocarto.2023.100412 Lineham 2022: 10.1016/j.joca.2022.05.007 Haartmans 2021: 10.1080/14789450.2021.1952868 Boffa 2021: 10.1177/1947603520942941 Hosnijeh 2015: 10.1016/j.maturitas.2015.04.004 Hunter 2011: 10.1016/j.joca.2010.10.029 Spil 2010: 10.1016/j.joca.2010.01.012
DOIs RCTs	Afshar 2023: 10.1002/fsn3.3708 Gu 2023: 10.1186/s12967-023-04165-9 Östlind 2022: 10.1177/11795441221081063 Ishijima 2022: 10.1016/j.joca.2022.03.003 Vassão 2021: 10.1186/s42358-021-00220-5 Marouf 2021: 10.4103/ijp.IJP_493_20 Tucker 2021: 10.1002/pmrj.12561 Lai 2019: 10.1097/MD.0000000000018110 Huang 2018: 10.1016/j.joca.2018.08.005 Cornish 2018: 10.1016/j.nutres.2017.12.010 Henrotin 2017: 10.1186/s12891-017-1585-2 Egsgaard 2015: 10.1016/j.pain.0000000000000011 Hunt 2013: 10.1186/1471-2474-14-115 Scorei 2011: 10.1007/s12011-011-9083-0 Cheras 2010: 10.1002/ptr.3075 Chua Jr 2008: 10.1016/j.joca.2008.02.002 Garnero 2008: 10.1016/j.joca.2007.10.002 Le Graverand 2006: 10.1016/j.joca.2006.04.009 Garnero 2005: 10.1002/art.21366

	Cibere 2005: 15868627
Include/Excluded after FT screening	
SRs	
Include	O'Sullivan 2023: 10.1016/j.ocarto.2023.100412
Include	Lineham 2022: 10.1016/j.joca.2022.05.007
Exclude: No protocol	Haartmans 2021: 10.1080/14789450.2021.1952868
Exclude: No protocol	Boffa 2021: 10.1177/1947603520942941
Exclude: No protocol	Convill 2021: 10.1177/1947603520941239
Exclude: No protocol	Hosnijeh 2015: 10.1016/j.maturitas.2015.04.004
Exclude: not diag-/prog-nosis	Hunter 2011: 10.1016/j.joca.2010.10.029
Exclude: No protocol	Spil 2010: 10.1016/j.joca.2010.01.012
MAs	
Exclude: not diag-/prog-nosis	Puts 2023: 37358362
Include	Abdelnaby 2023 : 10.1016/j.clim.2022.109187
Exclude: No protocol	Hao 2019 : 10.1016/j.joca.2018.10.009
Exclude: No protocol	Bi 2018: 10.1186/s13018-018-0959-y
Exclude: No protocol	Cheng 2020: 10.1177/1947603518798884
Exclude: No protocol	Zhang 2018: 10.1186/s12891-018-1932-y
Exclude: not diag-/prog-nosis	Kruijf 2014: 10.1002/acr.22320
RCTs	
Exclude: not diag-/prog-nosis	Afshar 2023: 10.1002/fsn3.3708
Exclude: not diag-/prog-nosis	Gu 2023: 10.1186/s12967-023-04165-9
Exclude: not diag-/prog-nosis	Östlind 2022: 10.1177/11795441221081063
Exclude: not diag-/prog-nosis	Ishijima 2022: 10.1016/j.joca.2022.03.003
Exclude: not diag-/prog-nosis	Vassão 2021: 10.1186/s42358-021-00220-5
Exclude: not diag-/prog-nosis	Marouf 2021: 10.4103/ijp.IJP_493_20
Exclude: not diag-/prog-nosis	Tucker 2021: 10.1002/pmrj.12561
Not RCT but relevant	Lai 2019: 10.1097/MD.0000000000018110
Exclude: Not RCT	Huang 2018: 10.1016/j.joca.2018.08.005
Exclude: not diag-/prog-nosis	Cornish 2018: 10.1016/j.nutres.2017.12.010
Exclude: not diag-/prog-nosis	Henrotin 2017: 10.1186/s12891-017-1585-2
Exclude: No protocol	Egsgaard 2015: 10.1016/j.pain.0000000000000011
Exclude: not diag-/prog-nosis	Hunt 2013: 10.1186/1471-2474-14-115
Exclude: not diag-/prog-nosis	Scorei 2011: 10.1007/s12011-011-9083-0
Exclude: not diag-/prog-nosis	Cheras 2010: 10.1002/ptr.3075
Exclude: No protocol	Chua Jr 2008: 10.1016/j.joca.2008.02.002
Exclude: No protocol	Garnero 2008: 10.1016/j.joca.2007.10.002
Exclude: No protocol	Le Graverand 2006: 10.1016/j.joca.2006.04.009
Exclude: No protocol	Garnero 2005: 10.1002/art.21366 (https://onlinelibrary.wiley.com/doi/epdf/10.1002/art.21366)
Exclude: not diag-/prog-nosis	Cibere 2005: 15868627

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#9	•••		Search: **(#7 AND #3)** Sort by: **Most Recent**	78	10:55:34
#8	•••		Search: **(#7 AND #2)** Sort by: **Most Recent**	209	10:55:28
#7	•••		Search: **(#4 AND #5 AND #6) NOT #1** Sort by: **Most Recent**	2,053	10:55:20
#6	•••		Search: **(biomarker* OR "bio-marker*" OR "biological indicator" OR "biological marker" OR "biological-indicator" OR "biological-marker" OR "bio-signature" OR biosignature OR "biological signature" OR "biological-signature")** Sort by: **Most Recent**	824,076	10:55:05
#5	•••		Search: **(Osteoarthritis OR arthritis OR osteoarthros* OR gonitis OR gonarthritis OR gonarthros*)** Sort by: **Most Recent**	432,032	10:54:52
#4	•••		Search: **Knee** Sort by: **Most Recent**	214,863	10:54:43
#3	•••		Search: **(systematic* AND review*) OR meta-analys* [Title/Abstract] OR meta-analysis OR systematic-review** Sort by: **Most Recent**	576,361	10:54:39
#2	•••		Search: **"randomized-controlled-trial" OR "Randomized-Controlled-Trials" OR "random-allocation" OR random*[Title] OR RCT** Sort by: **Most Recent**	1,027,779	10:54:32
#1	•••		Search: **Animals[Title] OR Cadaver[Title] OR animal*[Title] OR dog[Title] OR dogs[Title] OR canine[Title] OR cats[Title] OR feline[Title] OR horse*[Title] OR equine[Title] OR mouse[Title] OR mice[Title] OR rat[Title] OR rats[Title] OR rabbit*[Title] OR sheep[Title] OR porcine[Title] OR pig[Title] OR pigs[Title] OR rodent*[Title] OR monkey*[Title] OR cadaver*[Title/Abstract] OR "in vitro"[Title/Abstract] OR comment[Publication Type] OR editorial[Publication Type] OR letter[Publication Type] OR "historical article"[Publication Type] OR address[Publication Type] OR news[Publication Type] OR "newspaper article"[Publication Type] OR "case reports"[Publication Type] OR case report*[Title] OR abstracts[Title] OR editorial[Title] OR**	8,674,485	10:54:27

reply[Title] OR comment*[Title] OR commentary[Title] OR letter[Title] OR biomechanic*[Title] Sort by: **Most Recent**

Showing 1 to 9 of 9 entries

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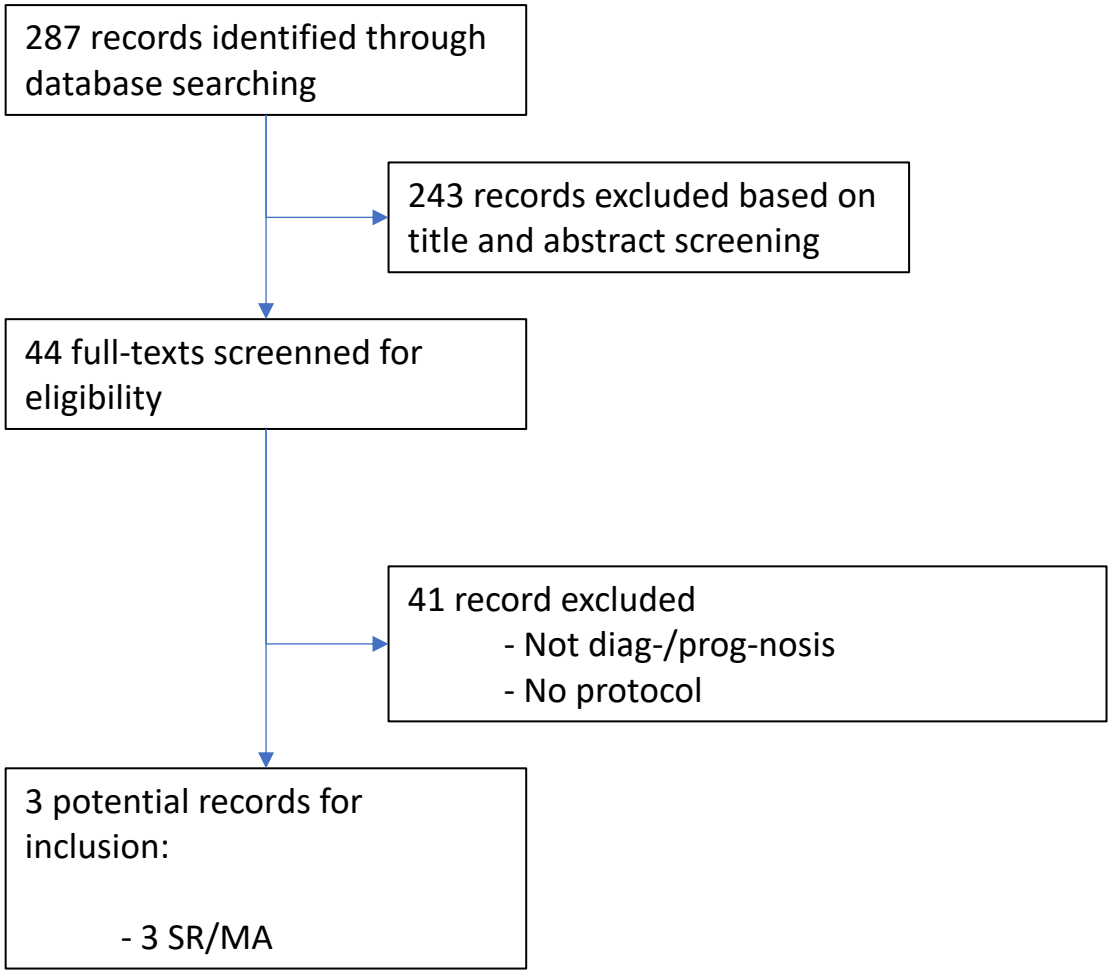
4. Studienselektion: Flowchart

Should biomarkers be used for the diagnosis and /or prognosis of knee OA?



Included SRs and MAs

(1-3)

1. Abdelnaby R, Sonbol YT, Dardeer KT, A EL, Ebrahim MA, Elmenawi KA, et al. Could Osteopontin be a useful biomarker in the diagnosis and severity assessment of osteoarthritis? A systematic review and meta-analysis of recent evidence. Clin Immunol. 2023;246:109187. doi: 10.1016/j.clim.2022.109187
2. Lineham B, Altaie A, Harwood P, McGonagle D, Pandit H, Jones E. A systematic review on the potential value of synovial fluid biomarkers to predict clinical outcomes in cartilage repair treatments. Osteoarthritis Cartilage. 2022;30(8):1035-49. doi: 10.1016/j.joca.2022.05.007
3. O'Sullivan O, Ladlow P, Steiner K, Hillman C, Stocks J, Bennett AN, et al. Current status of catabolic, anabolic and inflammatory biomarkers associated with structural and symptomatic changes in the chronic phase of post-traumatic knee osteoarthritis- a systematic review. Osteoarthr Cartil Open. 2023;5(4):100412. doi: 10.1016/j.ocarto.2023.100412

5. Charakteristika der eingeschlossenen Studien			
PICO number:	147	147	147
PICO Question:	Should biomarkers be used for the diagnosis and /or prognosis of knee OA?	Should biomarkers be used for the diagnosis and /or prognosis of knee OA?	Should biomarkers be used for the diagnosis and /or prognosis of knee OA?
Article name:	A systematic review on the potential value of synovial fluid biomarkers to predict clinical outcomes in cartilage repair treatments	Could Osteopontin be a useful biomarker in the diagnosis and severity assessment of osteoarthritis? A systematic review and meta-analysis of recent evidence	Current status of catabolic, anabolic and inflammatory biomarkers associated with structural and symptomatic changes in the chronic phase of post-traumatic knee osteoarthritis– a systematic review
Lead author	Lineham	Abdelnaby	O'Sullivan
Year published	2022	2023	2023
Number of included studies (if SR with or without MA)	9	14	8

Description of intervention group (optional for SRs)	Nine studies met the inclusion criteria and formed the study data, the characteristics of these are outlined in Table I. These included studies examining four different cartilage regeneration or repair interventions, ACI (1 study), HA (5 studies), HTO (2 studies) and KJD (1 study). All reported results in adults only. Apart from the ACI study performed on younger patients with focal chondral lesions, all the other studies included early OA patients. The timepoints measured ranged between 5 weeks and 24 months post- intervention (Table I).	Patients with knee OA	0
Description of control group (optional for SRs)	0	Controls	0
Number of patients in intervention group	191	631	634
Number of patients in control group	96	399	245
Mean age with range of intervention group	34 - 76.7	52.7 - 72.2	29.1
Mean age with range of control group	55 - 75.3	0	0

Inclusion criteria (on patient-level if clinical study; on article-level if SR) **Examples:** **Clinical study: "The inclusion criteria were (i) primary ACLR in (ii) patients aged over 50 years. The exclusion criteria were (iii) severe concomitant ligament injury (grade 3), (iv) tibiofemoral osteoarthritis visible on weight-bearing anteroposterior and/or sagittal radiographs (> 50% joint space narrowing), and (v) history of intra- or extra-articular ligament surgery in either knee."** **SR: "Studies comparing the diagnostic accuracy of physical examination (clinical tests or ultrasound) versus arthroscopy for the assessment of LHBT pathologies"**	All studies in human subjects undergoing articular cartilage regeneration interventions which had both SF biomarkers and clinical outcomes as an outcome measure of cartilage defects of the knee were included. There were no restrictions regarding patient age, sex or race or the date, or country of publication. Non-English language and animal studies were excluded.	Inclusions were: women and men between 40 and 80 years of age with primary knee OA according to American College of Rheumatology (ACR) criteria. Exclusions were: secondary OA, psychiatric conditions or cognitive impairments, pregnancy, previous drug or alcohol abuse, previous neurological or concomitant musculoskeletal disorders, lack of collaboration ability in general, and patients unable to abstain from analgesic medication for at least 72 hours.	Inclusion Criteria : - Full text articles, in English, Polish, Danish, or Spanish - Participants aged between, inclusive of, 18 and 45 years old - Significant injury one year or more previously - Study involved 'wet' biomarker (including serum, plasma, urine or synovial fluid) Exclusion Criteria: - Laboratory-based, in-vivo or animal studies - Participants under 18 or over 45 years old - Significant injury sustained less than 1 year ago
Follow-up period	0	0	0

Main results	Biomarker changes Table IV summaries biomarker changes and clinical outcome correlations. Of those biomarkers tested in a single study, for DPD28, NTX, YKL-40, FGF-2, HA, PICP, proteoglycan, MMP-1/ TIMP-1, MMP-3/TIMP-1, TGFb1, a significant increase in levels following intervention was demonstrated. For Activin A, COMP, MMP-240, total oxidant concentration, and VEGF, a significant decrease in recorded concentrations following intervention was recorded. For CPII, CTX-II, IL-1ra, IL-10, LTBP2, Tenascin- C, C-3B3, MMP-3 and total antioxidant concentration no change following intervention was observed. Of eleven biomarkers tested in more than one study, C-4S, C-6S, keratan sulphate, IL-6, IL-8, MMP-3, MMP-9, MMP- 13, and TIMP-1, showed inconsistent results between studies, however for	OPN levels in OA patients vs. healthy controls Six studies encompassing a total of 295 OA patients and 190 controls reported mean OPN concentrations in plasma, plasma OPN levels were significantly higher in OA patients (SMD = 6.41; 95% CI, 4.17–8.65; P < 0.00001). the heterogeneity was statistically significant (I2 =98%, P <0.00001). Three studies [13,21,29] reported OPN levels in serum in a total of 278 OA patients and 230 controls. OPN was significantly higher in OA patients (SMD =3.83; 95% CI, 0.23–7.43; P =0.04). The heterogeneity was also statistically significant (I2 =99%, P < 0.00001). Five studies [4,12,21,27,28] with a total of 292 OA patients and 233 controls reported mean OPN concentrations in the synovial fluid, where OPN levels were significantly higher in OA patients (SMD =4.95; 95% CI, 3.27–6.64; P < 0.00001) and	Serum COMP: Positively correlated with age, increased in males, associated with other biomarkers, no difference between injured and controls Synovial IL-1β: No difference between injured and controls, poor discrimination for meniscal injury Synovial IL-6: No difference between injured and controls, [34] no association with PROMs, [39] no association with inflammatory MRI biomarkers and weak discriminatory accuracy for knee OA in combined model, poor discrimination for meniscal injury TNF-α: No difference between injured and controls, no association with inflammatory MRI biomarkers and weak discriminatory accuracy for knee OA in combined model, poor discrimination for meniscal injury

	results between studies, however for IL-1B, and TNF-a no significant change following intervention was consistently reported. The study utilising MiRNA-PCR arrays recorded significant changes in hsa-miR- 23a-3p and hsa miR-30c-5p following intervention. Biomarker change over time Most of the studies measured biomarker levels at one time point only following intervention. Those that measured at multiple time points often found significant variation in the levels over time. There was a significant difference in the absolute marker levels found between the studies. Fig. 4 demonstrates the percentage change over time in MMP-3 levels in three of the four studies that investigated it following intervention. Schneider et al. measured MMP3 normalised to total protein and	95% CI, 3.27–3.84, P < 0.00001) and again, heterogeneity was statistically significant (I2 = 95%, P <0.00001) as mentioned in Fig. 3 and Table 1. 3.4. Plasma OPN levels in OA We pooled the mean plasma OPN levels in OA patients stratified by OA grading based on K-L scores. Five studies [12,23,25,26,30] reported data on the mean OPN concentration in 47 OA grade 4 patients with a pooled mean of 222.11 ng/ml (95% CI, 193.73–250.48, I2 =93.77; P < 0.01). Five studies [12,23,25,26,30] reported data on the mean OPN in 82 OA grade 3 patients with a pooled mean of 188.74 ng/ml (95% CI, 169.74–207.75, I2 =95.66; P < 0.01). Four studies [12,23,26,30] reported data on the mean OPN in 58 OA grade 2 patients with a pooled mean of 117.29 ng/ml (95% CI, 93.96–140.63, I2 =97.98; P < 0.01). Two studies [23,30]	Synovial COMP: No difference between injured and controls, poor correlation to meniscal injury, higher in males and injured cohort and associations with multiple other molecular biomarkers

	therefore levels are not comparable. Significant variation is seen although decreased levels were eventually seen by Ozcamdalli et al. following HA injection, and Kumagai et al. following HTO with Watt et al. showing no significant change over three time points. Correlation with clinical outcomes Five studies specifically reported on correlation of biomarkers with clinical outcomes with three studies reporting a statistically significant correlation (Table IV). For those studies with a comparator group, none showed a significant change in biomarker level in the tested intervention compared to the comparator group.	reported data on the mean OPN in ten OA grade 1 patient with a mean OPN concentration of 102.37 ng/ml (95% CI, 80.63–124.12 I2 =81.13; P <0.01). There was significant heterogeneity reported across studies, as demonstrated in Fig. 4 and Table 2. 3.5. Synovial OPN levels in OA We pooled the mean synovial OPN in patients with OA stratified by K-L grades. Four studies reported data on the mean OPN in 46 OA grade 4 patients with pooled mean of 312.53 ng/ml (95% CI, 266.62–358.43, I2 =98.08; p-value =0.00). Four studies [12,23,26,30] reported data on the mean OPN in 68 OA grade 3 patients with a pooled mean of 283.67 ng/ml (95% CI, 232.34–335.01, I2 =99.21 P <0.01). Four studies [12,23,26,30] reported data on the mean OPN in 58 OA grade 2 patients with a pooled mean of 221.60 ng/ml (95% CI, 194.13–249.08, I2 =95.66; P < 0.01).		

		Two studies [23,30] reported data on the mean OPN in 10 OA grade 1 patients with a mean of 191.17 ng/ml (95% CI, 183.95–198.39 I2 =0%; P =0.32). There was significant heterogeneity reported across the studies as mentioned in Fig. 5 and Table 2. For all OA grades, synovial OPN concentrations were higher than plasma OPN concentrations.	

Key findings (use Results and Conclusion in Abstract)	Results: 9 studies were included. Study heterogeneity precluded meta-analysis. There was significant variation in sampling and analysis. 33 biomarkers were evaluated in addition to microRNA and catabolic/ anabolic ratios. Five studies reported on correlation of biomarkers with six biomarkers significantly correlated with clinical outcomes following intervention. However, correlation was only demonstrated in isolated studies. Conclusion: This review demonstrates significant difficulties in drawing conclusions regarding the importance of SF biomarkers based on the available literature. Improved standardisation for collection and analysis of SF samples is required. Future publications should also focus on clinical outcome scores and seek to correlate biomarkers with progression to further understand the significance of identified markers in a	Results: OPN has been found to be associated with advanced knee joint damage in OA patients. In addition, higher expression of OPN is thought to be associated with disease progression. Nevertheless, further studies should examine the role of other markers of chronic bone damage, such as leptin and sclerostin. This systematic review and meta-analysis included 14 studies with a total of 776 cases and 530 controls. OPN was significantly elevated in osteoarthritis patients' plasma, serum, and synovial fluid samples, with significant heterogeneity between studies. Conclusion: We recommend that OPN plasma and synovial fluid levels be measured as a diagnostic and prognostic marker to determine the severity of OA symptoms.	Results: 952 studies were identified, 664 remaining after deduplication. Following first-round screening, 53 studies underwent second-round screening against pre-determined criteria. Eight studies, with 879 participants (49 % male), were included, measuring serum (n 1⁄4 7), synovial fluid (SF, n 1⁄4 6), or both (n 1⁄4 5). The pooled participant mean age was 29.1 (4). 51 biomarkers were studied (serum 1⁄4 38, SF 1⁄4 13), with no correlation between paired serum and SF samples. One serum biomarker, cartilage oligomeric matrix protein (COMP), and four SF bio- markers, interleukin (IL)-1β, IL-6, tumour necrosis factor (TNF), and COMP, were measured in multiple studies. Conclusion: Associations were described between 11 biomarkers related to catabolism (n 1⁄4 4), anabolism (n 1⁄4

	significance of identified markers in a clinical context.		catabolism (n 1/4 4), anabolism (n 1/4 2), inflammation (n 1/4 4) and non-coding RNA (n 1/4 1), with OA imaging changes (X-ray and MRI), pain, quality of life and function. Widespread differences in study design and methodology prevented meta-analysis, and evidence was generally weak. A unified approach is required before widespread research and clinical biomarker use.
Type of Study	Systematic review with or without meta-analysis (AMSTARII)	Systematic review with or without meta-analysis (AMSTARII)	Systematic review with or without meta-analysis (AMSTARII)
Assessment tool	AMSTAR	AMSTAR	AMSTAR
Overall Assessment	Critically low (Quality assessment)	Critically low (Quality assessment)	Critically low (Quality assessment)
What is the lowest evidence study included in the SR?	Prospective comparative study, Level 2	Retrospective comparative study or case series, Level 3	Retrospective comparative study or case series, Level 3
Level of evidence (Oxford 2011)	Level 3, downgraded due to critically low AMSTAR	Level 4, downgraded due to critically low AMSTAR	Level 4, downgraded due to critically low AMSTAR

Konservative Therapie (Medikamentös)

14. Empfehlung	Neu 2024
Empfehlungsgrad **EK** ⇑	Sofern bei Gonarthrose eine pharmakologische Therapie erforderlich ist, schlagen wir vor, dass diese angewendet wird: • neben nicht-pharmakologischen Behandlungen und zur Unterstützung der Bewegungstherapie • in der niedrigsten wirksamen Dosis über den kürzest möglichen Zeitraum.
	Adoption einer konsensbasierten Empfehlung aus: NICE Guideline NG226 (Punkt 1.4.1) (1)
Konsensstärke	100% (starker Konsens)

Die Empfehlung basiert auf Konsens des Komitees der NICE Leitlinie. Die Diskussion und Entscheidung für die Empfehlung wird beschrieben im Evidence Review I hier (Punkt 1.1.12.5 auf Seite 230):

NG226 Osteoarthritis in over 16s: diagnosis and management: Evidence review I: 19/10/2022 (nice.org.uk)

Empfehlung der zugrundeliegenden Quellleitlinie:

Leitlinie (Erscheinungsjahr)	NICE NG226 (2022) (1)
Empfehlung:	1.4.1 If pharmacological treatments are needed to manage osteoarthritis, use them: • alongside non-pharmacological treatments and to support therapeutic exercise • at the lowest effective dose for the shortest possible time.
Empfehlungsgrad:	„strong“
Evidenzgrad:	Kein Gesamtevidenzgrad angegeben. Konsensbasierte Empfehlung.
Referenzen:	Siehe Evidence Review I Tabelle 2 ab Seite 10: NG226 Osteoarthritis in over 16s: diagnosis and management: Evidence review I: 19/10/2022 (nice.org.uk)

1. (NICE), National Institute for Health and Care Excellence. Osteoarthritis in over 16s: diagnosis and management (NICE Guideline NG226). London: National Institute for Health and Care Excellence; 2022 Oct 19.https://www.nice.org.uk/guidance/ng226 [Date Accessed: 02.07.2024].

15. Empfehlung	Modifiziert 2024
Empfehlungsgrad ⇑⇑	Wir empfehlen, dass Patient*innen mit einer Gonarthrose ein topisch zu applizierendes nicht-steroidales entzündungshemmendes Medikament (NSAR) angeboten wird.
	Praktischer Hinweis: Aufgrund der Ökotoxizität von Diclofenac sollten gemäß der Arzneimittelkommission der Apotheker nach topischer Anwendung die Hände vor dem Waschen zuerst sorgfältig mit einem Tuch (Entsorgung im Restmüll) abgewischt werden (1)
Level of Evidence (GRADE) Auszugsweise <u>NSAR versus Placebo:</u> 1) Analgetische Wirkung: ⊕ und ⊕⊕⊕ 2) Funktion: ⊕⊕ und ⊕⊕⊕ <u>NSAR topisch versus oral:</u> 3) Quality of Life: Physical component: ⊕ und ⊕⊕⊕ 4) Analgetische Wirkung: ⊕⊕ und ⊕⊕⊕ 5) Funktion: ⊕⊕	Adoption einer evidenzbasierten Empfehlung aus NICE Guideline NG226 (Punkt 1.4.2) (2)
Konsensstärke	100 % (starker Konsens)

16. Empfehlung	Modifiziert 2024
Empfehlungsgrad ⇑	Sofern topische NSAR unwirksam oder ungeeignet sind, schlagen wir vor, ein orales NSAR bei Gonarthrose zu verwenden, wobei Folgendes zu beachten ist: • Mögliche gastrointestinale, hepato-renale, und kardiovaskuläre Toxizität • Alle Risikofaktoren die bei der betreffenden Person vorliegen können, einschließlich Alter, Schwangerschaft, aktuelle Medikamente und Begleiterkrankungen.
Level of Evidence (GRADE) Auszugsweise 1) Analgetische Wirkung: < 3 Monaten: ⊕ 2) Analgetische Wirkung: > 3 Monaten: ⊕⊕⊕⊕ 3) Funktion: ⊕⊕ 4) Quality of Life: ⊕	Adoption einer evidenzbasierten Empfehlung aus: NICE Guideline NG226 (Punkt 1.4.4) (2)
Konsensstärke	100 % (starker Konsens)

17. Empfehlung	Modifiziert 2024
Empfehlungsgrad ⇑⇑	Wir empfehlen eine gastroprotektive Behandlung mit einem Protonenpumpenhemmer bei Patient*innen mit einer Gonarthrose, während sie ein NSAR einnehmen, …
EK	…sofern ein erhöhtes Risiko für das Auftreten eines gastroduodenalen Ulkus und/oder einer Ulkuskomplikation vorliegt*****.
Level of Evidence (GRADE) Auszugsweise Analgetische Wirkung: ⊕ und ⊕⊕	Adaptation einer evidenzbasierten Empfehlung aus: NICE Guideline NG226 (Punkt 1.4.4) (2) *****Orientiert an aktualisierter S2k-Leitlinie Helicobacter pylori und gastroduodenale Ulkuskrankheit der Deutschen Gesellschaft für Gastroenterologie, Verdauungs- und Stoffwechselkrankheiten (DGVS), AWMF Registernr. 021-001, 07/2022 (3)
Konsensstärke	95,2 % (starker Konsens)

Schlüsselfrage und PICO Format sind dem Evidence Review I der Quellleitlinie zu entnehmen hier:

NG226 Osteoarthritis in over 16s: diagnosis and management: Evidence review I: 19/10/2022 (nice.org.uk) (ab Seite 5)

Suchhistorie und Recherche Flowchart sind den Appendices A-D des Evidence Review I zu entnehmen hier:

NG226 Osteoarthritis in over 16s: diagnosis and management: Evidence review I: appendices A to D 19/10/2022 (nice.org.uk) (ab Seite 35)

Evidenztabellen nach GRADE sind den Appendices E bis J des Evidence Review I der Quellleitlinie zu entnehmen hier:

NG226 Osteoarthritis in over 16s: diagnosis and management: Evidence review I: appendices E to J 19/10/2022 (nice.org.uk) (ab Seite 99)

Leitlinie (Erscheinungsjahr)	NICE NG226 (2022) (2)
Empfehlung:	1.4.2 Offer a topical non-steroidal anti-inflammatory drug (NSAID) to people with knee osteoarthritis. 1.4.4 If topical medicines are ineffective or unsuitable, consider an oral NSAID for people with osteoarthritis and take account of: • potential gastrointestinal, renal, liver and cardiovascular toxicity • any risk factors the person may have, including age, pregnancy, current medication and comorbidities. Offer a gastroprotective treatment (such as a proton pump inhibitor) for people with osteoarthritis while they are taking an NSAID.
Empfehlungsgrad:	1.4.2 „strong“ 1.4.4 „weak“ (erster Absatz) / „strong“ (letzter Absatz)
Evidenzgrad:	Kein Gesamtevidenzgrad angegeben. GRADE Profile siehe Appendices E bis J des Evidence Review I ab Seite 99
Referenzen:	Siehe Evidence Review I Tabelle 2 ab Seite 10 NG226 Osteoarthritis in over 16s: diagnosis and management: Evidence review I: 19/10/2022 (nice.org.uk)

1. Bundesvereinigung Deutscher Apothekerverbände e. V. (ABDA), Arzneimittelkommission der Apotheker. Information der Institutionen und Behörden: AMK: Ökotoxizität von Diclofenac - Hinweise zum verantwortungsvollen Umgang 13.01.2022. Available from: https://www.abda.de/fuer-apotheker/arzneimittelkommission/amk-nachrichten/detail/02-22-information-der-institutionen-und-behoerden-amk-oekotoxizitaet-von-diclofenac-hinweise-zum-verantwortungsbewussten-umgang/.[Date Accessed 02.07.2024]

2. (NICE), National Institute for Health and Care Excellence. Osteoarthritis in over 16s: diagnosis and management (NICE Guideline NG226). London: National Institute for Health and Care Excellence; 2022 Oct 19.https://www.nice.org.uk/guidance/ng226 [Date Accessed: 02.07.2024].

3. Fischbach W, Bornschein J, Hoffmann JC Aktualisierte S2k-Leitlinie Helicobacter pylori und gastroduodenale Ulkuskrankheit (AWMF-Registernummer: 021–001). 20230505 ed: Deutschen Gesellschaft für Gastroenterologie, Verdauungs- und Stoffwechselkrankheiten (DGVS); 2023 May. 544-606 p.https://register.awmf.org/assets/guidelines/021-001l_S2k_Helicobacter-pylori-gastroduodenale-Ulkuskrankheit_2023-06.pdf [Date Accessed: 02.07.2024].

18. Empfehlung	Modifiziert 2024
Empfehlungsgrad ⇓⇓	Wir empfehlen, dass Patient*innen mit Gonarthrose nicht routinemäßig mit Paracetamol behandelt werden, es sei denn • es wird nur selten zur kurzfristigen Schmerzlinderung eingesetzt und • alle anderen pharmakologischen Behandlungen sind kontraindiziert, werden nicht vertragen oder sind unwirksam.
Level of Evidence (GRADE) Auszugsweise Lebensqualität: ⊕⊕ Schmerz: ⊕⊕ Funktion: ⊕ und ⊕⊕ Hepato-renale Nebenwirkungen: ⊕⊕⊕	Adoption einer evidenzbasierten Empfehlung aus NICE Guideline NG226 (Punkt 1.4.5) (1)
Konsensstärke	100 % (starker Konsens)

Schlüsselfrage und PICO Format sind dem Evidence Review I der Quellleitlinie zu entnehmen hier:

NG226 Osteoarthritis in over 16s: diagnosis and management: Evidence review I: 19/10/2022 (nice.org.uk) (ab Seite 5)

Suchhistorie und Recherche Flowchart sind den Appendices A-D des Evidence Review I zu entnehmen hier:

NG226 Osteoarthritis in over 16s: diagnosis and management: Evidence review I: appendices A to D 19/10/2022 (nice.org.uk) (ab Seite 35)

Evidenztabellen nach GRADE sind dem Appendix E-J des Evidence Review I der Quellleitlinie zu entnehmen hier:

NG226 Osteoarthritis in over 16s: diagnosis and management: Evidence review I: appendices E to J 19/10/2022 (nice.org.uk) (ab Seite 99)

Empfehlung der zugrundeliegenden Quellleitlinie:

Leitlinie (Erscheinungsjahr)	NICE NG226 (2022) (1)

Empfehlung:	1.4.5 „Do not routinely offer paracetamol or weak opioids unless: they are only used infrequently for short-term pain relief and all other pharmacological treatments are contraindicated, not tolerated or ineffective“
Empfehlungsgrad:	„strong“
Evidenzgrad:	Kein Gesamtevidenzgrad angegeben. GRADE Profile siehe Appendices E bis J des Evidence Review I ab Seite 99
Referenzen:	Siehe Evidence Review I Tabelle 2 ab Seite 10 NG226 Osteoarthritis in over 16s: diagnosis and management: Evidence review I: 19/10/2022 (nice.org.uk)

1. (NICE), National Institute for Health and Care Excellence. Osteoarthritis in over 16s: diagnosis and management (NICE Guideline NG226). London: National Institute for Health and Care Excellence; 2022 Oct 19.https://www.nice.org.uk/guidance/ng226 [Date Accessed: 02.07.2024].

19. Empfehlung	Neu 2024
Empfehlungsgrad **EK ⇑**	Wir schlagen vor, bei Patient*innen mit Gonarthrose, Metamizol nur bei starken Schmerzen anzuwenden wenn andere analgetische Maßnahmen nicht geeignet, kontraindiziert oder nicht wirksam sind.
EK ⇑⇑	Es wird empfohlen bei der Verordnung dieses Medikamentes den Grund für die Indikation und die Aufklärung der Patient*innen über potentielle Nebenwirkungen und die Sicherungsaufklärung (was soll der/die Patient/in machen, wenn unerwartete Infektzeichen auftreten) zu dokumentieren.
Konsensstärke	93 % (Konsens)

1. Schlüsselfrage und PICO Format	
Clinical key question	Should metamizole (dipyrone) be used in patients with knee OA who have no contraindications to NSAIDs? (comparator is NSAIDs)
Population	Adults with isolated medial or lateral: • symptomatic knee OA (clinically confirmed), and • K/L stage 2/3/4 (radiographically confirmed) Patients must not have contraindications to NSAIDs.
Intervention	Metamizole (dipyrone)
Comparison	N/A
Outcome	• Progression of OA (within same/other compartments) • Adverse events requiring readmission, reoperation, or arthroplasty • Clinical and functional scores (validated PROMS): o Pain o Physical function o Health related quality of life o Satisfaction

2. Recherche Zusammenfassung

Identifier	*114b*
PICO(T) question	Should metamizole (dipyrone) be used in patients with knee OA who have no contraindications to NSAIDs? (comparator is NSAIDs)
Search characteristics	
Date of search	4/8/23
Initials of primary reader	BG
Database(s)	*PubMed*
Keywords	*Knee* *osteoarthritis; arthritis; osteoarthros*; gonitis; gonarthritis; gonarthros** metamizole, dipyrone
Search strings	*#1 Animals[Title] OR Cadaver[Title] OR animal*[Title] OR dog[Title] OR dogs[Title] OR canine[Title] OR cats[Title] OR feline[Title] OR horse*[Title] OR equine[Title] OR mouse[Title] OR mice[Title] OR rat[Title] OR rats[Title] OR rabbit*[Title] OR sheep[Title] OR porcine[Title] OR pig[Title] OR pigs[Title] OR rodent*[Title] OR monkey*[Title] OR cadaver*[Title/Abstract] OR "in vitro"[Title/Abstract] OR comment[Publication Type] OR editorial[Publication Type] OR letter[Publication Type] OR "historical article"[Publication Type] OR address[Publication Type] OR news[Publication Type] OR "newspaper article" [Publication Type] OR "case reports"[Publication Type] OR case report*[Title] OR abstracts[Title] OR editorial[Title] OR reply[Title] OR comment*[Title] OR commentary[Title] OR letter[Title] OR biomechanic*[Title]* *#2 "randomized-controlled-trial" OR "Randomized-Controlled-Trials" OR "random-allocation" OR random*[Title] OR RCT* *#3 (systematic* AND review*) OR meta-analys*[Title/Abstract] OR meta-analysis OR systematic-review* *#4 (Knee)* *#5 (Osteoarthritis OR arthritis OR osteoarthros* OR gonitis OR gonarthritis OR gonarthros*)*

	#6 (metamizole OR dipyrone) #7 (#4 AND #5 AND #6) NOT #1 #8 (#7 AND #2) #9 (#7 AND #3)
Number of hits	
RCTs (#8)	0
SR(+MA) (#9)	0
Studies published before 2003	
Articles to consider	
DOIs MAs	
DOIs SRs	
DOIs RCTs	
Include/Excluded after FT screening	

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PubMed Advanced Search Builder

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All Fields

Enter a search term

ADD Show Index

Query box

Enter / edit your search query here

Add to History

History and Search Details

Search	Actions	Details	Query	Results	Time
#9	•••		Search: **(#7 AND #3)** Sort by: **Most Recent**	0	04:59:31
#8	•••		Search: **(#7 AND #2)** Sort by: **Most Recent**	0	04:59:24
#7	•••		Search: **(#4 AND #5 AND #6) NOT #1** Sort by: **Most Recent**	2	04:59:12
#6	•••		Search: **(metamizole OR dipyrone)** Sort by: **Most Recent**	2,536	04:58:59
#5	•••		Search: **(Osteoarthritis OR arthritis OR osteoarthros* OR gonitis OR gonarthritis OR gonarthros*)** Sort by: **Most Recent**	421,674	03:38:20
#4	•••		Search: **(Knee)** Sort by: **Most Recent**	209,042	03:38:14
#3	•••		Search: **(systematic* AND review*) OR meta-analys* [Title/Abstract] OR meta-analysis OR systematic-review** Sort by: **Most Recent**	544,774	03:38:08
#2	•••		Search: **"randomized-controlled-trial" OR "Randomized-Controlled-Trials" OR "random-allocation" OR random*[Title] OR RCT** Sort by: **Most Recent**	1,003,090	03:37:58
#1	•••		Search: **Animals[Title] OR Cadaver[Title] OR animal*[Title] OR dog[Title] OR dogs[Title] OR canine[Title] OR cats[Title] OR feline[Title] OR horse*[Title] OR equine[Title] OR mouse[Title] OR mice[Title] OR rat[Title] OR rats[Title] OR rabbit*[Title] OR sheep[Title] OR porcine[Title] OR pig[Title] OR pigs[Title] OR rodent*[Title] OR monkey*[Title] OR cadaver*[Title/Abstract] OR "in vitro"[Title/Abstract] OR comment[Publication Type] OR editorial[Publication Type] OR letter[Publication Type] OR "historical article"[Publication Type] OR address[Publication Type] OR news[Publication Type] OR "newspaper article"**	8,533,280	03:37:49

[Publication Type] OR "case reports"[Publication Type] OR case report*[Title] OR abstracts[Title] OR editorial[Title] OR reply[Title] OR comment*[Title] OR commentary[Title] OR letter[Title] OR biomechanic*[Title] Sort by: **Most Recent**

Showing 1 to 9 of 9 entries

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4. Studienselektion: Flowchart

PubMed Search: Should metamizole (dipyrone) be used in patients with knee OA who have no contraindications to NSAIDs? (comparator is NSAIDs). (04/08/2023)

0 records identified through database searching

20. Empfehlung	Modifiziert 2024
Empfehlungsgrad ⇓⇓	Wir empfehlen nicht die routinemäßige Therapie von Patient*innen mit einer Gonarthrose mit schwach wirksamen Opioiden, es sei denn: • sie werden nur gelegentlich zur kurzfristigen Schmerzlinderung eingesetzt und • alle anderen pharmakologischen Behandlungen sind kontraindiziert, werden nicht vertragen oder sind unwirksam.
Level of Evidence (GRADE) Auszugsweise Analgetische Wirkung: ⊕ Funktion: ⊕	Adoption einer evidenzbasierten Empfehlung aus NICE Guideline NG226 (Punkt 1.4.5) (1)
Konsensstärke	100 % (starker Konsens)

21. Empfehlung	Modifiziert 2024
Empfehlungsgrad ⇓⇓	Wir empfehlen nicht die Behandlung von Gonarthrosepatient*innen mit stark wirksamen Opioiden.
Level of Evidence (GRADE) Auszugsweise Analgetische Wirkung: ⊕ Funktion: ⊕ und ⊕⊕ Zentralnervöse NW: ⊕⊕	Adoption einer evidenzbasierten Empfehlung aus NICE Guideline NG226 (Punkt 1.4.6) (1)
Konsensstärke	100 % (starker Konsens)

Schlüsselfrage und PICO Format sind dem Evidence Review I der Quellleitlinie zu entnehmen hier:

NG226 Osteoarthritis in over 16s: diagnosis and management: Evidence review I: 19/10/2022 (nice.org.uk) (ab Seite 5)

Suchhistorie und Recherche Flowchart sind den Appendices A-D des Evidence Review I zu entnehmen hier:

NG226 Osteoarthritis in over 16s: diagnosis and management: Evidence review I: appendices A to D 19/10/2022 (nice.org.uk) (ab Seite 35)

Evidenztabellen nach GRADE sind den Appendices E bis J des Evidence Review I der Quellleitlinie zu entnehmen hier:

NG226 Osteoarthritis in over 16s: diagnosis and management: Evidence review I: appendices E to J 19/10/2022 (nice.org.uk) (ab Seite 99)

Leitlinie (Erscheinungsjahr)	NICE NG226 (2022) (1)
Empfehlung:	1.4.5 „Do not routinely offer paracetamol or weak opioids unless: • they are only used infrequently for short-term pain relief **and** • all other pharmacological treatments are contraindicated, not tolerated or ineffective. Explain to people with osteoarthritis that there is no strong evidence of benefit for paracetamol. For more information about opioids, see NICE's guideline on medicines associated with dependence or withdrawal symptoms.“ 1.4.6 „Do not offer glucosamine or strong opioids to people to manage osteoarthritis.“
Empfehlungsgrad:	1.4.5 „strong“ 1.4.6 „strong“
Evidenzgrad:	Kein Gesamtevidenzgrad angegeben. GRADE Profile siehe Appendices E bis J des Evidence Review I ab Seite 99.

Referenzen:	Siehe Evidence Review I Tabelle 2 ab Seite 10 NG226 Osteoarthritis in over 16s: diagnosis and management: Evidence review I: 19/10/2022 (nice.org.uk)

1. (NICE), National Institute for Health and Care Excellence. Osteoarthritis in over 16s: diagnosis and management (NICE Guideline NG226). London: National Institute for Health and Care Excellence; 2022 Oct 19.https://www.nice.org.uk/guidance/ng226 [Date Accessed: 02.07.2024].

22. Empfehlung	Modifiziert 2024
Empfehlungsgrad ⇓⇓	Wir empfehlen nicht die Behandlung von Gonarthrosepatient*innen mit Glucosamin. Wenn eine/ein Gonarthrosepatientin/patient nach Glucosamin fragt, erklären Sie, dass es keine eindeutigen Beweise für den Nutzen von Glucosamin gibt.
Level of Evidence (GRADE) Auszugsweise <u>Glucosamin vs Placebo:</u> 1) Analgetische Wirkung: < 3 Monaten: ⊕ > 3 Monate: ⊕⊕⊕ 2) Funktion: < 3 Monate: ⊕⊕ > 3 Monate: ⊕⊕ und ⊕⊕⊕	Adoption einer evidenzbasierten Empfehlung aus NICE Guideline NG226 (Punkt 1.4.6, 1.4.7) (1)
Konsensstärke	100% (starker Konsens)

Schlüsselfrage und PICO Format sind dem Evidence Review I der Quellleitlinie zu entnehmen hier:

NG226 Osteoarthritis in over 16s: diagnosis and management: Evidence review I: 19/10/2022 (nice.org.uk) (ab Seite 5)

Suchhistorie und Recherche Flowchart sind den Appendices A-D des Evidence Review I zu entnehmen hier:

NG226 Osteoarthritis in over 16s: diagnosis and management: Evidence review I: appendices A to D 19/10/2022 (nice.org.uk) (ab Seite 35)

Evidenztabellen nach GRADE sind den Appendices E bis J des Evidence Review I der Quellleitlinie zu entnehmen hier:

NG226 Osteoarthritis in over 16s: diagnosis and management: Evidence review I: appendices E to J 19/10/2022 (nice.org.uk) (ab Seite 99)

Leitlinie (Erscheinungsjahr)	NICE NG226 (2022) (1)
Empfehlung:	1.4.6 „Do not offer glucosamine or strong opioids to people to manage osteoarthritis.“ 1.4.7 „If the person with osteoarthritis asks about glucosamine or strong opioids, explain that: • there is no strong evidence of benefit for glucosamine • the risks of strong opioids outweigh the benefits.“
Empfehlungsgrad:	1.4.6 „strong“ 1.4.7 „strong“
Evidenzgrad:	Kein Gesamtevidenzgrad angegeben. GRADE Profile siehe Appendices E bis J des Evidence Review I ab Seite 99
Referenzen:	Siehe Evidence Review I Tabelle 2 ab Seite 10 NG226 Osteoarthritis in over 16s: diagnosis and management: Evidence review I: 19/10/2022 (nice.org.uk)

1. (NICE), National Institute for Health and Care Excellence. Osteoarthritis in over 16s: diagnosis and management (NICE Guideline NG226). London: National Institute for Health and Care Excellence; 2022 Oct 19.https://www.nice.org.uk/guidance/ng226 [Date Accessed: 02.07.2024].

24. Empfehlung	Modifiziert 2024
Empfehlungsgrad ⇑	a) Wir schlagen, für eine kurzzeitige Therapie schmerzhafter Gonarthrosen, intraartikuläre Kortikosteroide vor: • wenn andere pharmakologische Therapieformen unwirksam oder ungeeignet sind **oder** • wenn dadurch physikalische Therapieformen unterstützt werden.
⇑⇑	b) Wir empfehlen Patient*innen darüber zu informieren, dass es sich um einen kurzzeitigen Therapieeffekt handelt (2-10 Wochen).
Level of Evidence (GRADE) Auszugsweise: Lebensqualität: ⊕⊕⊕ Funktion: ⊕ Schmerz: ⊕ Nebenwirkungen: ⊕⊕	Adoption einer evidenzbasierten Empfehlung aus NICE Guideline NG226 (Punkt 1.4.10) (1)
Konsensstärke	Online: 100 % (starker Konsens)

Schlüsselfrage und PICO Format sind dem Evidence Review J der Quellleitlinie zu entnehmen hier:

https://www.nice.org.uk/guidance/ng226/evidence/j-clinical-and-costeffectiveness-of-intraarticular-injections-for-the-management-of-osteoarthritis-pdf-405016302423 (ab Seite 7)

Suchhistorie und Recherche Flowchart sind den Appendices B-C des Evidence Review J zu entnehmen hier:

https://www.nice.org.uk/guidance/ng226/evidence/j-clinical-and-costeffectiveness-of-intraarticular-injections-for-the-management-of-osteoarthritis-pdf-405016302423 (ab Seite 173)

Evidenztabellen nach GRADE sind der Appendix F2 des Evidence Review J der Quellleitlinie zu entnehmen hier:

https://www.nice.org.uk/guidance/ng226/evidence/j-clinical-and-costeffectiveness-of-intraarticular-injections-for-the-management-of-osteoarthritis-pdf-405016302423
(Tabelle 62 ab Seite 473)

Leitlinie (Erscheinungsjahr)	NICE NG226 (2022) (1)
Empfehlung:	1.4.10 „Consider intra-articular corticosteroid injections when other pharmacological treatments are ineffective or unsuitable, or to support therapeutic exercise. Explain to the person that these only provide short-term relief (2 to 10 weeks)“
Empfehlungsgrad:	„weak“ (erster Absatz) „strong“ (zweiter Absatz)
Evidenzgrad:	Kein Gesamtevidenzgrad angegeben. GRADE Profile siehe Appendix F.2 des Evidence Review J (Tabelle 62) ab Seite 473
Referenzen:	Siehe Evidence Review J Tabelle 3 ab Seite 16 https://www.nice.org.uk/guidance/ng226/evidence/j-clinical-and-costeffectiveness-of-intraarticular-injections-for-the-management-of-osteoarthritis-pdf-405016302423

1. (NICE), National Institute for Health and Care Excellence. Osteoarthritis in over 16s: diagnosis and management (NICE Guideline NG226). London: National Institute for Health and Care Excellence; 2022 Oct 19.https://www.nice.org.uk/guidance/ng226 [Date Accessed: 02.07.2024].

26. Statement	Neu 2024
Es kann aufgrund der widersprüchlichen Evidenz keine Empfehlung zum Einsatz von intraartikulärer Hyaluronsäure-Injektion abgegeben werden.	
Orientiert an aufbereiteter Evidenz aus: NICE Guideline NG226 (Punkt 1.4.9) (1)	
Konsensstärke	81% (Konsens)

Schlüsselfrage und PICO Format sind dem Evidence Review J der Quellleitlinie zu entnehmen hier:

https://www.nice.org.uk/guidance/ng226/evidence/j-clinical-and-costeffectiveness-of-intraarticular-injections-for-the-management-of-osteoarthritis-pdf-405016302423 (ab Seite 7)

Suchhistorie und Recherche Flowchart sind den Appendices B-C des Evidence Review J zu entnehmen hier:

https://www.nice.org.uk/guidance/ng226/evidence/j-clinical-and-costeffectiveness-of-intraarticular-injections-for-the-management-of-osteoarthritis-pdf-405016302423 (ab Seite 173)

Evidenztabellen nach GRADE sind der Appendix F2 des Evidence Review J der Quellleitlinie zu entnehmen hier:

https://www.nice.org.uk/guidance/ng226/evidence/j-clinical-and-costeffectiveness-of-intraarticular-injections-for-the-management-of-osteoarthritis-pdf-405016302423 (Tabelle 61 ab Seite 469)

Leitlinie (Erscheinungsjahr)	NICE NG226 (2022) (1)
Empfehlung:	1.4.9 „Do not offer intra-articular hyaluronan injections to manage osteoarthritis.“
Empfehlungsgrad:	„strong“
Evidenzgrad:	Kein Gesamtevidenzgrad angegeben. GRADE Profile siehe Appendix F.2 des Evidence Review J (Tabelle 61) ab Seite 469
Referenzen:	Siehe Evidence Review J Tabelle 3 ab Seite 16 https://www.nice.org.uk/guidance/ng226/evidence/j-clinical-and-costeffectiveness-of-intraarticular-injections-for-the-management-of-osteoarthritis-pdf-405016302423

1. (NICE), National Institute for Health and Care Excellence. Osteoarthritis in over 16s: diagnosis and management (NICE Guideline NG226). London: National Institute for Health and Care Excellence; 2022 Oct 19.https://www.nice.org.uk/guidance/ng226 [Date Accessed: 02.07.2024].

27. Empfehlung	Neu 2024
Empfehlungsgrad ⇔	Plättchenreiches Plasma (PRP) kann bei Patient*innen mit symptomatischer Gonarthrose in Betracht gezogen werden, wenn andere analgetische und funktionsverbessernde Maßnahmen nicht geeignet, kontraindiziert oder nicht wirksam sind. Die methodische Qualität der klinischen Studien ist heterogen und eine Empfehlung für ein bestimmtes Herstellungsverfahren kann derzeit noch nicht abgegeben werden.
Level of Evidence (Oxford 2011) 2 2 4	 Costa et al. 2023 Xiong et al. 2023 Delanois et al. 2022
Konsensstärke	94 % (Konsens)

1. Schlüsselfrage und PICO Format	
Clinical key question	Should intra-articular PRP injection be considered in patients with knee OA?
Population	Adults with isolated medial or lateral: • symptomatic knee OA (clinically confirmed), and • K/L stage 2/3/4 (radiographically confirmed)
Intervention	PRP Injection
Comparison	NA
Outcome	• Progression of OA (within same/other compartments) • Adverse events requiring readmission, reoperation, or arthroplasty • Clinical and functional scores (validated PROMS): o Pain o Physical function o Health related quality of life o Satisfaction

2. Recherche Zusammenfassung

Identifier	*134*
PICO(T) question	Should intra-articular PRP injection be considered in patients with knee OA?
Search characteristics	
Date of search	5/9/23
Initials of primary reader	BG
Database(s)	*PubMed*
Keywords	*Knee* *osteoarthritis; arthritis; osteoarthros*; gonitis; gonarthritis; gonarthros** platelet-rich growth factors, platelet rich growth factors, platelet-rich fibrin, platelet rich fibrin, concentrates, Platelet-rich plasma, Platelet rich plasma
Search strings	*#1 Animals[Title] OR Cadaver[Title] OR animal*[Title] OR dog[Title] OR dogs[Title] OR canine[Title] OR cats[Title] OR feline[Title] OR horse*[Title] OR equine[Title] OR mouse[Title] OR mice[Title] OR rat[Title] OR rats[Title] OR rabbit*[Title] OR sheep[Title] OR porcine[Title] OR pig[Title] OR pigs[Title] OR rodent*[Title] OR monkey*[Title] OR cadaver*[Title/Abstract] OR "in vitro"[Title/Abstract] OR comment[Publication Type] OR editorial[Publication Type] OR letter[Publication Type] OR "historical article"[Publication Type] OR address[Publication Type] OR news[Publication Type] OR "newspaper article" [Publication Type] OR "case reports"[Publication Type] OR case report*[Title] OR abstracts[Title] OR editorial[Title] OR reply[Title] OR comment*[Title] OR commentary[Title] OR letter[Title] OR biomechanic*[Title]* *#2 "randomized-controlled-trial" OR "Randomized-Controlled-Trials" OR "random-allocation" OR random*[Title] OR RCT* *#3 (systematic* AND review*) OR meta-analys*[Title/Abstract] OR meta-analysis OR systematic-review* *#4 (Knee)*

	#5 (Osteoarthritis OR arthritis OR osteoarthros OR gonitis OR gonarthritis OR gonarthros*)* #6 platelet-rich growth factors OR "platelet rich growth factors" OR "platelet-rich fibrin" OR "platelet rich fibrin" OR "platelet concentrates" OR "Platelet-rich plasma " OR "Platelet rich plasma" #7 (#4 AND #5 AND #6) NOT #1 #8 (#7 AND #2) #9 (#7 AND #3) #10 (#7 AND #2) Filters: from 2020 – 2023 #11 (#7 AND #3) Filters: from 2020 - 2023
Number of hits	
RCTs (#10)	142
SR(+MA) (#11)	122
Studies published before 2003	0
Articles to consider	
DOIs MAs	1. 10.1016/j.knee.2021.08.008 2. 10.1186/s40634-021-00415-1 3. 10.1177/0363546520909397 4. 10.1016/j.arthro.2023.03.001 5. 10.3390/jcm11143985 6. 10.1155/2020/1907821 7. 10.1097/md.0000000000019388 8. 10.1177/03635465211062243 9. 10.1007/s10067-020-05185-2 10. 10.1016/j.joca.2022.07.011 11. 10.1177/1947603520931170 12. 10.1097/md.0000000000025168 13. 10.1016/j.arthro.2020.03.041 14. 10.1155/2021/2191926 15. 10.1186/s40001-020-00426-1 16. 10.3390/jpm13030429 17. 10.3390/ijms24076078 18. 10.1097/md.0000000000029655 19. 10.1186/s12891-021-04308-3 20. 10.1007/s00402-020-03551-y 21. 10.1097/md.0000000000028067

	22. 10.1177/2325967120973284 23. 10.3390/ph15080974 24. 10.1007/s00167-019-05763-1 25. 10.1016/j.ocarto.2022.100318 26. 10.5812/aapm-127121 27. 10.1177/0300060520964661 28. 10.1016/j.arth.2022.05.014 29. 10.1177/03635465211029659 30. 10.1016/j.ocarto.2022.100242 31. 10.1016/j.arthro.2020.07.011 32. 10.1186/s13018-020-01919-9 33. 10.3390/life10060094 34. 10.1007/s00402-021-04304-1 35. 10.5114/wiitm.2022.118777 36. 10.1016/j.jcot.2021.05.015 37. 10.1177/2309499019887660 38. 10.3389/fmed.2023.1204144 39. 10.1097/md.0000000000033339 40. 10.1186/s13018-022-03398-6 41. 10.1016/j.arthro.2021.02.045 42. 10.1186/s12891-020-03262-w 43. 10.2106/jbjs.20.02258 44. 10.1007/s00590-020-02623-4 45. 10.1007/s00402-022-04637-5 46. 10.1097/js9.0000000000000337
DOIs SRs	1. 10.3390/jpm13081227 2. 10.1016/j.arth.2022.05.031 3. 10.1097/ms9.0000000000000106 4. 10.1177/03635465211018837 5. 10.1016/j.arthro.2021.08.026 6. 10.1136/rmdopen-2021-001658 7. 10.2217/pmt-2020-0052 8. 10.52965/001c.25549
DOIs RCTs	1. 10.1177/2325967119900958 2. 10.1177/03635465211072554 3. 10.1055/s-0041-1724082 4. 10.1177/23259671221120678 5. 10.1016/j.injury.2022.11.036 6. 10.1016/j.injury.2022.01.012 7. 10.1001/jama.2021.19415 8. 10.1007/s00167-022-06887-7 9. 10.1186/s12891-021-04706-7 10. 10.3390/medicina57111193 11. 10.2217/rme-2020-0104 12. Elawamy A, Kamel EZ, Mahran SA, Abdellatif H, Hassanien M. Efficacy of Genicular Nerve Radiofrequency Ablation Versus Intra-Articular Platelet Rich Plasma in Chronic Knee

	Osteoarthritis: A Single-Blind Randomized Clinical Trial. Pain Physician. 2021;24(2):127-34. 13. 10.3233/bmr-181374 14. 10.1186/s13018-020-01753-z 15. 10.1016/j.rbo.2018.01.001 16. 10.1007/s10067-020-05121-4 17. 10.52628/88.4.10243 18. 10.1186/s12967-020-02530-6 19. 10.1302/0301-620x.104b6.Bjj-2021-1109.R2 20. 10.1016/j.knee.2023.03.002 21. 10.7759/cureus.31058 22. 10.1177/02692155221090407 23. 10.1177/0363546520986867 24. 10.18502/ijaai.v19i3.3452 25. 10.7759/cureus.29744 26. 10.1186/s12891-021-04017-x 27. 10.32725/jab.2020.012 28. 10.52628/87.4.18 29. 10.5704/moj.2207.004 30. 10.1038/s41598-020-80333-x 31. 10.1155/2022/9491439 32. 10.3390/biomedicines10050991 33. 10.1097/rli.0000000000000942 34. 10.1002/pmrj.12561 35. 10.3390/medicina58081028 36. 10.3389/fbioe.2022.1062371 37. 10.3390/jcm11113241 38. 10.1016/j.arthro.2020.10.013 39. 10.1007/s00402-021-04230-2 40. 10.1177/03635465221115821
Include/Excluded after FT screening	
SRs and MAs	
Excluded: does not specify knee OA	1. 10.1097/js9.0000000000000337
Excluded: not a systematic review	1. 10.52965/001c.25549
Included MAs	1. 10.1016/j.knee.2021.08.008 2. 10.1186/s40634-021-00415-1 3. 10.1177/0363546520909397 4. 10.1016/j.arthro.2023.03.001 5. 10.3390/jcm11143985 6. 10.1155/2020/1907821 7. 10.1097/md.0000000000019388 8. 10.1177/03635465211062243 9. 10.1007/s10067-020-05185-2 10. 10.1016/j.joca.2022.07.011

	11. 10.1177/1947603520931170 12. 10.1097/md.0000000000025168 13. 10.1016/j.arthro.2020.03.041 14. 10.1155/2021/2191926 15. 10.1186/s40001-020-00426-1 16. 10.3390/jpm13030429 17. 10.3390/ijms24076078 18. 10.1097/md.0000000000029655 19. 10.1186/s12891-021-04308-3 20. 10.1007/s00402-020-03551-y 21. 10.1097/md.0000000000028067 22. 10.1177/2325967120973284 23. 10.3390/ph15080974 24. 10.1007/s00167-019-05763-1 25. 10.1016/j.ocarto.2022.100318 26. 10.5812/aapm-127121 27. 10.1177/0300060520964661 28. 10.1016/j.arth.2022.05.014 29. 10.1177/03635465211029659 30. 10.1016/j.ocarto.2022.100242 31. 10.1016/j.arthro.2020.07.011 32. 10.1186/s13018-020-01919-9 33. 10.3390/life10060094 34. 10.1007/s00402-021-04304-1 35. 10.5114/wiitm.2022.118777 36. 10.1016/j.jcot.2021.05.015 37. 10.1177/2309499019887660 38. 10.3389/fmed.2023.1204144 39. 10.1097/md.0000000000033339 40. 10.1186/s13018-022-03398-6 41. 10.1016/j.arthro.2021.02.045 42. 10.1186/s12891-020-03262-w
Included SRs	1. 10.3390/jpm13081227 2. 10.1016/j.arth.2022.05.031 3. 10.1097/ms9.0000000000000106 4. 10.1177/03635465211018837 5. 10.1016/j.arthro.2021.08.026 6. 10.1136/rmdopen-2021-001658
Could not get full text	1. 10.2106/jbjs.20.02258 2. 10.2217/pmt-2020-0052 3. 10.1007/s00590-020-02623-4 4. 10.1007/s00402-022-04637-5

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#11	•••		Search: **(#7 AND #3)** Filters: **from 2020 - 2023**	122	03:49:49
#9	•••		Search: **(#7 AND #3)**	176	03:49:26
#8	•••		Search: **(#7 AND #2)**	230	03:49:12
#7	•••		Search: **(#4 AND #5 AND #6) NOT #1**	709	03:48:44
#6	•••		Search: **"platelet-rich growth factors" OR "platelet rich growth factors" OR "platelet-rich fibrin" OR "platelet rich fibrin" OR "platelet concentrates" OR "Platelet-rich plasma " OR "Platelet rich plasma"**	18,620	03:48:37
#5	•••		Search: **(Osteoarthritis OR arthritis OR osteoarthros* OR gonitis OR gonarthritis OR gonarthros*)** Sort by: **Most Recent**	423,352	03:46:41
#4	•••		Search: **(Knee)** Sort by: **Most Recent**	209,958	03:46:33
#3	•••		Search: **(systematic* AND review*) OR meta-analys* [Title/Abstract] OR meta-analysis OR systematic-review** Sort by: **Most Recent**	550,093	03:46:26
#2	•••		Search: **"randomized-controlled-trial" OR "Randomized-Controlled-Trials" OR "random-allocation" OR random*[Title] OR RCT** Sort by: **Most Recent**	1,007,223	03:46:19
#1	•••		Search: **Animals[Title] OR Cadaver[Title] OR animal*[Title] OR dog[Title] OR dogs[Title] OR canine[Title] OR cats[Title] OR feline[Title] OR horse*[Title] OR equine[Title] OR mouse[Title] OR mice[Title] OR rat[Title] OR rats[Title] OR rabbit*[Title] OR sheep[Title] OR porcine[Title] OR pig[Title] OR pigs[Title] OR rodent*[Title] OR monkey*[Title] OR cadaver*[Title/Abstract] OR "in vitro"[Title/Abstract] OR comment[Publication Type] OR editorial[Publication Type] OR letter[Publication Type] OR "historical article"[Publication Type] OR address[Publication Type] OR news[Publication Type] OR "newspaper article" [Publication Type] OR "case reports"[Publication Type] OR case**	8,557,116	03:46:11

Search	Actions	Details	Query	Results	Time
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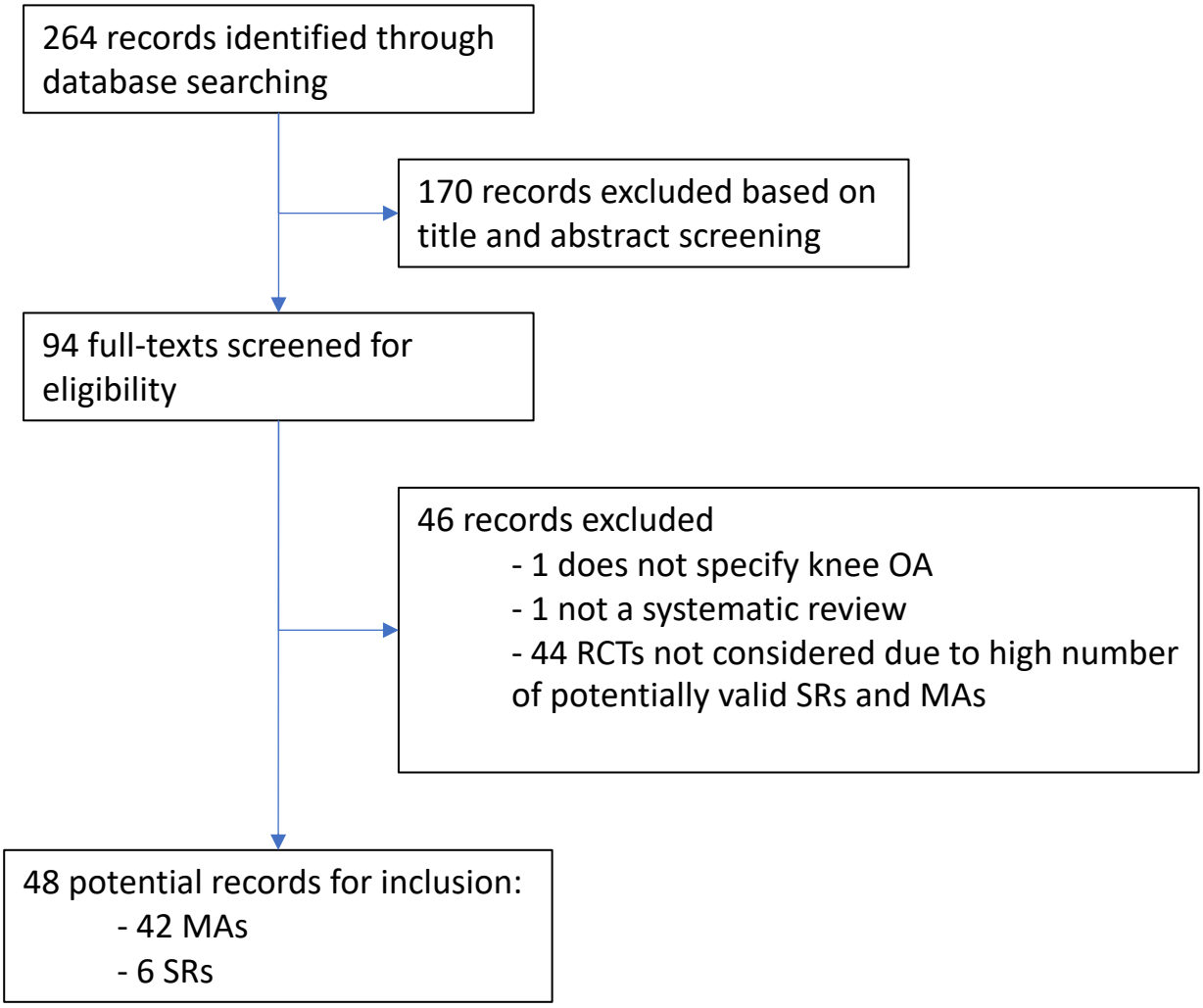
4. Studienselektion: Flowchart

PubMed Search: Should intra-articular PRP injection be considered in patients with knee OA? (05/09/2023)



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(1-48)

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5. Charakteristika der eingeschlossenen Studien

PICO number:	134	134	134
PICO Question:	Should intra-articular PRP injection be considered in patients with knee OA?	Should intra-articular PRP injection be considered in patients with knee OA?	Should intra-articular PRP injection be considered in patients with knee OA?
Article name:	Biologic Therapies for the Treatment of Knee Osteoarthritis: An Updated Systematic Review	Efficacy and safety of platelet-rich plasma injections for the treatment of osteoarthritis: a systematic review and meta-analysis of randomized controlled trials	How Does Platelet-Rich Plasma Compare Clinically to Other Therapies in the Treatment of Knee Osteoarthritis?
Lead author	Delanois	Xiong	Costa
Year published	2022	2023	2023
Number of included studies (if SR with or without MA)	51 on PRP	24	40
Description of intervention group (optional for SRs)	0	0	0
Description of control group (optional for SRs)	0	0	0
Number of patients in intervention group	4856 for both intervention and control groups	712	1444
Number of patients in control group	4856 for both intervention and control groups	683	1591
Mean age with range of intervention group	Not reported	32-71.4	49.8-66.5
Mean age with range of control group	0	35.1-73.6	46.6-70.2

Inclusion criteria (on patient-level if clinical study; on article-level if SR) **Examples:** **Clinical study: "The inclusion criteria were (i) primary ACLR in (ii) patients aged over 50 years. The exclusion criteria were (iii) severe concomitant ligament injury (grade 3), (iv) tibiofemoral osteoarthritis visible on weight-bearing anteroposterior and/or sagittal radiographs (> 50% joint space narrowing), and (v) history of intra- or extra-articular ligament surgery in either knee."** **SR: "Studies comparing the diagnostic accuracy of physical examination (clinical tests or ultrasound) versus arthroscopy for the assessment of LHBT pathologies"**	Inclusion criteria consisted of studies published between March 1, 2013 and November 10, 2021, full text availability, and in English (Figure 1). For PRP studies, exclusion criteria consisted of any cadaver studies, animal studies, conference abstracts, conference reviews, letters to the editor, surveys, case reports, case series, re-views, or otherwise levels of evidence III or lower. For BMSCs, ADSCs, and AMSCs, exclusion criteria consisted of similar criteria as above except for the inclusion of retrospective studies or otherwise levels of evidence I-III. A decision was made to include lower levels of evidence studies for the non-PRP biologic reports to account for the limited availability in these categories. Of note, studies from a previous review by Delanois et al [16] were assessed for inclusion.	The inclusion and exclusion criteria for literature screening were predetermined to allow for a more rigorous process. Inclusion criteria included (1) patients diagnosed with OA by clinical examination; (2) trial group received PRP injection treatment intervention; (3) control group received HA injection treatment or saline injection treatment; (4) outcome indicators of functional activity and analgesic effects were assessed by relevant scales, such as the Visual Analog Scale (VAS), Western Ontario and McMaster Universities Arthritis Index (WOMAC), Knee Injury and Osteoarthritis Outcome Score (KOOS), and International Knee documentation Committee (IKDC); (5) the experimental design was a RCT; (6) the language was restricted to English. The exclusion criteria were as follows: (1) animal experiments; (2) IA injection of other drugs, such as Procaine and Lidocaine, over the previous 1 year; (3) full-text content not available; and (4) missing or duplicate experimental data.	Inclusion and Exclusion Criteria We considered studies for this review based on the follow- ing inclusion criteria: (1) randomized controlled trials (RCTs) or quasi-RCTs (method of allocating participants to a treatment that is not strictly random; for instance, by date of birth or hospital record number) published in the English language; (2) patients diagnosed with knee OA using any recognized diagnostic criteria; (3) trials com- paring PRP intra-articular injection with any other type of treatment (oral or intra-articular placebo, intra-articular corticosteroid, intra-articular hyaluronic acid [HA], oral pharmacological agents, ozone therapy, and exercise); and (4) studies that used 1 or more outcomes of interest for this review.
Follow-up period	0	not reported	short to long-term follow-up (no numbers reported)

Main results	Preparations and Cellular Formulations An autologous venous blood draw can be prepared for PRP through differential centrifugation whereby centrifugal forces separate cellular components based on their speci!c gravities. In one method, autologous blood undergoes 2 centrifugations to ul-timately separate concentrated platelets. In a second method, the blood undergoes high speed centrifugation to collect the buffy coat layer. Among the studies included in this review, autologous venous blood was collected and delivered between 1 and 14 mL (mL) of PRP (Table 2). A total of 19 studies [19,20,22e25,32,34,37,42,45,46,50, 51,55,62,63,65,67] described the platelet count, while only 7 [19,23,45e47,50,56] detailed growth factor counts (platelet-derived growth factor and/or vascular endothelial growth factor) of the cellular content of the PRP preparations (Table 3). The majority utilized a lateral intra-articular approach for PRP delivery. The presence of leukocytes in the PRP preparation may not be desired given their proin"ammatory activity, and their potential bene!ts on proliferation, differentiation, immunity, and infection are not well-understood [98]. Eleven of the studies [18,20,28,34,42,49, 50,52,55,62,66]	3.4. Results of statistical analysis The VAS was used by investigators in 17 studies (26, 28–30, 32– 35, 40–42, 44–49) to assess pain intensity. In these studies, 966 subjects participated in PRP injection therapy trials, divided into experimental and control groups. The I2 value was 87%. Therefore, a random-effects model was used. Data analysis of the forest plot showed that the experimental group with PRP injection as an intervention had a significant improvement in VAS OA patients' pain scores compared to the control group (MD = −1.42, CI = 95% [−1.88, −0.96], I2 = 87%, P < 0.05; Figure 4). A subgroup analysis showed that the pain efficacy of PRP in patients with OA was synchronized in both the rest and movement states, and pain relief was consistent in both states (VAS-rest, MD = −0.92, CI = 95% [−1.58, −0.25], I2 = 89%, P < 0.05; VAS-movement, MD = −0.82, CI = 95% [−1.56, −0.08], test for subgroup differences, P>0.05, I2 = 0%; Figure 5). Additional subgroup analyses based on injection sites showed no statistical difference in efficacy between IA combined with intra-osseous (IO) simultaneous PRP injections and IA PRP injections in improving VAS scores in patients with OA (IA+IO PRP injections, MD= −0.74, CI = 95% [−1.29, −0.18], I2 = 61%, P < 0.05; IA	Overall Comparisons Pain. At short-term follow-up, PRP was only superior when compared with exercise (SMD, –1.96; 95% CI, –2.47 to 21.44; P < .00001). However, this analysis was based on only 2 studies.4,17 There was no study comparing PRP with oral pharmacological agents at short-term follow-up. At intermediate follow-up, PRP was more effective for pain relief when compared with HA (Figure 3) as well as all other therapies, with marked heterogeneity in all com-parisons (Table 2). A visual inspection of the funnel plot for the comparison with HA at intermediate follow-up appeared to be asymmetric, suggesting publication bias. Finally, at long-term follow-up, there was significant differ- ence that favored PRP when compared with HA (Figure 3), oral pharmacological agents (MD, 20.88; 95% CI, –1.16 to 20.60; P < .00001), and ozone therapy (SMD, –1.82; 95% CI, –2.39 to 21.25; P < .00001). However, only 1 study was included in each one of the last 2 comparisons.6,12 There was no study comparing PRP with saline at long- term follow-up. Function. At short-term follow-up, there was significant difference in favor of PRP, except when compared with cor- ticosteroid (SMD

	studies [18,20,28,34,42,45, 50,52,55,62,66] reported leukocyte-rich PRP, while 17 studies [22,23, 25,27,38,39,43,47,51,53,56,57,59e61,63,67] reported leukocyte-poor PRP. The remaining did not report speci!c leukocyte presence. Patient-Reported Outcome Measures A total of 24 of 51 studies compared PRP to hyaluronic acid (HA) (Table 4). Of these, 12 studies reported greater improvement in Western Ontario and McMaster Universities Arthritis Index (WOMAC) scores among PRP patients [23,25,38,42,43,50, 56,57,61,62,64,68]. Six studies reported WOMAC score equivalency between PRP and HA [24,27,40,44,46,63], and another reported inferior scores [29]. Eleven studies reported higher Visual Analog Scale (VAS) scores among PRP patients (range 0-10, higher scores correspond to increased pain) [18,24,25,27e29,34,42,56,57,64]. Six studies reported equivalency between PRP and HA regarding VAS scores [38,40,44,46,47,50], while 2 studies showed PRP combined with HA as being superior to PRP alone [63,67]. Another study evaluated the VAS subscores and found PRP to be superior to HA in VAS resting pain, while PRP was equivalent to HA in VAS movement pain	[illegible] PRP injections, MD= −1.43, CI = 95% [−2.18, −0.68], I2 = 87%, P < 0.05, test for subgroup differences, P > 0.05, I2 = 52.7%; Figure 6). A subgroup analysis based on leukocyte concentration showed that leukocyte-rich (LR) PRP injections were not considered effective for patients' pain symptoms. In contrast, leukocyte-poor (LP) PRP injections were effective in relieving pain (VAS, LR-PRP, MD = −0.81, CI = 95% [−1.65, −0.03], I2 = 83%, P = 0.06 > 0.05; LP-PRP, MD = −1.62, CI = 95% [−2.36, −0.88], I2 = 92%, P < 0.05; test for subgroup differences, P>0.05, I2 = 11.6%; Figure 7). The results of the forest plot data analysis based on PRP treatments of different joint sites indicate that PRP injection therapy was effective in reducing VAS pain scores in patients with ankle osteoarthritis (AOA), knee osteoarthritis (KOA) and temporomandibular joint osteoarthritis (TMJOA) compared to controls (AOA, MD = −1.15, CI = 95% [−1.74, −0.56], I2 = 40%, P < 0.05; KOA, MD = −1.03, CI = 95% [−1.16, −0.9], I2 = 87%, P < 0.05; TMJOA, MD = −1.35, CI = 95% [−1.74, −0.97], I2 = 92%, P < 0.05; Figure 8). However, there was no statistically significant difference between the experimental and control groups in VAS pain scores of hip osteoarthritis	which compared with cor- ticosteroid (SMD, –0.25; 95% CI, –1.19 to 0.69; P = .61). At intermediate follow-up, PRP was superior to all other ther- apies except exercise (SMD, –2.07; 95% CI, –4.37 to 0.24; P = .08). Considerable heterogeneity was seen in all analy- ses except PRP versus oral pharmacological agents. A visual inspection of the tunnel plot for the single compari- son with more than 10 studies (PRP vs HA at intermediate follow-up) suggested asymmetry (potential publication bias). At long-term follow-up, PRP was significantly more effective than the other therapies. However, except for the comparison with HA and corticosteroid, all other com- parisons were based on only 1 study each.6,12,30,39 Forest plot PRP versus HA are shown in Figure 4. Treatment Failure. There were no significant differen- ces between PRP and the other interventions in terms of treatment failures. In comparison with saline, Patel et al36 reported that 1 patient underwent total knee arthro- plasty (TKA) in the PRP 1 3 group. In comparison of PRP versus HA, 19 (1.87%) participants reported treatment fail- ure in the PRP group (15 underwent surgery or another treatment and 4 lacked improvement). In the HA group, there were

	[40]. Ten of 51 (20%) studies compared PRP to corticosteroid (CS) [26,33,35,38,39,48,49,52,65,99]. Of these, 4 studies reported higher WOMAC scores among PRP patients [35,38,48,65], while 1 study found WOMAC score equivalency between PRP and CS [99]. Four studies reported higher VAS scores among PRP patients [33,48,52,65]. Four studies reported VAS score equivalency be- tween PRP and CS [38,39,49,99]. Another examined the synergistic effects of CS with PRP, but found no meaningful WOMAC or VAS score differences [26]. Seven (14%) studies compared PRP to normal saline (NS) [32,37,43,45,51,54,66]. Of these, 6 reported superior WOMAC scores among PRP patients [32,37,43,45,51,66]. The 4 studies reporting VAS scores all demonstrated greater pain improvements among the PRP patients [32,37,45,51]. Six (12%) studies compared PRP to BMSC, exercise therapy, radiofrequency ablation/shockwave therapy, autologous condi- tioned serum/dextrose, or ozone [29,53,55,57,68,76]. In relation to BMSC, WOMAC scores were found to be equivocal or inferior to PRP [20,76]. Among the 2 studies evaluating exercise therapy, one re-	(HOA, MD = −0.27, CI = 95% [−0.8, 0.26], I2 = 56%, P > 0.05; Figure 8). The KOOS was used by investigators in five studies (27, 29, 33, 37, 38) to assess treatment effects. In these studies, 427 subjects participated in PRP injection treatment trials, divided into experimental and control groups. The I2 value was calculated to be 0%. Therefore, we used a fixed effects model in this study. Forest plots with KOOS as an outcome indicator showed that the experimental group had significantly improved pain scores, symptom scores, activities of daily living scale (ADL) scores, and Quality of Life scores (QOL) in patients with OA compared with the control group, but no significant improvement was observed in the sport scores (KOOS-pain, MD = 2.77, CI = 95% [0, 5.53], I2 = 0%, P < 0.05; KOOS-symptoms, MD = 3.73, CI = 95% [0.76, 6.71], I2 = 0%, P < 0.05; KOOS-ADL, MD = 3.61, CI = 95% [0.79, 6.43], I2 = 0%, P < 0.05; KOOS-QOL, MD = 4.66, CI = 95% [0.98, 8.35], I2 = 29%, P < 0.05; KOOS-sport, MD = 0.48, CI = 95% [−3.02, 3.98], I2 = 0%, P > 0.05; Figure 9). The WOMAC was used by investigators in 11 studies (26, 29, 31, 32, 34–36, 39, 41, 42, 49) to assess joint functional activity. In these studies, 574 subjects participated in PRP	31 (3.11%) treatment failures (22 underwent surgery or another treatment and 9 lacked improvement). In comparison with exercise and corticosteroid, treatment failure was reported in the only study for each compari- son,2,14 where 4 patients underwent TKA. There were no failures in other comparisons. Secondary Outcomes. At short-term follow-up by evalu- ating stiffness, results were only favorable to PRP when compared with placebo (MD, –0.25; 95% CI, –0.50 to 20.01; P = .04). At intermediate follow-up, PRP was more effective than all other therapies, except when compared with exercise. Finally, at long-term follow-up, there was a significant difference favorable to PRP when compared with HA (MD, –0.66; 95% CI, –0.81 to 20.51; P <.00001), oral pharmacological agents (MD, 20.82; 95% CI, –1.05 to 20.59; P < .00001), and ozone therapy (MD, –1.80; 95% CI, –2.21 to 21.39; P < .00001). Except for comparison with HA and placebo, all comparisons were based on only 1 study.6,12,39 In terms of sitffness, there was no study com- paring PRP with corticosteroid at long-term follow-up. Only 2 trials reported major adverse events (3 partici- pants with severe pain).15,16 There were no significant dif- ferences for any comparisons.

	studies evaluating exercise therapy, one re- ported higher WOMAC and VAS scores among PRP [55], and the other reported higher WOMAC scores among the exercise group [19]. One study reported higher VAS and Lequesne scores in PRP compared to radiofrequency ablation of the genicular nerve [30]. Conversely, another study reported higher VAS and Lequesne score among a shockwave therapy group [31]. PRP was found to be su- perior to dextrose, and ozone when assessing WOMAC and VAS scores [29,36,53,57]. In comparison to autologous conditioned serum, PRP was found to have inferior WOMAC and VAS scores [53]. Structural Changes Four (10%) studies reported radiographic outcomes after PRP use. As compared to HA, PRP demonstrated higher synovial vascularity and hypertrophy [18], but another study reported no differences in joint space width [23]. Relative to HA, PRP was re- ported to have an insigni!cantly higher patellofemoral cartilage volume [50]. A study comparing PRP to exercise therapy found superior radiographic outcomes among PRP users, including patellofemoral cartilage volume, synovitis percentage, subarticular bone marrow abnormality, and medial/lateral	studies, 374 subjects participated in PRP injection treatment trials, divided into experimental and control groups. The I2 value was 95%. Therefore, a random-effects model was used. The forest plots with WOMAC as an outcome indicator showed that WOMAC scores of patients with OA improved in the experimental group but not the control group (MD = −1.64, CI = 95% [−2.65, −0.64], I2 = 95%, P < 0.05; Figure 10). In the experimental group, patients showed significant improvements in joint pain, joint stiffness, and functional activity (WOMAC-pain, MD = −1.08, CI = 95% [−1.62, −0.53], I2 = 87%, P < 0.05; WOMAC-stiffness, MD = −1.17, CI = 88% [−1.72, −0.63], I2 = 87%, P < 0.05; WOMAC-function, MD = −1.12, CI = 95% [−1.65, −0.58], I2 = 87%, P < 0.05; Figure 11). The IKDC was used by investigators in two studies (31, 43) to assess the functional activity of the joints. In these studies, 137 subjects participated in PRP injection treatment trials and were divided into experimental and control groups. The I2 value was 93%. Therefore, a random-effects model was used. The results of the forest plot data analysis with IKDC as an outcome indicator showed that the experimental group receiving PRP demonstrated improved	comparisons. In terms of QoL, results were favorable to PRP only when compared with HA at long-term follow-up (SMD, 0.33; 95% CI, 0.11-0.55; P = .004) and exercise at intermediate follow-up (MD, 2.11; 95% CI, 0.40-3.83; P = .02). PRP was not more effective than placebo and corticosteroid at both short-term and intermediate follow-ups. We were not able to extract data on QoL, or there were no studies comparing PRP versus oral pharmacological agents or ozone therapy. Sensitivity and Subgroup Analysis In the comparison of PRP versus HA, by removing studies with potential selection bias, results were no longer favorable to PRP on both intermediate (SMD, –0.37; 95% CI, –0.90 to 0.17; P = .18) and long-term (SMD, –0.73; 95% CI, –1.82 to 0.37; P = .20) follow-ups in terms of pain. When evaluating outcome function, removal of these same studies affected results on short-term follow-up, which were no longer signif- icant (SMD, –0.00; 95% CI, –0.44 to 0.43; P = .99). By remov- ing studies with potential performance bias that evaluated pain and function, the differences between groups at all time points for both outcomes were no longer present. Among 7 studies comparing PRP versus

	meniscal disintegrity [55]. Platelet-Rich Plasma Summary Statement Numerous studies assessed PRP in relation to NS, HA, CS, and other comparative groups. A substantial number were considered to have the following: (1) “poor” to “fair” methodology (as measured by the MCMS); (2) highly variable cell preparation, technique, and formulations; (3) inconsistent pain, function, and stiffness scores; as well as (4) inconsistent structural outcomes as measured by ultrasound, radiograph, or magnetic resonance im- aging (MRI) evaluations. Overall, the literature assessing PRP use for knee OA remains inconclusive.	OA patient IKDC scores when compared to the control group (MD = 17.4, CI = 95% [3.26, 31.54], I2 = 93%, P < 0.05; Figure 12). 3.5. Adverse event reporting results Of the 24 studies included, 11 reported adverse reactions after PRP injections in patients with OA; however, most symptoms were mild and transient, such as pain and swelling at the injection site. Of these 11 studies, 2 showed more adverse reactions in the PRP injection group, with patients presenting with syncope, dizziness, headache, nausea, gastritis, sweating, and tachycardia, in addition to pain and stiffness (26, 30). Only one study reported intense knee pain in two patients, and all adverse	corticosteroid, 6 trials were considered to be at unclear risk of selection bias14,16,22,35,38,52 and 5 trials did not blind partici- pants.14,22,35,38,52 After sensitivity analysis, the only signif- icant difference was on function at intermediate follow-up (SMD, –0.51; 95% CI, –0.90 to 20.11; P = .01) even by removing studies with potential performance bias. In an analysis of function between PRP and a placebo, by removing a study with potential selection bias results were no longer favorable to PRP at short-term follow-up. Other outcomes were not significantly affected by sensitiv- ity analysis. We used data of intermediate follow-up for

			events reported were resolved without any sequelae (38). Based on the results reported in all studies, a few patients withdrew from the experimental studies because they experienced excessive adverse effects (34).	subgroup analysis, since this was the most analyzed time period. In comparison with placebo, the effect on function was modified (with no more significant difference between groups) by the following factors: platelet !43 baseline and LR-PRP. The difference was also no longer significant regarding pain in the 1-injection subgroup. In comparison with HA, there was no longer a significant difference for frozen and 1-injection subgroups regarding both pain and function outcomes as well as LP-PRP regarding pain. Finally, in comparison with different molecular weights of HA, there was no longer a statistically significant differ- ence favorable to PRP when compared with LMW-HA in terms of pain (SMD, –0.33; 95% CI, –0.85 to 0.19; P = .22). The other analysis for these subgroups (HMW or LMW) remained with a statistically significant difference favorable to PRP. For comparison of PRP versus corticosteroid, the find- ings were consistent for all subgroups except for LR-PRP on function (no longer significant). The degree of OA as an inclusion criterion varied immensely among studies, so it was not feasible to assess whether this factor changed the results. Summary of Findings The available evidence for all outcomes in

			The available evidence for all outcomes in any comparison was judged to be of either very low quality, where “we are very uncertain about the estimate,” or, less often, low qual- ity, meaning “further research is very likely to have an important effect on our confidence in the estimate of effect and is likely to change the estimate.” Explanations for this judgment were mainly risk of bias, high heterogeneity among studies, and the small number of events in the out- comes measured.

Key findings (use Results and Conclusion in Abstract)	Results: PRP comprised a majority of the studies (n 51), most with “fair” to “good” Modi!ed Coleman Methodology Score. Studies had variable cell preparations and formulations, with comparison study results leading to inconsistent PROMs, and structural changes. A limited number of studies were included for BMSC, ADSC, and AMSC, all with similar !ndings to PRP. Conclusion: Available literature evaluating “orthobiologics” for knee OA remain nonsuperior to com- parison cohorts. Higher level studies with larger sample sizes and improved methodologies are war- ranted to suggest differences. Despite a growth of “orthobiologics” in clinics, this updated systematic review highlights the uncertain ef!cacy for use in knee OA.	Results: We included 24 RCTs comprising 1344 patients with OA who met the inclusion criteria, with the main types of morbidity being knee osteoarthritis (KOA), hip osteoarthritis (HOA), ankle osteoarthritis (AOA), and temporomandibular joint osteoarthritis (TMJOA). Our results indicate that PRP injections were effective in improving Visual Analog Scale (VAS) pain scores in patients with KOA, HOA, and AOA compared to controls (AOA, MD = −1.15, CI = 95% [−1.74, −0.56], I2 = 40%, P < 0.05; KOA, MD = −1.03, CI = 95% [−1.16, −0.9], I2 = 87%, P < 0.05; TMJOA, MD = −1.35, CI = 95% [−1.74, −0.97], I2 = 92%, P < 0.05) but showed no significant efficacy in patients with HOA (MD = −0.27, CI = 95% [−0.8, 0.26], I2 = 56%, P>0.05). Compared to controls, PRP injections were effective in improving Knee Injury and Osteoarthritis Outcome Score (KOOS), including the patient’s pain symptoms, activities of daily living (ADL), and adhesion symptomatology, but not for that of sports function (KOOS-pain, MD = 2.77, CI = 95% [0, 5.53], I2 = 0%, P < 0.05; KOOS-symptoms, MD = 3.73, CI = 95% [0.76, 6.71], I2 = 0%, P < 0.05; KOOS-ADL, MD = 3.61, CI = 95% [0.79, 6.43], I2 = 0%, P < 0.05; KOOS-QOL, MD = 4.66, CI = 95% [0.98, 8.35], I2 = 29%, P < 0.05, KOOS	Results: A total of 40 studies with 3035 participants were included. Analysis of this review focused on comparing PRP with hyalur- onic acid, corticosteroid, and saline, as we believe they are the most relevant comparisons with the most studies available. At 6- month follow-up, PRP was as effective as and in some studies more effective than other therapies regarding pain, function, and stiffness. However, current evidence is of low or very low quality and is based on trials with high risk of bias and great heterogeneity among them. No significant difference among treatments was found concerning major adverse events and treatment failure. Conclusion: Although studies suggest that PRP may be more effective than or at least as effective as other modalities of non-surgical treatment for knee osteoarthritis in terms of pain, function, and adverse events, serious limitations and methodological flaws are considerable in the current literature. Therefore, the authors are not able to make recommendations for clinical practice regarding PRP for knee osteoarthritis.
Type of Study	Systematic review with or without meta-analysis (AMSTARII)	Systematic review with or without meta-analysis (AMSTARII)	Systematic review with or without meta-analysis (AMSTARII)
Assessment tool	AMSTAR	AMSTAR	AMSTAR
Overall Assessment	Critically low (Quality assessment)	Critically low (Quality assessment)	Critically low (Quality assessment)
What is the lowest evidence study included in the SR?	Retrospective comparative study or case series, Level 3	RCT, Level 1	RCT, Level 1

Level of evidence (Oxford 2011)	Level 4, downgraded due to critically low AMSTAR	Level 2, downgraded due to critically low AMSTAR	Level 2, downgraded due to critically low AMSTAR

Konservative Therapie (Nichtmedikamentös)

30. Empfehlung	Neu 2024
Empfehlungsgrad ⇑	Wir schlagen vor, bei Vorliegen einer Gonarthrose, Gehhilfen (beispielsweise Gehstützen) zur Entlastung in Erwägung zu ziehen.
Level of Evidence (GRADE) Auszugsweise walking canes vs. no device intervention: Schmerz (WOMAC): ⊕⊕ Schmerz (VAS): ⊕⊕⊕ Funktion: ⊕⊕	Adoption einer evidenzbasierten Empfehlung aus: NICE Guideline NG226 (Punkt 1.3.10) (1)
Konsensstärke	100 % (starker Konsens)

31. Empfehlung	Modifiziert 2024
Empfehlungsgrad ⇓⇓	Wir empfehlen keinen routinemäßigen Einsatz von Schuhzurichtungen oder Gonarthrose-Orthesen.
⇔	Schuhzurichtungen oder Gonarthrose-Orthesen kann man in Erwägung ziehen, wenn: • eine vorangegangene Bewegungstherapie ineffektiv war, oder • diese ohne den Einsatz oben genannter Hilfsmittel unzureichend ist, • eine wesentliche Gelenkinstabilität vorliegt, oder • eine abnormale biomechanische Belastung, oder • eine Verbesserung der Beweglichkeit und Funktion des Gelenkes durch oben genannte Hilfsmittel zu erwarten sind.
Level of Evidence (GRADE) Auszugsweise: Insoles vs. no device intervention: Schmerz: ⊕ Function: ⊕ Braces vs no device intervention: Schmerz: ⊕ Function: ⊕	Adoption einer evidenzbasierten Empfehlung aus: NICE Guideline NG226 (Punkt 1.3.11) (1)
Konsensstärke	100% (starker Konsens)

Schlüsselfrage und PICO Format sind dem Evidence Review H der Quellleitlinie zu entnehmen hier:

https://www.nice.org.uk/guidance/ng226/evidence/h-clinical-and-cost-effectiveness-of-devices-for-the-management-of-osteoarthritis-pdf-11250452853 (ab Seite 6)

Suchhistorie und Recherche Flowchart sind den Appendices B-C des Evidence Review H zu entnehmen hier:

https://www.nice.org.uk/guidance/ng226/evidence/h-clinical-and-cost-effectiveness-of-devices-for-the-management-of-osteoarthritis-pdf-11250452853 (ab Seite 125)

Evidenztabellen nach GRADE sind dem Appendix F des Evidence Review H der Quellleitlinie zu entnehmen hier:

https://www.nice.org.uk/guidance/ng226/evidence/h-clinical-and-cost-effectiveness-of-devices-for-the-management-of-osteoarthritis-pdf-11250452853 (ab Seite 318)

Empfehlung der zugrundeliegenden Quellleitlinie:

Leitlinie (Erscheinungsjahr)	NICE NG226 (2022) (1)
Empfehlung:	1.3.10 „Consider walking aids (such as walking sticks) for people with lower limb osteoarthritis“ 1.3.11 „Do not routinely offer insoles, braces, tape, splints or supports to people with osteoarthritis unless: there is joint instability or abnormal biomechanical loading **and** therapeutic exercise is ineffective or unsuitable without the addition of an aid or device **and** the addition of an aid or device is likely to improve movement and function.“
Empfehlungsgrad:	1.3.10 „weak“ 1.3.11 „strong“
Evidenzgrad:	Kein Gesamtevidenzgrad angegeben. GRADE Profile siehe Appendix F des Evidence Review H ab Seite 318
Referenzen:	Siehe Evidence Review H Tabelle 2 ab Seite 9 https://www.nice.org.uk/guidance/ng226/evidence/h-clinical-and-cost-effectiveness-of-devices-for-the-management-of-osteoarthritis-pdf-11250452853

1. (NICE), National Institute for Health and Care Excellence. Osteoarthritis in over 16s: diagnosis and management (NICE Guideline NG226). London: National Institute for Health and Care Excellence; 2022 Oct 19.https://www.nice.org.uk/guidance/ng226 [Date Accessed: 02.07.2024].

32. Empfehlung	Neu 2024
Empfehlungsgrad ⇓⇓	Wir empfehlen keinen routinemäßigen Einsatz von Tape bei Personen mit Gonarthrose.
⇔	Der Einsatz von Tape kann in Erwägung gezogen werden, wenn: • eine Instabilität der Gelenke oder eine abnorme biomechanische Belastung vorliegt und • therapeutische Übungen ohne Tape unwirksam oder ungeeignet sind und • eine Verbesserung der Beweglichkeit und Funktion des Gelenkes durch den Einsatz von Tape zu erwarten ist.
Level of Evidence (GRADE) Auszugsweise Taping vs. keine Intervention: Schmerz ≤ 3 Monate: ⊕ Funktion ≤ 3 Monate: ⊕⊕ Lebensqualität ≤ 3 Monate: ⊕	Adoption einer evidenzbasierten Empfehlung aus: NICE Guideline NG226 (Punkt 1.3.11) (1)
Konsensstärke	94 % (Konsens)

Schlüsselfrage und PICO Format sind dem Evidence Review H der Quellleitlinie zu entnehmen hier:

https://www.nice.org.uk/guidance/ng226/evidence/h-clinical-and-cost-effectiveness-of-devices-for-the-management-of-osteoarthritis-pdf-11250452853 (ab Seite 6)

Suchhistorie und Recherche Flowchart sind den Appendices B-C des Evidence Review H zu entnehmen hier:

https://www.nice.org.uk/guidance/ng226/evidence/h-clinical-and-cost-effectiveness-of-devices-for-the-management-of-osteoarthritis-pdf-11250452853 (ab Seite 125)

Evidenztabellen nach GRADE sind dem Appendix F des Evidence Review H der Quellleitlinie zu entnehmen hier:

https://www.nice.org.uk/guidance/ng226/evidence/h-clinical-and-cost-effectiveness-of-devices-for-the-management-of-osteoarthritis-pdf-11250452853 (ab Seite 318)

Empfehlung der zugrundeliegenden Quellleitlinie:

Leitlinie (Erscheinungsjahr)	NICE NG226 (2022) (1)
Empfehlung:	1.3.11 „Do not routinely offer insoles, braces, tape, splints or supports to people with osteoarthritis unless: there is joint instability or abnormal biomechanical loading **and** therapeutic exercise is ineffective or unsuitable without the addition of an aid or device **and** the addition of an aid or device is likely to improve movement and function.“
Empfehlungsgrad:	„strong“
Evidenzgrad:	Kein Gesamtevidenzgrad angegeben. GRADE Profile siehe Appendix F des Evidence Review H ab Seite 318
Referenzen:	Siehe Evidence Review H Tabelle 2 ab Seite 9 https://www.nice.org.uk/guidance/ng226/evidence/h-clinical-and-cost-effectiveness-of-devices-for-the-management-of-osteoarthritis-pdf-11250452853

1. (NICE), National Institute for Health and Care Excellence. Osteoarthritis in over 16s: diagnosis and management (NICE Guideline NG226). London: National Institute for Health and Care Excellence; 2022 Oct 19.https://www.nice.org.uk/guidance/ng226 [Date Accessed: 02.07.2024].

33. Empfehlung	Modifiziert 2024
Empfehlungsgrad ⇑	Wir schlagen vor, aquatische Bewegungstherapie für die Behandlung von Patient*innen mit Gonarthrose zur Reduktion von Schmerzen, zur Verbesserung der Funktion und Steigerung der Lebensqualität in Erwägung zu ziehen.
Level of Evidence (Oxford 2011) 1 2 2	 Bartels et al. (2016) Dong et al. (2018) Song and Oh (2022)
Konsensstärke	(100 % starker Konsens)

1. Schlüsselfrage und PICO Format	
clinical key question	Does aqua based exercise improve outcomes in knees with clinically and radiographically confirmed OA?
population	patients (> 18) Symptomatic knee oa X ray verified K/L stage 2/3/4
intervention	Interventions (minimum duration 1 week): • Supervised aquatic exercise • Unsupervised aquatic exercise
comparison	•Each other • Pharmacological treatment*** • No exercise intervention (including either): o Exercise versus no treatment* o Exercise plus additional treatment versus additional treatment alone** *No treatment defined as either (1) doing nothing or (2) very low intensity intervention such as advice **Inclusion of studies where additional treatment is the same in each arm will be assessed on a case by case basis. Studies including high intensity additional treatment may not be included due to the risk that treatment could have an interaction with the intervention of interest and mask the true treatment effect. ***Pool classes of pharmacological treatment but conduct subgroup analysis if heterogeneity is present
outcome	Stratify by ≤/>3 months (longest time-point in each): • Health-related quality of life [validated patient-reported outcomes, continuous data prioritised] • Physical function [validated patient-reported outcomes, continuous data prioritised] • Pain [validated patient-reported outcomes, continuous data prioritised] • Psychological distress [validated patient-reported outcomes, continuous data prioritised] • Osteoarthritis flares [validated patient-reported outcomes, continuous data prioritised] • Serious adverse events [dichotomous

2. Recherche Zusammenfassung

Identifier	*ID Ordinal 63a*
PICO(T) question	Does aqua based exercise improve outcomes in knees with clinically and radiographically confirmed OA?
Search characteristics	
Date of search	07 08 2023
Initials of primary reader	CA
Database(s)	*PubMed*
Keywords	*Knee* *osteoarthritis; arthritis; osteoarthros*; gonitis; gonarthritis; gonarthros** aquatic therapy; hydrotherapy; water therapy; exercise
Search strings	*#1 Animals[Title] OR Cadaver[Title] OR animal*[Title] OR dog[Title] OR dogs[Title] OR canine[Title] OR cats[Title] OR feline[Title] OR horse*[Title] OR equine[Title] OR mouse[Title] OR mice[Title] OR rat[Title] OR rats[Title] OR rabbit*[Title] OR sheep[Title] OR porcine[Title] OR pig[Title] OR pigs[Title] OR rodent*[Title] OR monkey*[Title] OR cadaver*[Title/Abstract] OR "in vitro"[Title/Abstract] OR comment[Publication Type] OR editorial[Publication Type] OR letter[Publication Type] OR "historical article"[Publication Type] OR address[Publication Type] OR news[Publication Type] OR "newspaper article" [Publication Type] OR "case reports"[Publication Type] OR case report*[Title] OR abstracts[Title] OR editorial[Title] OR reply[Title] OR comment*[Title] OR commentary[Title] OR letter[Title] OR biomechanic*[Title]* *#2 "randomized-controlled-trial" OR "Randomized-Controlled-Trials" OR "random-allocation" OR random*[Title] OR RCT* *#3 (systematic* AND review*) OR meta-analys*[Title/Abstract] OR meta-analysis OR systematic-review* *#4 (Knee)* *#5 (Osteoarthritis OR arthritis OR osteoarthros* OR gonitis OR gonarthritis OR gonarthros*)*

	#6 "aquatic therapy" OR "aqua therapy" OR "aquatherapy"OR hydrotherapy OR "hydro therapy" OR "water therapy" OR (("water" OR "aqua" OR "hydro") AND ("exercise" OR "therapy")) #7 (#4 AND #5 AND #6) NOT #1 #8 (#7 AND #2) #9 (#7 AND #3)
Number of hits	
RCTs (#8)	44
SR(+MA) (#9)	137
Studies published before 2003	0 SR/MAs + 27 RCTs
Articles to consider	
DOIs MAs	Dong 2018: 10.1097/MD.0000000000013823 Bartels 2016: 10.1002/14651858.CD005523.pub3 Lu 2015: 10.1007/s00393-014-1559-9 Song 2022: 10.3390/healthcare10030560
DOIs SRs	Golightly 2012: 10.3810/psm.2012.11.1988 Harzy 2009: 10.1007/s10067-009-1114-2 Forestier 2008: 10.1016/j.jbspin.2007.06.009
DOIs RCTs	Rewald 2020: 10.1016/j.apmr.2019.12.023 Taglietti 2018: 10.1177/0269215517754240 Dias 2017: 10.1016/j.bjpt.2017.06.012 Siqueira 2017: 10.1097/PHM.0000000000000564 Munukka 2016: 10.1016/j.joca.2016.05.007 Hale 2012: 10.1016/j.apmr.2011.08.004 Lund 2008: 10.2340/16501977-0134 Silva 2008: 10.2522/ptj.20060040 Wang 2017: 10.1111/j.1365-2648.2006.04102.x Hinman 2007: 10.2522/ptj.20060006
Include/Excluded after FT screening	
Include	Dong 2018: 10.1097/MD.0000000000013823
Include	Bartels 2016: 10.1002/14651858.CD005523.pub3
Could not retrieve	Lu 2015: 10.1007/s00393-014-1559-9
Include	Song 2022: 10.3390/healthcare10030560
Exclude: not specific enough and is a comprehensive review	Golightly 2012: 10.3810/psm.2012.11.1988
Exclude: not about exercise	Harzy 2009: 10.1007/s10067-009-1114-2
Exclude: about exercise	Forestier 2008: 10.1016/j.jbspin.2007.06.009

Include	Rewald 2020: 10.1016/j.apmr.2019.12.023
Included in study	Taglietti 2018: 10.1177/0269215517754240
Include	Dias 2017: 10.1016/j.bjpt.2017.06.012
Could not retrieve	Siqueira 2017: 10.1097/PHM.0000000000000564
Included in study	Munukka 2016: 10.1016/j.joca.2016.05.007
Included in study	Hale 2012: 10.1016/j.apmr.2011.08.004
Included in study	Lund 2008: 10.2340/16501977-0134
Included in study	Silva 2008: 10.2522/ptj.20060040
Could not retrieve	Wang 2007: 10.1111/j.1365-2648.2006.04102.x
Included in study	Hinman 2007: 10.2522/ptj.20060006

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Search	Actions	Details	Query	Results	Time
#9	•••		Search: **(#7 AND #3)** Sort by: **Most Recent**	44	08:31:52
#8	•••		Search: **(#7 AND #2)** Sort by: **Most Recent**	137	08:31:45
#7	•••		Search: **(#4 AND #5 AND #6) NOT #1** Sort by: **Most Recent**	378	08:31:36
#6	•••		Search: **"aquatic therapy" OR "aqua therapy" OR "aquatherapy"OR hydrotherapy OR "hydro therapy" OR "water therapy" OR (("water" OR "aqua" OR "hydro") AND ("exercise" OR "therapy"))** Sort by: **Most Recent**	105,882	08:31:24
#5	•••		Search: **(Osteoarthritis OR arthritis OR osteoarthros* OR gonitis OR gonarthritis OR gonarthros*)** Sort by: **Most Recent**	421,630	08:31:18
#4	•••		Search: **(Knee)** Sort by: **Most Recent**	209,024	08:31:05
#3	•••		Search: **(systematic* AND review*) OR meta-analys* [Title/Abstract] OR meta-analysis OR systematic-review** Sort by: **Most Recent**	544,652	08:30:58
#2	•••		Search: **"randomized-controlled-trial" OR "Randomized-Controlled-Trials" OR "random-allocation" OR random*[Title] OR RCT** Sort by: **Most Recent**	1,002,994	08:28:34
#1	•••		Search: **Animals[Title] OR Cadaver[Title] OR animal*[Title] OR dog[Title] OR dogs[Title] OR canine[Title] OR cats[Title] OR feline[Title] OR horse*[Title] OR equine[Title] OR mouse[Title] OR mice[Title] OR rat[Title] OR rats[Title] OR rabbit*[Title] OR sheep[Title] OR porcine[Title] OR pig[Title] OR pigs[Title] OR rodent*[Title] OR monkey*[Title] OR cadaver*[Title/Abstract] OR "in vitro"[Title/Abstract] OR comment[Publication Type] OR**	8,532,728	08:28:26

editorial[Publication Type] OR letter[Publication Type] OR "historical article"[Publication Type] OR address[Publication Type] OR news[Publication Type] OR "newspaper article" [Publication Type] OR "case reports"[Publication Type] OR case report*[Title] OR abstracts[Title] OR editorial[Title] OR reply[Title] OR comment*[Title] OR commentary[Title] OR letter[Title] OR biomechanic*[Title] Sort by: **Most Recent**

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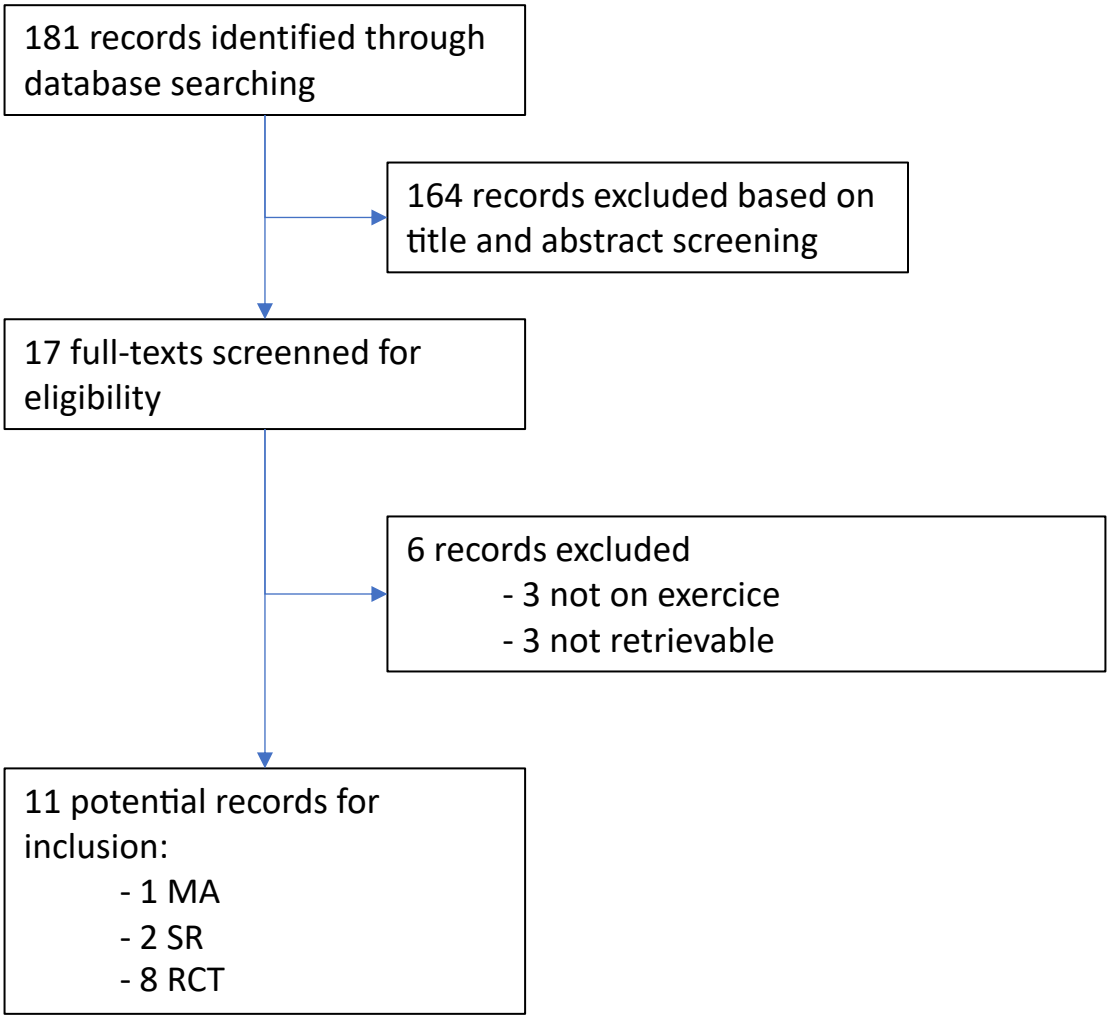
4. Studienselektion: Flowchart

PubMed Search: Does aqua based exercise improve outcomes in knees with clinically and radiographically confirmed OA?
(07/08/2023)



Included SRs and MAs

(1-3)

1. Bartels EM, Juhl CB, Christensen R, Hagen KB, Danneskiold-Samsøe B, Dagfinrud H, et al. Aquatic exercise for the treatment of knee and hip osteoarthritis. Cochrane Database Syst Rev. 2016;3(3):Cd005523. doi: 10.1002/14651858.CD005523.pub3
2. Dong R, Wu Y, Xu S, Zhang L, Ying J, Jin H, et al. Is aquatic exercise more effective than land-based exercise for knee osteoarthritis? Medicine (Baltimore). 2018;97(52):e13823. doi: 10.1097/md.0000000000013823
3. Song JA, Oh JW. Effects of Aquatic Exercises for Patients with Osteoarthritis: Systematic Review with Meta-Analysis. Healthcare (Basel). 2022;10(3). doi: 10.3390/healthcare10030560

Included RCTs

(1-8)

1. Dias JM, Cisneros L, Dias R, Fritsch C, Gomes W, Pereira L, et al. Hydrotherapy improves pain and function in older women with knee osteoarthritis: a randomized controlled trial. Braz J Phys Ther. 2017;21(6):449-56. doi: 10.1016/j.bjpt.2017.06.012
2. Hale LA, Waters D, Herbison P. A randomized controlled trial to investigate the effects of water-based exercise to improve falls risk and physical function in older adults with lower-extremity osteoarthritis. Arch Phys Med Rehabil. 2012;93(1):27-34. doi: 10.1016/j.apmr.2011.08.004
3. Hinman RS, Heywood SE, Day AR. Aquatic physical therapy for hip and knee osteoarthritis: results of a single-blind randomized controlled trial. Phys Ther. 2007;87(1):32-43. doi: 10.2522/ptj.20060006
4. Lund H, Weile U, Christensen R, Rostock B, Downey A, Bartels EM, et al. A randomized controlled trial of aquatic and land-based exercise in patients with knee osteoarthritis. J Rehabil Med. 2008;40(2):137-44. doi: 10.2340/16501977-0134
5. Munukka M, Waller B, Rantalainen T, Häkkinen A, Nieminen MT, Lammentausta E, et al. Efficacy of progressive aquatic resistance training for tibiofemoral cartilage in postmenopausal women with mild knee osteoarthritis: a randomised controlled trial. Osteoarthritis Cartilage. 2016;24(10):1708-17. doi: 10.1016/j.joca.2016.05.007
6. Rewald S, Lenssen AFT, Emans PJ, de Bie RA, van Breukelen G, Mesters I. Aquatic Cycling Improves Knee Pain and Physical Functioning in Patients With Knee Osteoarthritis: A Randomized Controlled Trial. Arch Phys Med Rehabil. 2020;101(8):1288-95. doi: 10.1016/j.apmr.2019.12.023
7. Silva LE, Valim V, Pessanha AP, Oliveira LM, Myamoto S, Jones A, et al. Hydrotherapy versus conventional land-based exercise for the management of patients with osteoarthritis of the knee: a randomized clinical trial. Phys Ther. 2008;88(1):12-21. doi: 10.2522/ptj.20060040
8. Taglietti M, Facci LM, Trelha CS, de Melo FC, da Silva DW, Sawczuk G, et al. Effectiveness of aquatic exercises compared to patient-education on health status in individuals with knee osteoarthritis: a randomized controlled trial. Clin Rehabil. 2018;32(6):766-76. doi: 10.1177/0269215517754240

5. Charakteristika der eingeschlossenen Studien

PICO number:	63a	63a	63a
PICO Question:	Does aqua based exercise improve outcomes in knees with clinically and radiographically confirmed OA?	Does aqua based exercise improve outcomes in knees with clinically and radiographically confirmed OA?	Does aqua based exercise improve outcomes in knees with clinically and radiographically confirmed OA?
Article name:	Effects of Aquatic Exercises for Patients with Osteoarthritis: Systematic Review with Meta-Analysis	Aquatic exercise for the treatment of knee and hip osteoarthritis (Review)	Is aquatic exercise more effective than land-based exercise for knee osteoarthritis?
Lead author	Song	Bartels	Dong
Year published	2022	2016	2018
Number of included studies (if SR with or without MA)	20	13	8
Description of intervention group (optional for SRs)	Studies that administered aquatic exercise-based interventions were selected. Aquatic exercise was defined as exercises performed in water that was between waist and chest height. The exercise types were cardiovascular exercises, such as walking, running, and other movements and weight training exercises, such as stretching, dumbbell use and leg lifts	Trials including at least one treatment group in which aquatic exercise. We included trials that used all types of exercises (e.g. ROM, strength, aerobics) performed in a therapeutic/ heated indoor pool.	Aquatic therapy
Description of control group (optional for SRs)	To include comparative interventions, we sought studies that featured a control group that did not receive the experimental treatment, and/or a group that performed land-based exercises.		Landbased exercises
Number of patients in intervention group	737	1190 participants	229
Number of patients in control group	760		287
Mean age with range of intervention group	Over 48	age of 68 years, with a range of 62 to 74 years	59-67
Mean age with range of control group	Over 48		59-69

Inclusion criteria (on patient-level if clinical study; on article-level if SR) Examples: Clinical study: "The inclusion criteria were (i) primary ACLR in (ii) patients aged over 50 years. The exclusion criteria were (iii) severe concomitant ligament injury (grade 3), (iv) tibiofemoral osteoarthritis visible on weight-bearing anteroposterior and/or sagittal radiographs (> 50% joint space narrowing), and (v) history of intra- or extra-articular ligament surgery in either knee." SR: "Studies comparing the diagnostic accuracy of physical examination (clinical tests or ultrasound) versus arthroscopy for the assessment of LHBT pathologies"	2.2.1. Patients We sought studies that featured patients who were diagnosed with osteoarthritis and who were capable of communicating. 2.2.2. Intervention Studies that administered aquatic exercise-based interventions were selected. Aquatic exercise was defined as exercises performed in water that was between waist and chest height. The exercise types were cardiovascular exercises, such as walking, running, and other movements and weight training exercises, such as stretching, dumbbell use and leg lifts [19]. 2.2.3. Comparator To include comparative interventions, we sought studies that featured a control group that did not receive the experimental treatment, and/or a group that performed land-based exercises. 2.2.4. Outcome The outcome focused on in this review was the effects of aquatic exercise on patients with osteoarthritis of the lower extremities. Pain was selected as the primary outcome.Pain was measured on various scales (Visual Analog Scale; VAS, Western Ontario and McMaster Universities OA Index; WOMAC, Knee injury and Osteoarthritis	We included randomized controlled trials (RCTs) concerning treatment of knee or hip osteoarthritis (OA), or both, with aquatic exercise compared to a control group (e.g. usual care, education, social attention, telephone call, or waiting list for surgery). We included participants with OA in either one and/or both knee(s) and/or one or both hip(s), as defined by the American College of Rheumatology (ACR) criteria (Altman 1986), who did not suffer from any other arthritic conditions or any other disease that may affect the joints. Participants with all degrees of osteoarthritis, and both primary and/or secondary OA, were eligible. We only included trials with a mixture of participants with different rheumatic diseases if we were able to extract data on the participants with OA. Trials including at least one treatment group in which aquatic exercise was applied. We included trials that used all types of exercises (e.g. ROM, strength, aerobics) performed in a therapeutic/ heated indoor pool. The use of medication, alternative therapies, or lifestyle changes were described in the included studies, and must have been comparable in both groups studied	All included studies met the following inclusion criteria: the study design was a RCT; patients were diagnosed with knee OA according to symptoms and radiologic findings without any invasive intervention; The RCT compared AQE to LBE. All types of exercise developed in a therapeutic/heated indoor/outdoor pool were eligible; and the experimental group which received AQE combined with the certain therapy (e.g., nonsteroidal anti- inflammatory drugs) and the control group with the same certain therapy were also included. Studies were excluded if they met the following criteria: the study included animal experiments, and it was a review, cross- over study, cohort study, PICO protocol, or conference abstract;the study included an AQE experimental group, but the control group did not perform any exercise (e.g., no intervention or just education) and there was no LBE group; the study focused not only on knee OA, but other joint diseases as well (e.g., hip OA), precluding the ability to separate the outcomes from the patients with knee OA; the study had been published previously; and the study was not published in the English language.

	WOMAC, Knee Injury and Osteoarthritis Outcome Score; KOOS, etc.), and in a study using two or more pain scales, WOMAC and KOOS results were used for meta-analysis. Joint function, which is influenced by the degree of stiffness and movement of one's joints, and quality of life, which reflects an individual's general well-being in daily life, were analyzed as secondary outcomes. 2.2.5. Inclusion and Exclusion Criteria The inclusion criteria for articles to be systemically analyzed were as follows: (1) con- cerning aquatic exercise among patients with osteoarthritis, (2) featuring an RCT design, (3) published in English or Korean and (4) published in a journal. The exclusion criteria were as follows: (1) a hydrotherapy-focused study, such as balneotherapy using mineral water, spa therapy (focusing on water temperature and flow rate), or Kneipp hydrotherapy (focusing on temperature and water pressure); (2) an animal- focused or pre-clinical study; (3) a non-comparative study; (4) an unpublished thesis; (5) a non-experimental study, such as observational research or a review; and (6) a study in which the intervention outcomes concerned cost.	both groups studied. Beneficial outcome measures recommended by OMERACT III (Bellamy 1997) included the following. Primary outcomes 1. Pain. 2. Disability (e.g. measured by the Activities of Daily Living Scale, Western Ontario and McMaster Universities Arthritis Index (WOMAC), physical function subscale). 3. Qualityoflife. 4. Radiographs (studies that were overone year in duration) (Bellamy 1997).	
Follow-up period	4–24 weeks.	12 weeks	6W-12M

Main results	Of the 13 studies that measured pain, 10 included a control group that did not re- ceive any treatment and presented pain scores in the form of means and standard devi- ations [14,22,26,27,29,31,33,34,37,39]; these 10 studies were selected for a meta-analysis (Figure 3A). Patients with osteoarthritis who performed aquatic exercise experienced a 0.61-point decrease in pain (n = 756; MD = −0.61; 95% CI: −0.90–−0.32) and the effect size differed significantly between the treatment group and the control group (Z = 4.09, p < 0.001). However, moderate heterogeneity was observed (I2 = 68%), and a subgroup analysis was performed to assess the cause of the heterogeneity. The 10 studies included in this analysis showed differences regarding participants. Eight studies were performed on subjects with osteoarthritis of the lower extremities, such as the hip and knee. The other two studies recruited patients with any form of osteoarthritis. Aquatic exercise has been found to be more effective in patients with osteoarthritis of the lower extremities [7]; therefore, we felt that it would be meaningful to compare the pain-related changes reported by the studies involving patients with osteoarthritis of the lower extremities with	Analysis of all trials that measured self-reported disability (12 trials, excluding Kim 2012) showed a statistically significant reduction in disability (SMD −0.32, 95% CI −0.47 to −0.17; Analysis 1.2), and negligible heterogeneity (Figure 5). This effect corresponded to five points lower (95% CI three to eight) on a 0 to 100 scale compared to the control group. However, the one extreme of the 95% CI showed a clinical non-relevant difference of effect. Three included trials performed measurements some weeks after the end of the aquatic exercise intervention. One trial measured 24 weeks after the exercise period (Cochrane 2005), one trial measured 12 weeks after the exercise period (Lund 2008), and one trial measured four, 12, and 24 weeks following the exercise period (Stener-Victorin 2004). We did not observe any statistically significant effect on pain (SMD −0.30, 95% CI −0.92 to 0.32; ; Analysis 4.1), disability (SMD −0.32, 95% CI −0.83 to 0.20; Analysis 4.2), or QoL (SMD −0.15, 95% CI −0.64 to 0.34; Analysis 4.3). In all cases we observed high heterogeneity. For one trial, Lund 2008, that included participants with knee OA alone, we did not observe any effect on either pain (SMD 0.14	There were no significant differences in VAS (SMD: -0.62, 95% CI [-1.27, 0.03], P = .06), WOMAC pain (SMD: -1.66, 95% CI [-4.90, 1.58], P = .31), and KOOS pain (SMD: 0.19, 95% CI [-0.07, 0.45], P = .15) in the AQE group compared to the LBE group (Fig. 3). The meta-analysis (SMD: 0.19, 95% CI [-0.32, 0.71], P = .46) showed that there was no significant difference between the AQE and LBE groups for symptom improvement (Fig. 4). There were no significant differences in KOOS ADL (SMD: 0.17, 95% CI [-0.08, 0.43], P = .19), KOOS sport&rec (SMD: 0.24, 95% CI [-0.19, 0.67], P = .27), or SF-36 physical function (SMD: 1.68, 95% CI [-5.38, 2.03], P = .38) between the AQE and LBE groups. Therefore, the meta-analysis revealed that there was no difference in the improvement of physical function between the 2 interventions (Fig. 5). Heterogeneity was not observed in the analyses for QOL (P = .80, I2 = 0%), and the meta-analysis (SMD: 0.19, 95% CI [-0.07, 0.44], P = .15) demonstrated that there was no significant difference in the improvement of QOL between the 2 groups (Fig. 6)

	osteoarthritis of the lower extremities with those reported by the studies featuring patients with osteoarthritis of the fingers or vertebrae. In the eight studies conducted on patients with osteoarthritis of the lower extremities, pain was reduced by 0.78 points (n = 388; MD = −0.78; 95% CI: −1.03–−0.52) when compared to the control group, the effect size differed significantly between the treatment group and the control group (Z = 9.82, p < 0.001), and low heterogeneity was observed (I2 = 29%). In the two studies that did not limit the focus to a particular body location, pain was reduced by 0.11 points (n = 368; MD = −0.11; 95% CI: −0.33–0.11) when compared to the control group, the effect size did not significantly differ between the treatment group and the control group, and no heterogeneity was observed (I2 = 0%). Among the four studies that measured quality of life, three included a control group that did not receive any treatment and presented the quality-of-life score in the form of means and standard deviations; these three studies [14,22,34] were selected for a meta- analysis (Figure 3A). This showed that the quality of life of the patients who performed aquatic exercise improved by 0.77 points (n = 279; MD = −0.77; 95% CI: −1.38–−0.15) when	observe any effect on either pain (SMD 0.14; 95% CI −0.39 to 0.68; Analysis 5.1), disability (SMD −0.13, 95% CI −0.67 to 0.40; Analysis 5.2), or QoL (SMD −0.11, 95% CI −0.65 to 0.42; Analysis 5.3). One trial, Stener-Victorin 2004, included participants with hip OA and we observed a statistically significant effect at follow-up on pain (SMD −1.66, 95% CI −2.82 to −0.51; Analysis 6.1), disability (SMD −1.47, 95% CI −2.58 to −0.35; Analysis 6.2), and QoL (SMD −1.09, 95% CI −2.15 to −0.04; Analysis 6.3). However the right extreme of the 95% CI for QoL showed a clinical non-relevant difference of effect.	of QOL between the 2 groups (Fig. 3).

	compared to the control group. The effect size differed significantly between the aquatic exercise group and the land-based exercise group (Z = 2.44, p = 0.001); however, high heterogeneity was observed (I2 = 80%). Among the 20 studies that measured joint dysfunction in patients with osteoarthritis, seven included a control group that did not receive any treatment, assessed joint dysfunction through self-reported questionnaires, and presented the joint dysfunction scores in the form of means and standard deviations; these seven studies [14,26,27,33,34,37,39] were selected for a meta-analysis (Figure 3A). This showed that the joint dysfunction score was 0.34 points lower in the aquatic exercise group (n = 279; MD = −0.77; 95% CI: −1.38–−0.15) when compared to the control group. The effect size differed significantly between the two groups (Z = 3.58, p < 0.001), and heterogeneity was not observed (I2 = 0%). Meanwhile, when considering studies that featured a land-based exercise group, the aquatic exercise group [26,27,34] showed a 0.14-point lower dysfunction score (n = 204; MD = −0.14; 95% CI: −0.42–0.13). The effect size did not significantly differ between the two groups, and heterogeneity was not observed (I2 = 0%; Figure 3B).		

Key findings (use Results and Conclusion in Abstract)	For the 20 studies included, a meta-analysis showed that aquatic exercise produces 0.61-point reduction (n = 756; mean difference (MD) = −0.61; 95% confidence interval (CI): −0.90–−0.32) in pain compared with a control group, and aquatic exercise was effective in reducing pain (n = 315; MD = −0.28; 95% CI: −0.50–−0.05) compared with a land-based exercise group. Another meta- analysis showed that aquatic exercise produces 0.77-point improvement in quality of life (n = 279; MD = −0.77; 95% CI: −1.38–−0.15) compared with a control group. Finally, a meta-analysis showed that aquatic exercise produces 0.34-point reduction in joint dysfunction (n = 279; MD = −0.77; 95% CI: −1.38–−0.15) compared with a control group. For patients with osteoarthritis, aquatic-exercise-based interventions are effective for reducing pain and joint dysfunction and improving quality of life.	Main results Trusted evidence. Informed decisions. Better health. Cochrane Database of Systematic Reviews Nine new trials met the inclusion criteria and we excluded two earlier included trials. Thus the number of participants increased from 800 to 1190 and the number of included trials increased from six to 13. Most participants were female (75%), with an average age of 68 years and a body mass index (BMI) of 29.4. Osteoarthritis duration was 6.7 years, with a great variation of the included participants. The mean aquatic exercise duration was 12 weeks. We found 12 trials at low to unclear risk of bias for all domains except blinding of participants and personnel. They showed that aquatic exercise caused a small short term improvement compared to control in pain (SMD −0.31, 95% CI −0.47 to −0.15; 12 trials, 1076 participants) and disability (SMD −0.32, 95% CI −0.47 to −0.17; 12 trials, 1059 participants). Ten trials showed a small effect on quality of life (QoL) (SMD −0.25, 95% CI −0.49 to −0.01; 10 trials, 971 participants). These effects on pain and disability correspond to a five point lower (95% CI three to eight points lower) score on mean pain and mean disability compared to the control group (scale 0 to 100), and a seven point	Results: Eight RCTs were included, involving a total of 579 patients. The meta-analysis showed that there was no significant difference between AQE and LBE for pain relief, physical function, and improvement in the quality of life, for both short- and long-term interventions, in patients with knee OA. However, the adherence and satisfaction level for AQE was higher than for LBE. Compared to no intervention, AQE showed a mild effect for elevating activities of daily living (standardized mean difference [SMD]: -0.55, 95% confidence interval [CI] [-0.94, -0.16], P = .005) and a high effect for improving sports and recreational activities (SMD: -1.03, 95% CI [-1.82, -0.25], P = .01). Conclusion: AQE is comparable to LBE for treating knee OA.
Overall Assessment	Critically low (Quality assessment)	Critically low (Quality assessment)	High (Quality assessment)
Level of evidence (Oxford 2011)	Level 2, downgraded due to critically low AMSTAR	Level 2, downgraded due to critically low AMSTAR	Level 1*, upgraded due to high AMSTAR

34. Empfehlung	Modifiziert 2024
Empfehlungsgrad ⇑⇑	Wir empfehlen, bei Patient*innen mit Gonarthrose eine an die individuellen Bedürfnisse angepasste Bewegungstherapie durchzuführen.
⇑	Wir schlagen vor, dass die Bewegungstherapie unter Aufsicht durchgeführt werden sollte.
⇑⇑	Wir empfehlen Patient*innen darauf hinzuweisen, dass Gelenkschmerzen zu Beginn der Durchführung von Bewegungstherapie zunehmen können und zu erklären, dass • regelmäßige und konsequente Bewegung gut für die Gelenke ist, auch wenn diese anfangs Schmerzen oder Unbehagen verursachen kann. (Cave: Zustand der aktivierten Arthrose) • die langfristige Einhaltung eines Trainingsplans dessen Nutzen erhöht, indem Schmerzen reduziert und die Funktionsfähigkeit und Lebensqualität gesteigert werden.
Level of Evidence (GRADE) Auszugsweise Krafttraining ohne Aufsicht vs. Krafttraining unter Aufsicht: Schmerz ≤ 3 Monate: ⊕⊕⊕ Schmerz > 3 Monate: ⊕⊕⊕ Krafttraining ohne Aufsicht vs. keine Behandlung: Schmerz ≤ 3 Monate: ⊕⊕ Schmerz > 3 Monate: ⊕ Funktion ≤ 3 Monate: ⊕⊕ Funktion > 3 Monate: ⊕⊕⊕	Adoption einer evidenzbasierten Empfehlung aus: NICE Guideline NG226 (Punkt 1.3.1, 1.3.2, 1.3.3) (1)
Konsensstärke	100% (starker Konsens)

Schlüsselfrage und PICO Format sind dem Evidence Review C der Quellleitlinie zu entnehmen hier:

https://www.nice.org.uk/guidance/ng226/evidence/c-clinical-and-cost-effectiveness-of-exercise-for-the-management-of-osteoarthritis-pdf-11250452848 (ab Seite 7)

Suchhistorie und Recherche Flowchart sind den Appendices B-C des Evidence Review C zu entnehmen hier:

https://www.nice.org.uk/guidance/ng226/evidence/c-clinical-and-cost-effectiveness-of-exercise-for-the-management-of-osteoarthritis-pdf-11250452848 (ab Seite 276)

Evidenztabellen nach GRADE sind dem Appendix F des Evidence Review C der Quellleitlinie zu entnehmen hier:

https://www.nice.org.uk/guidance/ng226/evidence/c-clinical-and-cost-effectiveness-of-exercise-for-the-management-of-osteoarthritis-pdf-11250452848 (ab Seite 799)

Empfehlung der zugrundeliegenden Quellleitlinie:

Leitlinie (Erscheinungsjahr)	NICE NG226 (2022) (1)
Empfehlung:	1.3.1 „For all people with osteoarthritis, offer therapeutic exercise tailored to their needs (for example, local muscle strengthening, general aerobic fitness)“ 1.3.2 „Consider supervised therapeutic exercise sessions for people with osteoarthritis“ 1.3.3 „Advise people with osteoarthritis that joint pain may increase when they start therapeutic exercise. Explain that: • doing regular and consistent exercise, even though this may initially cause pain or discomfort, will be beneficial for their joints • long-term adherence to an exercise plan increases its benefits by reducing pain and increasing functioning and quality of life.“
Empfehlungsgrad:	1.3.1 „strong“ 1.3.2 „weak“ 1.3.3 „strong“
Evidenzgrad:	Kein Gesamtevidenzgrad angegeben. GRADE Profile siehe Appendix F des Evidence Review C ab Seite 799
Referenzen:	Siehe Evidence Review C Tabelle 2 ab Seite 11 https://www.nice.org.uk/guidance/ng226/evidence/c-clinical-and-cost-effectiveness-of-exercise-for-the-management-of-osteoarthritis-pdf-11250452848

1. (NICE), National Institute for Health and Care Excellence. Osteoarthritis in over 16s: diagnosis and management (NICE Guideline NG226). London: National Institute for Health and Care Excellence; 2022 Oct 19.https://www.nice.org.uk/guidance/ng226 [Date Accessed: 02.07.2024].

35. Empfehlung	Neu 2024
Empfehlungsgrad ⇑	Wir schlagen vor Manuelle Therapie bei Personen mit Gonarthrose nur in Kombination mit Bewegungstherapie durchzuführen und zu erklären, dass unzureichende Belege für eine alleinige Durchführung vorliegen.
Level of Evidence Auszugsweise Manuelle Therapie + Bewegungstherapie vs. keine Behandlung: Schmerz ≤ 3 Monate: ⊕⊕ Funktion ≤ 3 Monate: ⊕⊕ Lebensqualität ≤ 3 Monate): ⊕	Adoption einer evidenzbasierten Empfehlung aus NICE Guideline NG226 (Punkt 1.3.6 und 1.3.7) (1)
Konsensstärke	100 % (starker Konsens)

Schlüsselfrage und PICO Format sind dem Evidence Review E der Quellleitlinie zu entnehmen hier:

https://www.nice.org.uk/guidance/ng226/evidence/e-clinical-and-cost-effectiveness-of-manual-therapy-for-the-management-of-osteoarthritis-pdf-11250452850 (ab Seite 6)

Suchhistorie und Recherche Flowchart sind den Appendices B-C des Evidence Review E zu entnehmen hier:

https://www.nice.org.uk/guidance/ng226/evidence/e-clinical-and-cost-effectiveness-of-manual-therapy-for-the-management-of-osteoarthritis-pdf-11250452850 (ab Seite 60)

Evidenztabellen nach GRADE sind dem Appendix F des Evidence Review E der Quellleitlinie zu entnehmen hier:

https://www.nice.org.uk/guidance/ng226/evidence/e-clinical-and-cost-effectiveness-of-manual-therapy-for-the-management-of-osteoarthritis-pdf-11250452850 (ab Seite 130)

Empfehlung der zugrundeliegenden Quellleitlinie:

Leitlinie (Erscheinungsjahr)	NICE NG226 (2022) (1)
Empfehlung:	1.3.6 „Only consider manual therapy (such as manipulation, mobilisation or soft tissue techniques): • for people with hip or knee osteoarthritis **and** • alongside therapeutic exercise.“ 1.3.7 „If discussing manual therapy, explain to people with osteoarthritis that there is not enough evidence to support its use alone for managing osteoarthritis.“
Empfehlungsgrad:	1.3.6 „weak“ 1.3.7. „strong“
Evidenzgrad:	Kein Gesamtevidenzgrad angegeben. GRADE Profile siehe Appendix F des Evidence Review E ab Seite 130
Referenzen:	Siehe Evidence Review E Tabelle 2 ab Seite 9 https://www.nice.org.uk/guidance/ng226/evidence/e-clinical-and-cost-effectiveness-of-manual-therapy-for-the-management-of-osteoarthritis-pdf-11250452850

1. (NICE), National Institute for Health and Care Excellence. Osteoarthritis in over 16s: diagnosis and management (NICE Guideline NG226). London: National Institute for Health and Care Excellence; 2022 Oct 19.https://www.nice.org.uk/guidance/ng226 [Date Accessed: 02.07.2024].

36. Statement	Modifiziert 2024
Die Beleglage ist nicht ausreichend, um den Einsatz von Massage bei Gonarthrose empfehlen zu können.	
Level of Evidence (Oxford 2011) 3 2 1	 Nemati et al . 2024 Liu et al. 2023 Skelly et al. 2020
Konsensstärke	100% (starker Konsens)

1. Schlüsselfrage und PICO Format	
Clinical key question	Does isolated or adjuvant massage therapy improve outcomes in knees with clinically and/or radiographically confirmed OA?
Population	Adults with isolated medial or lateral: • symptomatic knee OA (clinically confirmed), and • K/L stage 2/3/4 (radiographically confirmed)
Intervention	Isolated or adjuvant massage therapy
Comparison	NA
Outcome	• Progression of OA (within same/other compartments) • Adverse events requiring readmission, reoperation, or arthroplasty • Clinical and functional scores (validated PROMS): o Pain o Physical function o Health related quality of life o Satisfaction

2. Recherche Zusammenfassung

Identifier	*ID Ordinal 150*
PICO(T) question	Does isolated or adjuvant massage therapy improve outcomes in knees with clinically and/or radiographically confirmed OA?
Search characteristics	
Date of search	05/02/2024
Initials of primary reader	BG
Database(s)	*PubMed*
Keywords	*Knee* *osteoarthritis; arthritis; osteoarthros*; gonitis; gonarthritis; gonarthros** massage, soft tissue technique
Search strings	*#1 Animals[Title] OR Cadaver[Title] OR animal*[Title] OR dog[Title] OR dogs[Title] OR canine[Title] OR cats[Title] OR feline[Title] OR horse*[Title] OR equine[Title] OR mouse[Title] OR mice[Title] OR rat[Title] OR rats[Title] OR rabbit*[Title] OR sheep[Title] OR porcine[Title] OR pig[Title] OR pigs[Title] OR rodent*[Title] OR monkey*[Title] OR cadaver*[Title/Abstract] OR "in vitro"[Title/Abstract] OR comment[Publication Type] OR editorial[Publication Type] OR letter[Publication Type] OR "historical article"[Publication Type] OR address[Publication Type] OR news[Publication Type] OR "newspaper article" [Publication Type] OR "case reports"[Publication Type] OR case report*[Title] OR abstracts[Title] OR editorial[Title] OR reply[Title] OR comment*[Title] OR commentary[Title] OR letter[Title] OR biomechanic*[Title]* *#2 "randomized-controlled-trial" OR "Randomized-Controlled-Trials" OR "random-allocation" OR random*[Title] OR RCT* *#3 (systematic* AND review*) OR meta-analys*[Title/Abstract] OR meta-analysis OR systematic-review* *#4 (Knee)*

	#5 (Osteoarthritis OR arthritis OR osteoarthros OR gonitis OR gonarthritis OR gonarthros*)* #6 massage OR "soft tissue technique" #7 (#4 AND #5 AND #6) NOT #1 #8 (#7 AND #2) #9 (#7 AND #3)
Number of hits	
RCTs (#8)	77
SR(+MA) (#9)	34
Studies published before 2003	3 (SRs and MAs)+ 3 (RCTs)
Articles to consider	
DOIs MAs	1. 10.1155/2022/4048550 2. 10.3389/fimmu.2023.1309751 3. 10.1016/j.ctcp.2021.101522
DOIs SRs	1. 10.1016/j.jphys.2015.05.018 2. 10.1089/jicm.2023.0271 3. 10.1016/j.pmn.2012.01.001 4. Skelly AC, Chou R, Dettori JR, Turner JA, Friedly JL, Rundell SD, et al. AHRQ Comparative Effectiveness Reviews. Noninvasive Nonpharmacological Treatment for Chronic Pain: A Systematic Review Update. Rockville (MD): Agency for Healthcare Research and Quality (US); 2020. 5. Skelly AC, Chou R, Dettori JR, Turner JA, Friedly JL, Rundell SD, et al. AHRQ Comparative Effectiveness Reviews. Noninvasive Nonpharmacological Treatment for Chronic Pain: A Systematic Review. Rockville (MD): Agency for Healthcare Research and Quality (US); 2018. 6. 10.1016/j.joca.2007.06.014
DOIs RCTs	1. 10.3822/ijtmb.v6i1.119 2. 10.1136/ard.2004.026526 3. 10.1155/2014/490512 4. 10.3233/bmr-140476 5. 10.1159/000510239 6. 10.1515/jcim-2020-0350 7. 10.1097/md.0000000000030385 8. 10.3389/fmed.2023.997116 9. 10.1016/j.ctcp.2017.12.012 10. 10.1016/j.ctcp.2016.08.002

	11. 10.3233/thc-161234 12. 10.1111/jjns.12254 13. 10.1007/s11606-018-4763-5 14. 10.1371/journal.pone.0030248 15. 10.1001/archinte.166.22.2533 16. 10.1589/jpts.26.139 17. 10.1016/j.jbmt.2021.09.008 18. 10.1891/1541-6577.31.4.379 19. 10.1186/s13063-022-06388-5
Include/Excluded after FT screening	
SRs and MAs	
Included	1. 10.1016/j.jphys.2015.05.018 2. 10.1089/jicm.2023.0271 3. Skelly AC, Chou R, Dettori JR, Turner JA, Friedly JL, Rundell SD, et al. AHRQ Comparative Effectiveness Reviews. Noninvasive Nonpharmacological Treatment for Chronic Pain: A Systematic Review Update. Rockville (MD): Agency for Healthcare Research and Quality (US); 2020. 4. Skelly AC, Chou R, Dettori JR, Turner JA, Friedly JL, Rundell SD, et al. AHRQ Comparative Effectiveness Reviews. Noninvasive Nonpharmacological Treatment for Chronic Pain: A Systematic Review. Rockville (MD): Agency for Healthcare Research and Quality (US); 2018. 5. 10.1155/2022/4048550 6. 10.3389/fimmu.2023.1309751 7. 10.1016/j.ctcp.2021.101522 8. 10.1016/j.joca.2007.06.014
Excluded: Not a true SR. No flowchart explaining exclusion of articles in stages	1. 10.1016/j.pmn.2012.01.001
RCTs	
Included from included SRs	1. 10.3822/ijtmb.v6i1.119 2. 10.1155/2014/490512 3. 10.1016/j.ctcp.2017.12.012 4. 10.1111/jjns.12254 5. 10.1007/s11606-018-4763-5 6. 10.1371/journal.pone.0030248 7. 10.1001/archinte.166.22.2533 8. 10.1891/1541-6577.31.4.379
Included	1. 10.1136/ard.2004.026526 2. 10.3233/bmr-140476s 3. 10.1159/000510239 4. 10.1515/jcim-2020-0350

	5. 10.1097/md.0000000000030385 6. 10.3389/fmed.2023.997116 7. 10.1016/j.ctcp.2016.08.002 8. 10.3233/thc-161234 9. 10.1589/jpts.26.139 10. 10.1016/j.jbmt.2021.09.008
Excluded: protocol	1. 10.1186/s13063-022-06388-5

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Query box

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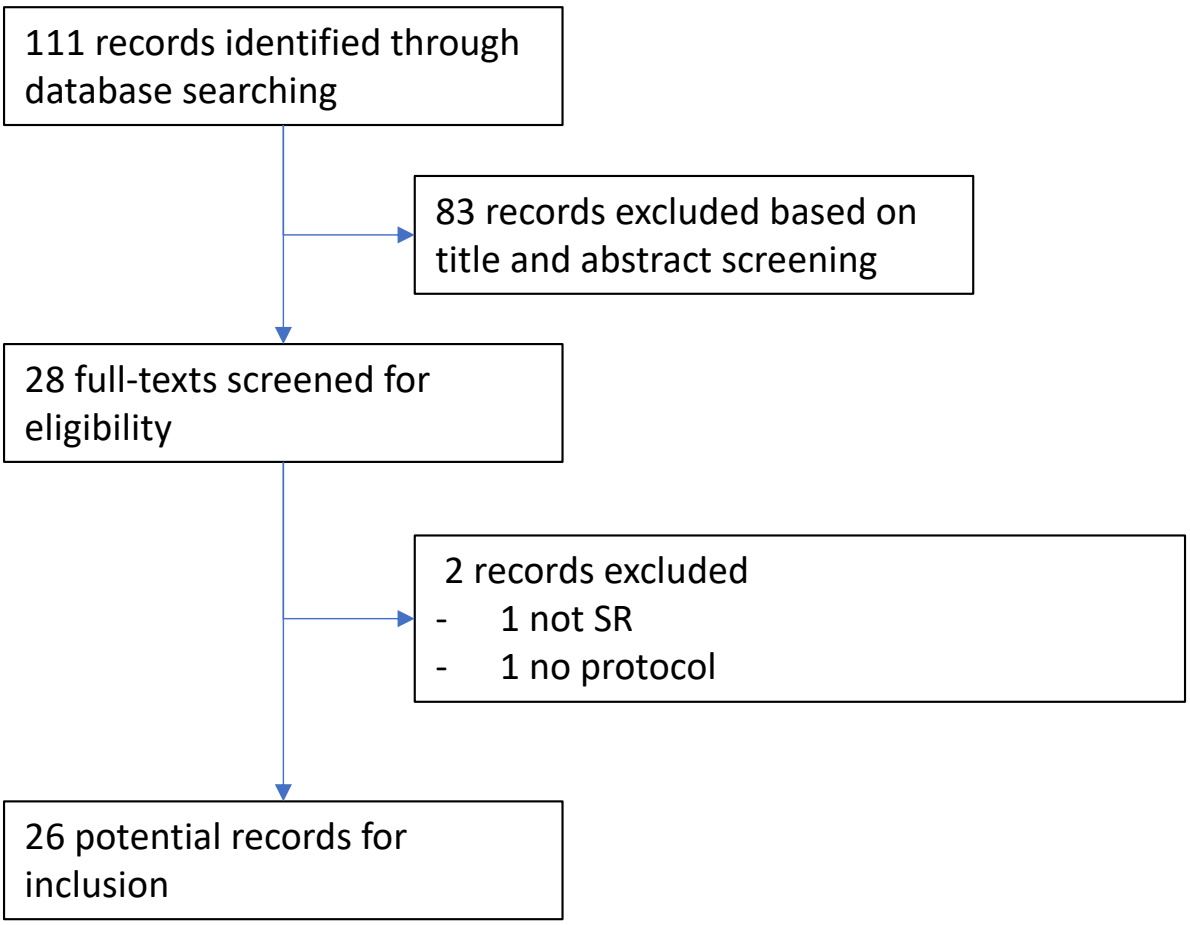
History and Search Details

Search	Actions	Details	Query	Results	Time
#9	•••		Search: **(#7 AND #3)** Sort by: **Most Recent**	34	04:00:04
#8	•••		Search: **(#7 AND #2)** Sort by: **Most Recent**	77	03:59:59
#7	•••		Search: **(#4 AND #5 AND #6) NOT #1** Sort by: **Most Recent**	151	03:59:52
#6	•••		Search: **massage OR "soft tissue technique"** Sort by: **Most Recent**	18,973	03:59:45
#5	•••		Search: **(Osteoarthritis OR arthritis OR osteoarthros* OR gonitis OR gonarthritis OR gonarthros*)** Sort by: **Most Recent**	431,904	03:59:20
#4	•••		Search: **(Knee)** Sort by: **Most Recent**	214,795	03:59:12
#3	•••		Search: **(systematic* AND review*) OR meta-analys* [Title/Abstract] OR meta-analysis OR systematic-review** Sort by: **Most Recent**	576,031	03:59:05
#2	•••		Search: **"randomized-controlled-trial" OR "Randomized-Controlled-Trials" OR "random-allocation" OR random*[Title] OR RCT** Sort by: **Most Recent**	1,027,428	03:58:57
#1	•••		Search: **Animals[Title] OR Cadaver[Title] OR animal*[Title] OR dog[Title] OR dogs[Title] OR canine[Title] OR cats[Title] OR feline[Title] OR horse*[Title] OR equine[Title] OR mouse[Title] OR mice[Title] OR rat[Title] OR rats[Title] OR rabbit*[Title] OR sheep[Title] OR porcine[Title] OR pig[Title] OR pigs[Title] OR rodent*[Title] OR monkey*[Title] OR cadaver*[Title/Abstract] OR "in vitro"[Title/Abstract] OR comment[Publication Type] OR editorial[Publication Type] OR letter[Publication Type] OR "historical article"[Publication Type] OR address[Publication Type] OR news[Publication Type] OR "newspaper article" [Publication Type] OR "case reports"[Publication Type] OR case report*[Title] OR abstracts[Title] OR editorial[Title] OR reply[Title] OR comment*[Title] OR commentary[Title] OR letter[Title] OR biomechanic*[Title]** Sort by: **Most Recent**	8,673,036	03:58:44

4. Studienselektion: Flowchart

PubMed Search: Does isolated or adjuvant massage therapy improve outcomes in knees with clinically and/or radiographically confirmed OA? (05/02/2024)



Included SRs and MAs

(1-8)

1. Bervoets DC, Luijsterburg PA, Alessie JJ, Buijs MJ, Verhagen AP. Massage therapy has short-term benefits for people with common musculoskeletal disorders compared to no treatment: a systematic review. J Physiother. 2015;61(3):106-16. doi: 10.1016/j.jphys.2015.05.018
2. Nemati D, Hinrichs R, Johnson A, Lauche R, Munk N. Massage Therapy as a Self-Management Strategy for Musculoskeletal Pain and Chronic Conditions: A Systematic Review of Feasibility and Scope. J Integr Complement Med. 2023. doi: 10.1089/jicm.2023.0271
3. Skelly AC, Chou R, Dettori JR, Turner JA, Friedly JL, Rundell SD, et al. AHRQ Comparative Effectiveness Reviews. Noninvasive Nonpharmacological Treatment for Chronic Pain: A Systematic Review Update. Rockville (MD): Agency for Healthcare Research and Quality (US); 2020.
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8. Zhang W, Moskowitz RW, Nuki G, Abramson S, Altman RD, Arden N, et al. OARSI recommendations for the management of hip and knee osteoarthritis, part I: critical appraisal of existing treatment guidelines and systematic review of current research evidence. Osteoarthritis Cartilage. 2007;15(9):981-1000. doi: 10.1016/j.joca.2007.06.014

Included RCTs

(1-18)

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14. Liu K, Zhan Y, Zhang Y, Zhao Y, Chai Y, Lv H, et al. Efficacy and safety of Tuina (Chinese Therapeutic Massage) for knee osteoarthritis: A randomized, controlled, and crossover design clinical trial. Front Med (Lausanne). 2023;10:997116. doi: 10.3389/fmed.2023.997116
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16. Ojoawo AO, Olaogun MO, Hassan MA. Comparative effects of proprioceptive and isometric exercises on pain intensity and difficulty in patients with knee osteoarthritis: A randomised control study. Technol Health Care. 2016;24(6):853-63. doi: 10.3233/thc-161234
17. Peungsuwan P, Sermcheep P, Harnmontree P, Eungpinichpong W, Puntumetakul R, Chatchawan U, et al. The Effectiveness of Thai Exercise with Traditional Massage on the Pain, Walking Ability and QOL of Older People with Knee Osteoarthritis: A Randomized Controlled Trial in the Community. J Phys Ther Sci. 2014;26(1):139-44. doi: 10.1589/jpts.26.139
18. Sabet F, Ebrahimipour E, Mohammadipour F, Daneshjoo A, Jafarnezhadgero A. Effects of Swedish massage on gait spatiotemporal parameters in adult women with medial knee osteoarthritis: A randomized controlled trial. J Bodyw Mov Ther. 2021;28:521-6. doi: 10.1016/j.jbmt.2021.09.008

5. Charakteristika der eingeschlossenen Studien

PICO number:	150	150	150
PICO Question:	Does isolated or adjuvant massage therapy improve outcomes in knees with clinically and/or radiographically confirmed OA?	Does isolated or adjuvant massage therapy improve outcomes in knees with clinically and/or radiographically confirmed OA?	Does isolated or adjuvant massage therapy improve outcomes in knees with clinically and/or radiographically confirmed OA?
Article name:	Efficacy and safety of Tuina (Chinese Therapeutic Massage) for knee osteoarthritis: A randomized, controlled, and crossover design clinical trial	Noninvasive Nonpharmacological Treatment for Chronic Pain: A Systematic Review Update	Massage Therapy as a Self-management Strategy for Musculoskeletal Pain and Chronic Conditions: A Systematic Review of Feasibility and Scope
Lead author	Kaoqiang Liu	Skelly	Nemati
Year published	2023	2020	2023
Number of included studies (if SR with or without MA)	0	1 (specifically on massage)	17
Description of intervention group (optional for SRs)	The test group first received Tuina treatment for 4 weeks and then received health education intervention for another 4 weeks.	0	0
Description of control group (optional for SRs)	The control group first received health education intervention for 4 weeks and then received Tuina treatment for another 4 weeks.	0	0
Number of patients in intervention group	46	125	68+32 (two studies reviewed separately)
Number of patients in control group	45	0	0
Mean age with range of intervention group	60.33 ± 3.44	70 vs. 62 vs. 63 vs. 64 vs. 64 (5 groups)	Not specified
Mean age with range of control group	59.56 ± 3.57	0	0

Inclusion criteria (on patient-level if clinical study; on article-level if SR) **Examples:** **Clinical study: "The inclusion criteria were (i) primary ACLR in (ii) patients aged over 50 years. The exclusion criteria were (iii) severe concomitant ligament injury (grade 3), (iv) tibiofemoral osteoarthritis visible on weight-bearing anteroposterior and/or sagittal radiographs (> 50% joint space narrowing), and (v) history of intra- or extra-articular ligament surgery in either knee."** **SR: "Studies comparing the diagnostic accuracy of physical examination (clinical tests or ultrasound) versus arthroscopy for the assessment of LHBT pathologies"**	The inclusion criteria were as follows: subjects who signed written informed consent; age range from 50 to 80 years old (including boundary values); male or female; meeting the diagnostic criteria of KOA; X-ray imaging score of the knee joint; KL classification ≤ 3; the severity of KOA; 700 ≤ WOMAC total score ≤ 1,200; and clinical diagnosis of unilateral knee osteoarthritis. The exclusion criteria were as follows: subjects with acute fracture damage of the meniscus or surrounding ligament; rheumatic or rheumatoid arthritis; tumor around the knee joint; tuberculosis; idiopathic osteonecrosis of the knee joint; women who are breastfeeding or pregnant; having severe diseases such as cardiovascular, pulmonary, hepatic, renal, and hematopoietic systems, hemophilia, and other hemorrhagic diseases, and mental disease; use of a cardiac pacemaker; received intra-articular injection within 6 months prior to the trial; used disease-improving drugs and cartilage protectors within 6 months prior to the trial; treated with corticosteroids, acupuncture, or physical therapy 1 week before the treatment; the skin of patients on the treatment sites being damaged; long-term use of other drugs that affect the efficacy and safety judgment and have comprehensive treatment; and participated in other studies within 3 months before the trial. The researchers considered these patients inappropriate to be included.	The focus of this review is on randomized controlled trials (RCTs) reporting on longer-term outcomes (at least 1 month postintervention) that otherwise meet our PICOTS criteria. Inclusion: Adults with osteoarthritis-related pain (primary or secondary osteoarthritis) of the hip, knee or hand Exclusion: Other types of arthritis (e.g., rheumatoid), patients with joint replacement	This review examined articles that described studies within the realm of Rehabilitation Science, specifically those investigating musculoskeletal pain (e.g., neck pain, back pain, and arthritis pain) as well as conditions that impact health-related quality of life, including stress,anxiety, and depression. Studies were limited to quantitative investigations such as clinical trials, cohort, and crossover studies. Studies were included with a comparison group of any type, clinical trials with or without controls, parallel or crossover design, and with or without random allocation. Articles were included if massage was performed by participants. Finally, study eligibility was restricted to only peer-reviewed articles published in English.

Follow-up period	8	4 months	4 weeks, 8 weeks
Main results	A total of 96 patients were randomized into a test group and a control group, 48 patients in each group. Two patients in the test group withdrew in the 2nd week of the second stage, and three patients in the control group, respectively, withdrew in the 2nd, 3rd, and 4th week of the first stage (Figure 2; flow diagram of participant screening and randomization for details). Two groups are comparable in age, gender, BMI, X-ray image classification, WOMAC total score, WOMAC pain score, WOMAC stiffness score, WOMAC daily activity score, and VAS score (detailed baseline data of 96 patients are shown in Table 2). The analysis of variance (ANOVA) test for two-stage crossover designs was used to analyze the differences among intervention effects, stage effects, and individual differences. The results have shown that both the intervention effect and the stage effect contributed to the difference in the WOMAC total score, WOMAC pain score, WOMAC stiffness score, WOMAC daily activity score, and VAS score ($p < 0.05$). Detailed results are shown in Table 3. However, as shown in Table 4, the change value of the second stage is smaller than that of the first stage, so the stage effect reduces the difference between the two treatments	One fair-quality trial (N=125) compared four different dosages of massage therapy with usual care (continued current treatment).184 The massage protocol consisted of standard Swedish massage strokes applied in each intervention group over 8 weeks. The dosage varied from 240 to 720 minutes based on the frequency (once or twice per week) and duration of massage (30-60 minutes per session). Compliance was acceptable in all groups, and the methodological shortcoming of this trial was a lack of blinding for the patients and care providers in the usual care arm. Only short-term outcomes were reported. Massage. Data were insufficient from one fair-quality trial (n=125) to evaluate the short-term effects of massage therapy (4 different dosages) compared with usual care.184 Function was measured using the WOMAC total and physical function subscale scores (both 0 to 100 scales) and pain was measured using the WOMAC pain subscale and the VAS (both 0 to 10). No significant effects were seen in any outcome measure at 4 months postmassage treatment versus usual care (Table 27). Authors reported a trend for greater magnitude of change in function and pain with higher massage	

	the difference between the two treatments. In this case, the difference between the two treatments is still statistically significant, indicating that the conclusion is still reliable. Compared with the baseline, the WOMAC total score, WOMAC pain score, WOMAC stiffness, WOMAC daily activity, and VAS score of patients in both groups improved significantly at weeks 4 and 8 ($p < 0.001$). However, at week 4, the test group was superior to the control group in the WOMAC total score, WOMAC pain score, WOMAC stiffness, WOMAC daily activity, and VAS score ($p < 0.001$). Detailed results are shown in Table 4. At the same time, an independent sample t-test was used to compare and analyze differences between different intervention effects (Tuina and health education). The results showed that the mean difference between the efficacy of the Tuina treatment and health education was significant in the WOMAC total score (194.96, 95% CI = 164.94–224.97, P < 0.001), WOMAC pain score (45.96, 95% CI = 35.82–56.09, P < 0.001), WOMAC stiffness (31.42, 95% CI = 26.37–36.46, P < 0.001), WOMAC daily activity (117.58, 95% CI = 97.56–137.61, P < 0.001), and VAS score (1.07, 95% CI = 0.83–1.32, P < 0.001). Tuina therapy was	function and pain with higher massage dosages versus lower massage dosages and versus usual care (statistical tests not provided).	

	superior to health education in improving the WOMAC total score, WOMAC pain score, WOMAC stiffness, WOMAC daily activity, and VAS score ($p < 0.001$). Detailed results are shown in Tables 4, 5 and Figure 3. Safety Both groups had no serious adverse events during the treatment. A total of two female patients in the test group had local skin pain around the knee joint after Tuina therapy, which was caused by the stimulation of manipulation, and completed all treatments without special treatment. One patient in the control group withdrew because the pain in the knee joint increased during health education. A total of two patients in the control group took celecoxib (0.2g, qd, po) because of increased pain during health education.Safety Both groups had no serious adverse events during the treatment. A total of two female patients in the test group had local skin pain around the knee joint after Tuina therapy, which was caused by the stimulation of manipulation, and completed all treatments without special treatment. One patient in the control group withdrew because the pain in the knee joint increased during health education. A total of two patients in the control group took celecoxib (0.2g, qd, po) because of increased pain during health education.		

Key findings (use Results and Conclusion in Abstract)	Results: Compared with the baseline, the WOMAC total score, WOMAC pain score, WOMAC stiffness, WOMAC daily activity, and VAS score of patients in both groups were improved significantly at weeks 4 and 8 ($p < 0.001$). All patients who received Tuina treatment were significantly superior to those who received health education intervention in the WOMAC total score (194.96, 95% CI = 164.94–224.97, $P < 0.001$), WOMAC pain score (45.96, 95% CI = 35.82–56.09, $P < 0.001$), WOMAC stiffness (31.42, 95% CI = 26.37–36.46, $P < 0.001$), WOMAC daily activity (117.58, 95% CI = 97.56–137.61, $P < 0.001$), and VAS score (1.07, 95% CI = 0.83–1.32, $P < 0.001$). Both groups had no serious adverse events during the treatment. Conclusion: This trial demonstrated that Tuina can reduce joint pain in patients with KOA and improve the physical functions of the knee joint effectively and safely.	There was insufficient evidence from one trial to determine the effects of massage versus usual care on short-term function, pain, or harms, or to evaluate the effect of varying dosages of massage on outcomes (SOE: insufficient).	Results: A total of 17 studies were evaluated and included 770 participants (Female: N=606) with musculoskeletal pain or chronic conditions. The emerged themes for MTSM utilization consisted of arthritis pain (knee, n=3; neck, n=1, hand, n=2), neck and back pain (n=4), and stress and anxiety (n=3). Prescribed self-administered massage duration ranged from a single session to a maximum of 8-12 weeks, where 4-week (n=8) was the most commonly prescribed duration. Out of 11 studies that used MTSM as a solo modality, seven studies (41.2%) showed significant improvement in the outcome measures such as chronic neck and back pain, stress or anxiety, fatigue, quality of sleep, and health-related quality of life. In addition, health benefits, including anxiety, depression, pain intensity, and pain threshold, were observed in six studies (35.3%) where MTSM was applied as a co-adjuvant modality, which was combined with therapist-applied massage and physiotherapy. Conclusion: Our findings support that MTSM is a viable approach to enhance the benefit of therapist-applied massage or as a solo modality for symptom management of musculoskeletal pain and chronic conditions. The review provides suggestions for design

			The review provides suggestions for design improvement, such as reporting participants' adherence to the prescribed massage regimen, that would be informative for providing a robust understanding of the magnitude or the extent to which MTSM is effective. Future studies on MTSM intervention are encouraged to use a theoretical framework and validated measures for determining and facilitating treatment fidelity.
Type of Study	Randomised controlled trial (ROBII	Systematic review with or without meta-analysis (AMSTARII)	Systematic review with or without meta-analysis (AMSTARII)
Assessment tool	ROBII	AMSTAR	AMSTAR
Overall Assessment	High (RoB)	High (Quality assessment)	Low (Quality assessment)
What is the lowest evidence study included in the SR?		RCT, Level 1	Retrospective comparative study or case series, Level 3
Level of evidence (Oxford 2011)	Level 3, downgraded due to high risk of bias	Level 1*, upgraded due to high AMSTAR	Level 3

37. Statement	Modifiziert 2024
Die derzeitige Evidenz ist nicht ausreichend, um den Einsatz von Vibrationstherapie bei Gonarthrose beurteilen zu können.	
Level of Evidence (Oxford 2011) 2	Qiu et al. 2022
Konsensstärke	100% (starker Konsens)

1. Schlüsselfrage und PICO Format	
clinical key question	Does isolated or adjuvant vibration therapy improve outcomes in knees with clinically and radiographically confirmed OA?
population	Adults with: • symptomatic knee OA (clinically confirmed), AND • K/L stage 2/3/4 (radiographically confirmed), AND
intervention	• Device supported traction treatments
comparison	• Any other conservative treatment
outcome	• Progression of OA • Clinical and functional scores (validated PROMS): o Pain o Physical function o Health related quality of life o Satisfaction

2. Recherche Zusammenfassung

Identifier	*ID Ordinal 81*
PICO(T) question	Does isolated or adjuvant VIBRATION THERAPY improve outcomes in knees with clinically and radiographically confirmed OA?
Search characteristics	
Date of search	04 07 2023
Initials of primary reader	CA
Database(s)	*PubMed*
Keywords	*Knee* *osteoarthritis; arthritis; osteoarthros*; gonitis; gonarthritis; gonarthros** Vibration; therapy
Search strings	*#1 Animals[Title] OR Cadaver[Title] OR animal*[Title] OR dog[Title] OR dogs[Title] OR canine[Title] OR cats[Title] OR feline[Title] OR horse*[Title] OR equine[Title] OR mouse[Title] OR mice[Title] OR rat[Title] OR rats[Title] OR rabbit*[Title] OR sheep[Title] OR porcine[Title] OR pig[Title] OR pigs[Title] OR rodent*[Title] OR monkey*[Title] OR cadaver*[Title/Abstract] OR "in vitro"[Title/Abstract] OR comment[Publication Type] OR editorial[Publication Type] OR letter[Publication Type] OR "historical article"[Publication Type] OR address[Publication Type] OR news[Publication Type] OR "newspaper article" [Publication Type] OR "case reports"[Publication Type] OR case report*[Title] OR abstracts[Title] OR editorial[Title] OR reply[Title] OR comment*[Title] OR commentary[Title] OR letter[Title] OR biomechanic*[Title]* *#2 "randomized-controlled-trial" OR "Randomized-Controlled-Trials" OR "random-allocation" OR random*[Title] OR RCT* *#3 (systematic* AND review*) OR meta-analys*[Title/Abstract] OR meta-analysis OR systematic-review* *#4 (Knee)* *#5 (Osteoarthritis OR arthritis OR osteoarthros* OR gonitis OR gonarthritis OR gonarthros*)*

	#6 (vibration AND (treatment OR therapy)) #7 (#4 AND #5 AND #6) NOT #1 #8 (#7 AND #2) #9 (#7 AND #3)
Number of hits	
RCTs (#8)	38
SR(+MA) (#9)	16
Studies published before 2003	0 RCT OR SR/MAs
Articles to consider	
DOIs MAs	Qiu 2022: 10.2340/jrm.v54.2032 Fischer 2019 : 10.3389/fneur.2019.00627 Anwer 2016: 10.1016/j.physio.2015.10.004 Li 2015: 10.1155/2015/758147 Zafar 2015: 10.1016/j.apmr.2015.03.010 Wang 2015: 10.1177/0269215514564895
DOIs SRs	
DOIs RCTs	Pasterczyk-Szczurek 2023: 10.1186/s12891-023-06334-9 Lai 2021: 10.1016/j.jesf.2021.01.003 Lai 2019: No DOI Bokaeian 2016: 10.1016/j.jbmt.2015.08.005 Wang 2016: 10.1177/0269215515607970 Rabini 2015 : No DOI Segal 2013 : 10.1016/j.pmrj.2012.07.011 Simao 2012: 10.1016/j.apmr.2012.04.017 Avelar 2011: 10.1089/acm.2010.0782 Kitay 2009: 10.1016/j.joca.2009.04.015 Trans 2009: 10.1016/j.knee.2008.11.014
Include/Excluded after FT screening	
	RCTs
Include	Pasterczyk-Szczurek 2023: 10.1186/s12891-023-06334-9
Included in study	Lai 2021: 10.1016/j.jesf.2021.01.003
Included in study	Lai 2019: No DOI
Included in study	Bokaeian 2016: 10.1016/j.jbmt.2015.08.005
Included in study	Wang 2016: 10.1177/0269215515607970
Include	Rabini 2015 : No DOI
Included in study	Segal 2013 : 10.1016/j.pmrj.2012.07.011

Included in study	Simao 2012: 10.1016/j.apmr.2012.04.017
Included in study but could not retrieve	Avelar 2011: 10.1089/acm.2010.0782
Exclude	Kitay 2009: 10.1016/j.joca.2009.04.015
Included in study	Trans 2009: 10.1016/j.knee.2008.11.014
	SRs/MAs
Include	Qiu 2022: 10.2340/jrm.v54.2032
Excude : not specific enough	Fischer 2019 : 10.3389/fneur.2019.00627
Include	Anwer 2016: 10.1016/j.physio.2015.10.004
Include	Li 2015: 10.1155/2015/758147
Include	Zafar 2015: 10.1016/j.apmr.2015.03.010
Incude	Wang 2015: 10.1177/0269215514564895

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#8	•••	›	Search: **(#7 AND #2)** Sort by: **Most Recent**	38	04:58:36
#9	•••	›	Search: **(#7 AND #3)** Sort by: **Most Recent**	16	04:58:11
#7	•••	›	Search: **(#4 AND #5 AND #6) NOT #1** Sort by: **Most Recent**	76	04:57:57
#6	•••	›	Search: **(vibration AND (treatment OR therapy))** Sort by: **Most Recent**	15,555	04:57:44
#5	•••	›	Search: **(Osteoarthritis OR arthritis OR osteoarthros* OR gonitis OR gonarthritis OR gonarthros*)** Sort by: **Most Recent**	419,867	03:14:39
#4	•••	›	Search: **(Knee)** Sort by: **Most Recent**	208,100	03:14:36
#3	•••	›	Search: **(systematic* AND review*) OR meta-analys*[Title/Abstract] OR meta-analysis OR systematic-review** Sort by: **Most Recent**	539,520	03:14:32
#2	•••	›	Search: **"randomized-controlled-trial" OR "Randomized-Controlled-Trials" OR "random-allocation" OR random*[Title] OR RCT** Sort by: **Most Recent**	998,827	03:14:28
#1	•••	›	Search: **Animals[Title] OR Cadaver[Title] OR animal*[Title] OR dog[Title] OR dogs[Title] OR canine[Title] OR cats[Title] OR feline[Title] OR horse*[Title] OR equine[Title] OR mouse[Title] OR mice[Title] OR rat[Title] OR rats[Title] OR rabbit*[Title] OR sheep[Title] OR porcine[Title] OR pig[Title] OR pigs[Title] OR rodent*[Title] OR monkey*[Title] OR cadaver*[Title/Abstract] OR "in vitro"[Title/Abstract] OR comment[Publication Type] OR editorial[Publication Type] OR letter[Publication Type] OR "historical article"[Publication Type] OR address[Publication Type] OR news[Publication Type] OR "newspaper article" [Publication Type] OR "case reports"[Publication Type] OR case report*[Title] OR abstracts[Title] OR editorial[Title] OR reply[Title] OR comment*[Title] OR commentary[Title] OR letter[Title] OR biomechanic*[Title]** Sort by: **Most Recent**	8,508,800	03:14:24
#0	•••	›	Search: **Clipboard**	12	05:44:49

Showing 1 to 10 of 10 entries

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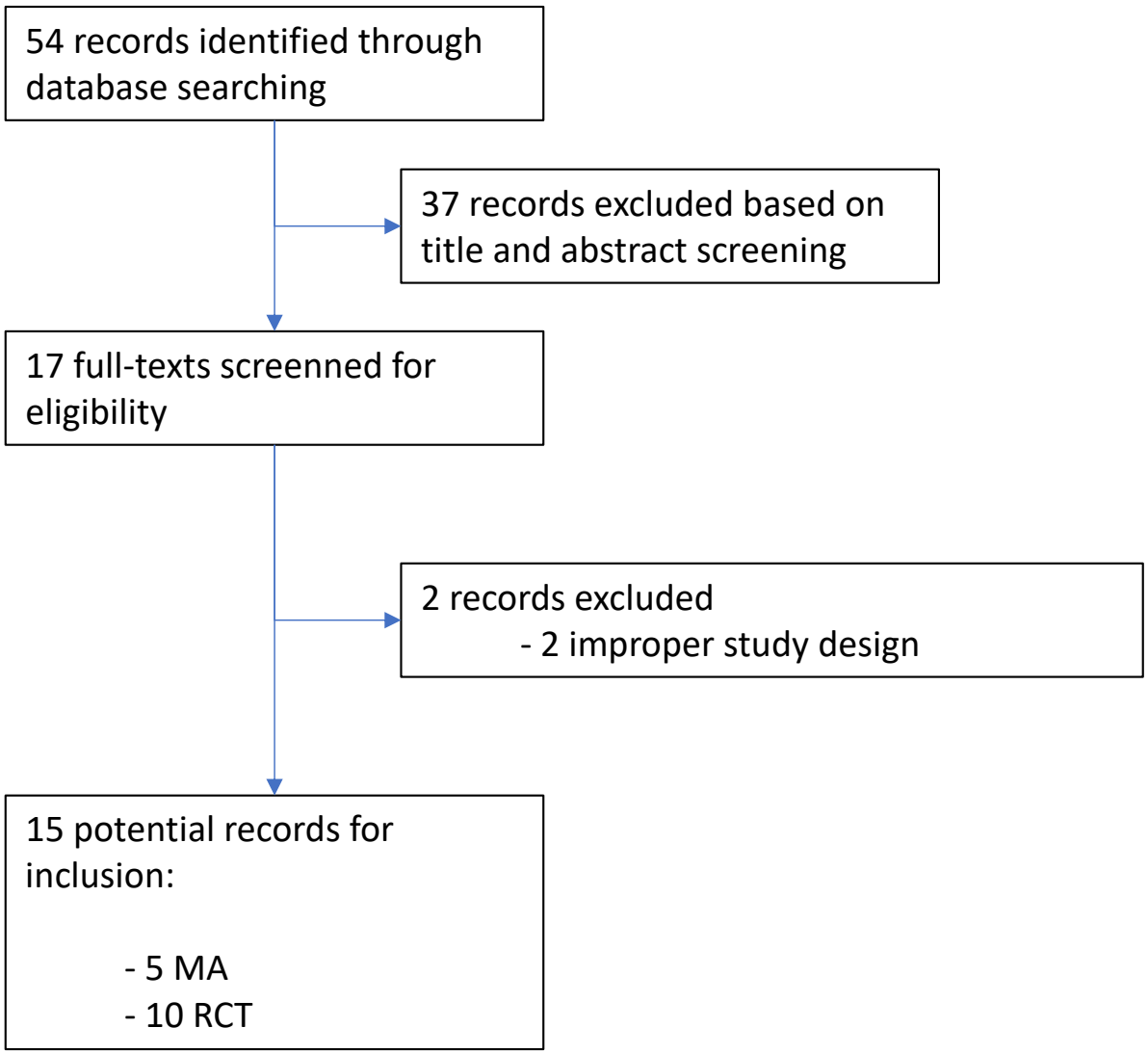
4. Studienselektion: Flowchart

PubMed Search: Does isolated or adjuvant VIBRATION THERAPY improve outcomes in knees with clinically and radiographically confirmed OA?

(04/07/2023)



Included SRs and MAs

(1-5)

1. Anwer S, Alghadir A, Zafar H, Al-Eisa E. Effect of whole body vibration training on quadriceps muscle strength in individuals with knee osteoarthritis: a systematic review and meta-analysis. Physiotherapy. 2016;102(2):145-51. doi: 10.1016/j.physio.2015.10.004
2. Li X, Wang XQ, Chen BL, Huang LY, Liu Y. Whole-Body Vibration Exercise for Knee Osteoarthritis: A Systematic Review and Meta-Analysis. Evid Based Complement Alternat Med. 2015;2015:758147. doi: 10.1155/2015/758147
3. Qiu CG, Chui CS, Chow SKH, Cheung WH, Wong RMY. Effects of Whole-Body Vibration Therapy on Knee Osteoarthritis: A Systematic Review and Meta-Analysis of Randomized Controlled Trials. J Rehabil Med. 2022;54:jrm00266. doi: 10.2340/jrm.v54.2032
4. Wang P, Yang X, Yang Y, Yang L, Zhou Y, Liu C, et al. Effects of whole body vibration on pain, stiffness and physical functions in patients with knee osteoarthritis: a systematic review and meta-analysis. Clin Rehabil. 2015;29(10):939-51. doi: 10.1177/0269215514564895
5. Zafar H, Alghadir A, Anwer S, Al-Eisa E. Therapeutic effects of whole-body vibration training in knee osteoarthritis: a systematic review and meta-analysis. Arch Phys Med Rehabil. 2015;96(8):1525-32. doi: 10.1016/j.apmr.2015.03.010

Included RCTs

(1-10)

1. Avelar NC, Simão AP, Tossige-Gomes R, Neves CD, Rocha-Vieira E, Coimbra CC, et al. The effect of adding whole-body vibration to squat training on the functional performance and self-report of disease status in elderly patients with knee osteoarthritis: a randomized, controlled clinical study. J Altern Complement Med. 2011;17(12):1149-55. doi: 10.1089/acm.2010.0782
2. Bokaeian HR, Bakhtiary AH, Mirmohammadkhani M, Moghimi J. The effect of adding whole body vibration training to strengthening training in the treatment of knee osteoarthritis: A randomized clinical trial. J Bodyw Mov Ther. 2016;20(2):334-40. doi: 10.1016/j.jbmt.2015.08.005
3. Lai Z, Lee S, Chen Y, Wang L. Comparison of whole-body vibration training and quadriceps strength training on physical function and neuromuscular function of individuals with knee osteoarthritis: A randomised clinical trial. J Exerc Sci Fit. 2021;19(3):150-7. doi: 10.1016/j.jesf.2021.01.003
4. Lai Z, Lee S, Hu X, Wang L. Effect of adding whole-body vibration training to squat training on physical function and muscle strength in individuals with knee osteoarthritis. J Musculoskelet Neuronal Interact. 2019;19(3):333-41.
5. Pasterczyk-Szczurek A, Golec J, Golec E. Effect of low-magnitude, variable-frequency vibration therapy on pain threshold levels and mobility in adults with moderate knee osteoarthritis-randomized controlled trial. BMC Musculoskelet Disord. 2023;24(1):287. doi: 10.1186/s12891-023-06334-9
6. Rabini A, de Sire A, Marzetti E, Gimigliano R, Ferriero G, Piazzini DB, et al. Effects of focal muscle vibration on physical functioning in patients with knee osteoarthritis: a randomized controlled trial. Eur J Phys Rehabil Med. 2015;51(5):513-20.
7. Segal NA, Glass NA, Shakoor N, Wallace R. Vibration platform training in women at risk for symptomatic knee osteoarthritis. Pm r. 2013;5(3):201-9; quiz 9. doi: 10.1016/j.pmrj.2012.07.011
8. Simão AP, Avelar NC, Tossige-Gomes R, Neves CD, Mendonça VA, Miranda AS, et al. Functional performance and inflammatory cytokines after squat exercises and whole-body vibration in elderly individuals with knee osteoarthritis. Arch Phys Med Rehabil. 2012;93(10):1692-700. doi: 10.1016/j.apmr.2012.04.017
9. Trans T, Aaboe J, Henriksen M, Christensen R, Bliddal H, Lund H. Effect of whole body vibration exercise on muscle strength and proprioception in females with knee osteoarthritis. Knee. 2009;16(4):256-61. doi: 10.1016/j.knee.2008.11.014
10. Wang P, Yang L, Liu C, Wei X, Yang X, Zhou Y, et al. Effects of Whole Body Vibration Exercise associated with Quadriceps Resistance Exercise on functioning and quality of life in patients with knee osteoarthritis: a randomized controlled trial. Clin Rehabil. 2016;30(11):1074-87. doi: 10.1177/0269215515607970

5. Charakteristika der eingeschlossenen Studien

PICO number:	81	81	81
PICO Question:	Does isolated or adjuvant VIBRATION THERAPY improve outcomes in knees with clinically and radiographically confirmed OA?	Does isolated or adjuvant VIBRATION THERAPY improve outcomes in knees with clinically and radiographically confirmed OA?	Does isolated or adjuvant VIBRATION THERAPY improve outcomes in knees with clinically and radiographically confirmed OA?
Article name:	EFFECTS OF WHOLE-BODY VIBRATION THERAPY ON KNEE OSTEOARTHRITIS: A SYSTEMATIC REVIEW AND META-ANALYSIS OF RANDOMIZED CONTROLLED TRIALS	No other studies added	No other studies added
Lead author	Qiu		
Year published	2022		
Number of included studies (if SR with or without MA)	14		
Description of intervention group (optional for SRs)	0		
Description of control group (optional for SRs)	0		
Number of patients in intervention group	559		
Number of patients in control group	0		
Mean age with range of intervention group	51.8-75 years		
Mean age with range of control group	0		

Inclusion criteria (on patient-level if clinical study; on article-level if SR) **Examples:** **Clinical study: "The inclusion criteria were (i) primary ACLR in (ii) patients aged over 50 years. The exclusion criteria were (iii) severe concomitant ligament injury (grade 3), (iv) tibiofemoral osteoarthritis visible on weight-bearing anteroposterior and/or sagittal radiographs (> 50% joint space narrowing), and (v) history of intra- or extra-articular ligament surgery in either knee."** **SR: "Studies comparing the diagnostic accuracy of physical examination (clinical tests or ultrasound) versus arthroscopy for the assessment of LHBT pathologies"**	Inclusion criteria were: (i) randomized controlled trials (RCTs); (ii) investigating effects of WBV; (iii) partici- pants diagnosed with knee OA; (iv) primary outcome measures including pain, stiffness, physical perfor- mance, lower limb muscle strength, quality of life, adverse events; and (v) reported in English. Exclusion criteria were: (i) lack of control group; (ii) conference abstracts; (iii) review paper; (iv) protocol paper.		
Follow-up period	4-24 weeks		

Main results	Pain intensity Five studies (14, 23, 24, 27, 29) used a visual analogue scale (VAS) and 1 study (26) used numerical rating scale (NRS) to evaluate pain intensity. The results of these 6 studies showed that WBV significantly reduced pain (SMD = 0.46 points, 95% CI = 0.20 – 0.71, p = 0.0004). Subgroup analysis showed that both low-frequency WBV (SMD = 0.61 points, 95% CI = 0.15 – 1.07, p = 0.009) and high-frequency WBV (SMD = 0.39 points, 95% CI = 0.08–0.70, p = 0.01) significantly reduced pain (Fig. 3). The WOMAC-pain subscale was used in 4 studies, which all used high-frequency vibration. The results also showed a significant reduction in pain intensity (SMD = 0.46 points, 95% CI = 0.17 – 0.76, p = 0.002) (Fig. 4). Stiffness Four studies (14, 19, 20, 24) with high-frequency vibration as an intervention used the WOMAC-		

	intervention used the WOMAC stiffness subscale to assess the effects on knee stiffness. The results showed that WBV did not significantly reduce stiffness (SMD = 0.07 points, 95% CI = −0.42–0.55, p = 0.79) (Fig. 4). WOMAC-function Seven studies (14, 15, 19, 20, 24, 26, 29) used the WOMAC-function subscale to evaluate self-reported function. The results showed that WBV signifi- cantly improved self-reported function in knee OA (SMD = 0.51 points, 95% CI = 0.27 – 0.75, p < 0.0001). In the subgroup analysis, self-reported function was improved in both the low-frequency group (SMD = 0.68 points, 95% CI = 0.25 – 1.12, p = 0.002) and the high-frequency group (SMD = 0.43 points, 95% CI = 0.14 – 0.72, p = 0.004) (Fig. 4). Functional performance Timed Up and Go (TUG) test. A total of		

	6 studies reported results of the TUG test (14, 15, 19, 24, 27, 29). Results of meta-analysis showed WBV signifi- cantly enhanced the performance of the TUG test in patients with knee OA (SMD = 0.82 points, 95% CI = 0.46 – 1.18, p < 0.00001). In the subgroup analysis, low-frequency WBV significantly improved the per-formance of the TUG test (SMD = 0.72 points, 95% CI = 0.22 – 1.22, p = 0.005). The high-frequency group also significantly improved in the TUG test (SMD = 0.82 points, 95% CI = 0.31 – 1.34, p = 0.002) (Fig. 5). 6-minute walk test (6MWT). Five studies reported the results of the 6MWT (14, 15, 19, 20, 24). Meta-analysis showed a trend that WBV was superior to the control group, but did not reach statistical significance (SMD = 0.75 points, 95% CI = –0.18 – 1.68, p = 0.11). In subgroup analysis, 4 studies with high-frequency were analysed, and the results were similar			

	analysed, and the results were similar (SMD = 1.00 points, 95% CI = –0.17 – 2.16, p = 0.09) (Fig. 6). Berg Balance Scale (BBS). Three studies used the BBS to test the ability of balance (19, 20, 23). There was no significant difference between WBV and con- trol groups (SMD = 0.23 points, 95% CI = –0.47 – 0.92, p = 0.53). In the subgroup analysis, high-frequency WBV had marginal significance (SMD=0.59 points, 95% CI = –0.02 – 1.20, p = 0.06). There was insuf- ficient data to perform subgroup analysis in the low-frequency group (Fig. 7). Chair stand test (CST). Two studies used a chair stand test as an outcome measure to assess functio- nal performance (19, 23). WBV with strengthening exercises did not have additional beneficial effects compared with the control group on the CST (SMD = –0.12 points, 95% CI = –0.86 – 0.62, p = 0.75) (Fig. 8).		

	Gait Speed Test. Two studies in the high-frequency group compared the effects of WBV on gait speed (20, 24). In comparison with strengthening exercise, WBV did not significantly increase the gait speed of individuals with knee OA (SMD = 0.29 points, 95% CI = –1.11 – 1.69, p = 0.68) (Fig. 8). Muscle strength. Six trials reported the outcome measures of muscle strength, involving isokinetic peak torque, peak power at 90°/s, and knee extensor isometric strength (14, 15, 20, 26, 27, 29). WBV significantly improved the extensor isokinetic peak torque (SMD = 0.65 points, 95% CI = 0.00 – 1.29, p = 0.05) and isokinetic peak power (SMD = 0.68 points, 95% CI = 0.26 – 1.10, p = 0.001). For subgroup analysis, low-frequency vibration was beneficial for extensor isokinetic peak torque (SMD = 0.90 points, 95% CI = 0.07 – 1.73, p = 0.03) and isokinetic peak power (SMD			

	= 0.76 points, 95% CI = 0.26 – 1.26, p = 0.003). No significant difference in flexor strength was found (Fig. 9). WBV with strengthening exercises showed additio- nal effects on knee extensor isometric muscle strength (SMD = 0.44 points, 95% CI = 0.13–0.75, p = 0.006) (Fig. 11). Subgroup analysis showed high-frequency WBV significantly enhanced knee extensor isometric strength (SMD = 0.51 points, 95% CI = 0.17–0.84, p = 0.003) (Fig. 11). No significant difference in flexor strength was found (Fig. 10).		

Key findings (use Results and Conclusion in Abstract)	Results: A total of 14 randomized controlled trials involving 559 patients with knee osteoarthritis met the inclusion criteria. Nine studies were good-quality trials (PEDro score=6–8), and 5 studies were fair-quality trials (PEDro score=4–5). Ten studies were included in the meta-analysis. One study showed negative effects of whole-body vibration on knee osteoarthritis. The duration of whole-body vibration ranged from 4 to 24 weeks. Meta-analysis revealed that whole-body vibration with strengthening exercises has a significant treatment effect on pain score (stan- dardized mean difference (SMD) = 0.46 points, 95% confidence interval (95% CI) = 0.20–0.71, p = 0.0004), the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC-function) (SMD = 0.51 points, 95% CI = 0.27–0.75, p < 0.0001), Timed Up and Go (TUG) test (SMD = 0.82 points, 95% CI = 0.46–1.18, p < 0.00001)		

	95% CI = 0.40–1.18, p < 0.00001), extensor isokinetic peak torque (SMD = 0.65 points, 95% CI = 0.00– 1.29, p = 0.05), peak power (SMD = 0.68 points, 95% CI = 0.26–1.10, p = 0.001), and extensor isometric strength (SMD = 0.44 points, 95% CI = 0.13–0.75, p = 0.006). Both low-frequency (10–30 Hz) and high-frequency (30–40 Hz) whole-body vibration were associated with significant changes in pain, physical function, and knee extensor strength (p < 0.05). WBV was not associated with significant changes in stiff- ness, balance ability, quality of life, and knee flexor strength. No adverse events were reported. Conclusion: Meta-analysis showed that low-frequency and high-frequency whole-body vibration had additional positive effects compared with strengthe- ning exercises alone on pain, knee extensor muscle strength, and physical function in individuals with knee OA. Whole-body vibration with strengthening exercises can be incorporated into treatment protocols.		
Type of Study	Systematic review with or without meta-analysis (AMSTARII)		
Assessment tool	AMSTAR		

Overall Assessment	Critically low (Quality assessment)		
What is the lowest evidence study included in the SR?	RCT, Level 1		
Level of evidence (Oxford 2011)	Level 2, downgraded due to critically low AMSTAR		

38. Statement	Modifiziert 2024
a) Für die apparative Traktionsbehandlung kann aufgrund der geringen Anzahl an Studien mit teilweise methodischen Mängeln keine Empfehlung ausgesprochen werden.	
Level of Evidence (Oxford 2011) 1 3	 Abdel-Aal et al. (2022) Alpayci et al. (2012)
b) Für die manuelle Traktion kann aufgrund fehlender Evidenz keine Empfehlung ausgesprochen werden.	
Konsensstärke	95 % (Konsens)

1. Schlüsselfrage und PICO Format	
clinical key question	Do isolated or adjuvant device supported traction treatments improve outcomes in knees with clinically and radiographically confirmed OA?
population	Adults with: • symptomatic knee OA (clinically confirmed), AND • K/L stage 2/3/4 (radiographically confirmed), AND
intervention	• Device supported traction treatments
comparison	• Any other conservative treatment

outcome	• Progression of OA
	• Clinical and functional scores (validated PROMS):
	  ○ Pain
	  ○ Physical function
	  ○ Health related quality of life
	  ○ Satisfaction

2. Recherche Zusammenfassung

Identifier	*ID Ordinal*
PICO(T) question	Do isolated or adjuvant device supported traction treatments improve outcomes in knees with clinically and radiographically confirmed OA?
Search characteristics	
Date of search	04/06/2023
Initials of primary reader	FVR
Database(s)	*PubMed*
Keywords	*Knee* *osteoarthritis; arthritis; osteoarthros*; gonitis; gonarthritis; gonarthros** (traction AND (treatment OR therapy))
Search strings	*#1 Animals[Title] OR Cadaver[Title] OR animal*[Title] OR dog[Title] OR dogs[Title] OR canine[Title] OR cats[Title] OR feline[Title] OR horse*[Title] OR equine[Title] OR mouse[Title] OR mice[Title] OR rat[Title] OR rats[Title] OR rabbit*[Title] OR sheep[Title] OR porcine[Title] OR pig[Title] OR pigs[Title] OR rodent*[Title] OR monkey*[Title] OR cadaver*[Title/Abstract] OR "in vitro"[Title/Abstract] OR comment[Publication Type] OR editorial[Publication Type] OR letter[Publication Type] OR "historical article"[Publication Type] OR address[Publication Type] OR news[Publication Type] OR "newspaper article" [Publication Type] OR "case reports"[Publication Type] OR case report*[Title] OR abstracts[Title] OR editorial[Title] OR reply[Title] OR comment*[Title] OR commentary[Title] OR letter[Title] OR biomechanic*[Title]* *#2 "randomized-controlled-trial" OR "Randomized-Controlled-Trials" OR "random-allocation" OR random*[Title] OR RCT* *#3 (systematic* AND review*) OR meta-analys*[Title/Abstract] OR meta-analysis OR systematic-review* *#4 (Knee)* *#5 (Osteoarthritis OR arthritis OR osteoarthros* OR gonitis OR gonarthritis OR gonarthros*)*

	#6 (traction AND (treatment OR therapy)) #7 (#4 AND #5 AND #6) NOT #1 #8 (#7 AND #2) #9 (#7 AND #3)
Number of hits	
RCTs (#8)	5
SR(+MA) (#9)	2
Studies published before 2003	1 RCT and 0 SR
Articles to consider	
DOIs MAs	
DOIs SRs	10.1016/j.joca.2014.08.011
DOIs RCTs	10.1177/02692155221091508 10.1007/s00167-016-4131-0 10.1177/0269215512459062
Include/Excluded after FT screening	SRs
Include	10.1016/j.joca.2014.08.011
	RCTs
Include	10.1177/02692155221091508 10.1007/s00167-016-4131-0 10.1177/0269215512459062

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Query box

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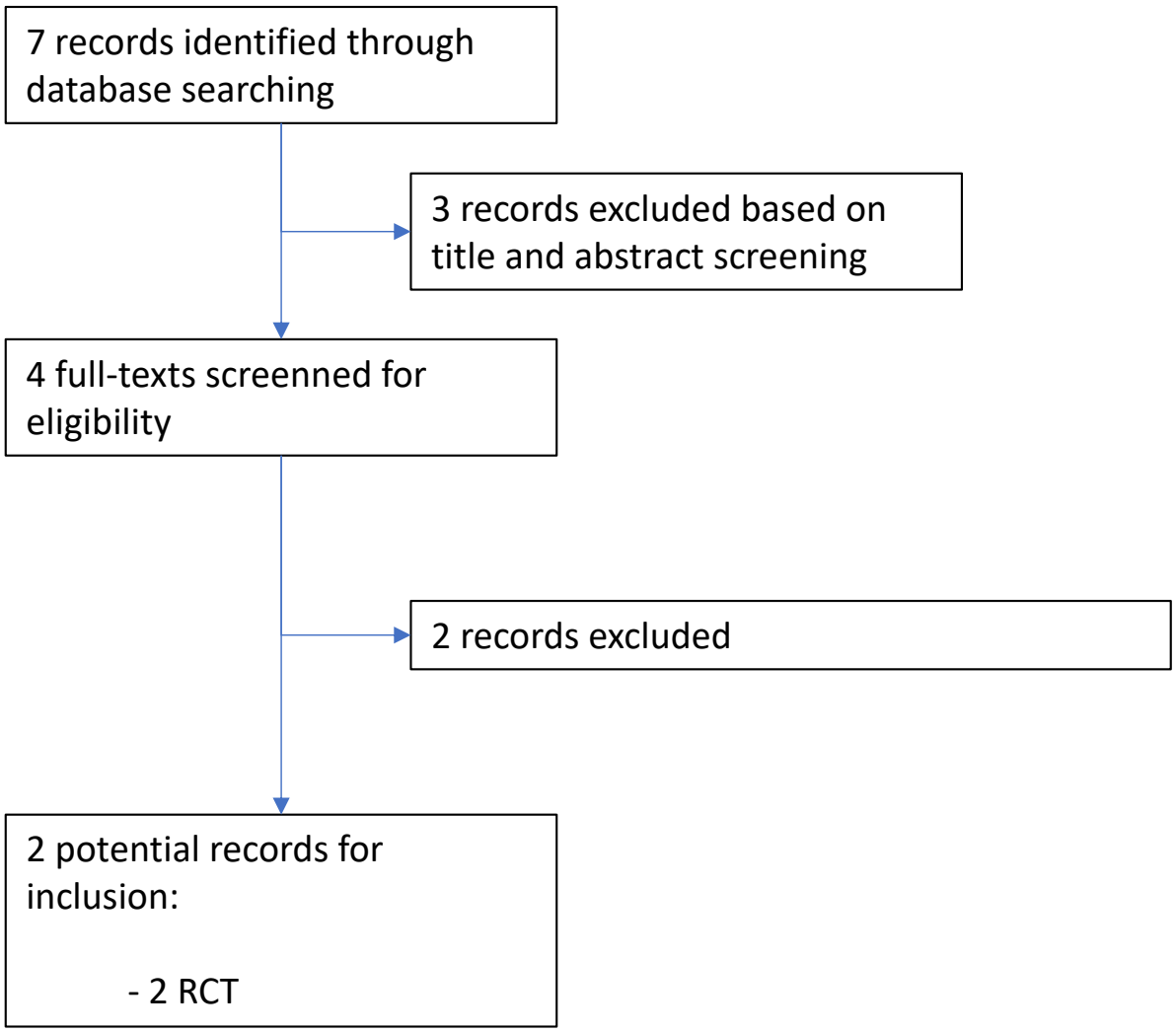
History and Search Details

Search	Actions	Details	Query	Results	Time
#9	•••		Search: **(#7 AND #3)** Sort by: **Most Recent**	2	08:41:00
#8	•••		Search: **(#7 AND #2)** Sort by: **Most Recent**	5	08:40:54
#7	•••		Search: **(#4 AND #5 AND #6) NOT #1** Sort by: **Most Recent**	59	08:40:46
#6	•••		Search: **(traction AND (treatment OR therapy))** Sort by: **Most Recent**	20,402	08:40:28
#5	•••		Search: **(Osteoarthritis OR arthritis OR osteoarthros* OR gonitis OR gonarthritis OR gonarthros*)** Sort by: **Most Recent**	419,883	08:40:22
#4	•••		Search: **(Knee)** Sort by: **Most Recent**	208,102	08:40:13
#3	•••		Search: **(systematic* AND review*) OR meta-analys* [Title/Abstract] OR meta-analysis OR systematic-review** Sort by: **Most Recent**	539,552	08:40:06
#2	•••		Search: **"randomized-controlled-trial" OR "Randomized-Controlled-Trials" OR "random-allocation" OR random*[Title] OR RCT** Sort by: **Most Recent**	998,858	08:40:00
#1	•••		Search: **Animals[Title] OR Cadaver[Title] OR animal*[Title] OR dog[Title] OR dogs[Title] OR canine[Title] OR cats[Title] OR feline[Title] OR horse*[Title] OR equine[Title] OR mouse[Title] OR mice[Title] OR rat[Title] OR rats[Title] OR rabbit*[Title] OR sheep[Title] OR porcine[Title] OR pig[Title] OR pigs[Title] OR rodent*[Title] OR monkey*[Title] OR cadaver*[Title/Abstract] OR "in vitro"[Title/Abstract] OR comment[Publication Type] OR editorial[Publication Type] OR letter[Publication Type] OR "historical article"[Publication Type] OR address[Publication**	8,508,944	08:39:52

4. Studienselektion: Flowchart

PubMed Search: Do isolated or adjuvant device supported trac2on treatments improve outcomes in knees with clinically and radiographically confirmed OA? (04/06/2023)



(1, 2)

1. Abdel-Aal NM, Ibrahim AH, Kotb MM, Hussein AA, Hussein HM. Mechanical traction from different knee joint angles in patients with knee osteoarthritis: A randomized controlled trial. Clin Rehabil. 2022;36(8):1083-96. doi: 10.1177/02692155221091508
2. Alpayci M, Ozkan Y, Yazmalar L, Hiz O, Ediz L. A randomized controlled trial on the efficacy of intermittent and continuous traction for patients with knee osteoarthritis. Clin Rehabil. 2013;27(4):347-54. doi: 10.1177/0269215512459062

5. Charakteristika der eingeschlossenen Studien

PICO number:	67	67	67
PICO Question:	Do isolated or adjuvant device supported traction treatments improve outcomes in knees with clinically and radiographically confirmed OA?	Do isolated or adjuvant device supported traction treatments improve outcomes in knees with clinically and radiographically confirmed OA?	Do isolated or adjuvant device supported traction treatments improve outcomes in knees with clinically and radiographically confirmed OA?
Article name:	A randomized controlled trial on the efficacy of intermittent and continuous traction for patients with knee osteoarthritis	Mechanical traction from different knee joint angles in patients with knee osteoarthritis: A randomized controlled trial	NO OTHER STUDIES AVAILABLE
Lead author	Alpayci	Abdel-Aal	
Year published	2012	2022	
Number of included studies (if SR with or without MA)	0	0	

Description of intervention group (optional for SRs)	the intermittent group received hot pack, short wave diathermy and intermittent traction; and the continuous group received hot pack, short wave diathermy and continuous traction, for three weeks (weekends excluded).	Group B received conventional physiotherapy treatment with traction applied while the patient in long sitting and knee joint at full extension.8 Group C received conventional physiotherapy treatment with traction while the patient in supine with hip and knee in 90° positions (leg in an adjustable table covered with a soft layer of compressed sponge),10 while Group D received conventional physiotherapy treatment with traction while the patient is supine with the knee in 20°flexion position (by using a wedge under the knee joint)9 as in Figure 1. All traction groups received continuous knee joint traction with axial traction force applied along the shaft of the tibia. Traction was applied with a fixed weight of 15 kg which was reported to provid enlargement in the knee joint space that may reduce the intra-articular stress.8,20,21 Traction was applied	

		stress.8,20,21 Traction was applied for 15 min, 3 sessions a week for 4 weeks. The Traction System TM-400® (ITO Physiotherapy & Rehabilitation) device was used. Adjustable suitable cuff sizes were used for all patients and the thigh was secured with straps during traction applications. Also, the adjustable table (in group C) and wedge (in group D) were firmly fixed with straps.	
Description of control group (optional for SRs)	The control group received hot pack and short wave diathermy	Group (A) received conventional physiotherapy(CPT) treatment;	
Number of patients in intervention group	intermittent group, 32; continuous group, 33	Group B, 30; Group C, 30; Group D, 30	
Number of patients in control group	33	Group A, 30	
Mean age with range of intervention group	intermittent group, 58.20; continuous group, 57.97	Group B, 51.66; Group C, 53.9; Group D, 51.73	
Mean age with range of control group	59.3	Group A, 51.43	

Inclusion criteria (on patient-level if clinical study; on article-level if SR) **Examples:** **Clinical study: "The inclusion criteria were (i) primary ACLR in (ii) patients aged over 50 years. The exclusion criteria were (iii) severe concomitant ligament injury (grade 3), (iv) tibiofemoral osteoarthritis visible on weight-bearing anteroposterior and/or sagittal radiographs (> 50% joint space narrowing), and (v) history of intra- or extra-articular ligament surgery in either knee."** **SR: "Studies comparing the diagnostic accuracy of physical examination (clinical tests or ultrasound) versus arthroscopy for the assessment of LHBT pathologies"**	Patients were diagnosed with knee osteoarthritis according to the American College of Rheumatology criteria6 by a physiatrist, who excluded any other medical conditions. Patients with any of the follow- ing conditions were excluded from the study: sec- ondary gonarthrosis, inflammatory joint disease, injections or physical therapy on the knee within the last three months, use of steroid or non-steroidal anti-inflammatory drug within the last 15 days, and other causes of pain in the lower extremity (e.g. polyneuropathy, restless leg syndrome, fibromyal- gia, hip pathologies, spinal root compressions, cen- tral nervous system diseases), mental status disorders, and poor medical condition. Patients with bilateral stage 3 knee osteoarthritis according to the Kellgren–Lawrence radiological rating scale7 were included in the study	All participants were invited to join the study through written advertisements and signed a written consent form before participation. Participants were diagnosed with knee osteoarth- ritis by an orthopedic physician. The diagnosis is based on clinical findings and X-ray imaging. The inclusion criteria were 1) age from 45 to 60 years 2) unilateral knee osteoarthritis (grade 2 or 3) according to the Kellgren–Lawrence radiological rating scale.13 Patients were excluded if they had: secondary gonarthrosis, knee deformities, joint infections and inflammatory joint disease, physical therapy on the knee within the last 3 months or steroid injections, non-steroidal anti-inflammatory drug within the last 15 days, other causes of pain in the lower extremity (e.g. central nervous system diseases, fibromyalgia, polyneuropathy, restless leg syndrome, hip pathologies, spinal root compressions), skin disease or	

	study.	foot compressions), skin disease or open wounds around the knee joint, mental status disorders, poor medical condition, previous ligament or meniscal injuries or subjects who had received surgery on the knee joint, and bone tumors.	
Follow-up period	7 weeks	Descriptive statistics were calculated for all groups at baseline, after 4 weeks of intervention, and after 8 weeks as a follow-up.	

Main results	Compared with baseline (week 0), at the end of treatments (week 3) all the outcome measures, except range of motion, were significantly reduced in all three groups (all P=0.000). However, consid- ering the change data from baseline to week 3, there were no significant differences among the three groups in the visual analog scale pain (P=0.461) and WOMAC stiffness (P=0.408) scores, while there were significant differences between the con- trol and continuous groups in the WOMAC pain (P=0.009) and WOMAC total (P=0.021) scores. Also, in terms of the change data from baseline to week 3, both traction groups were significantly dif- ferent from the control group in the physical func- tion scores (Table 2). At the follow-up (week 7), all the outcome measures, except range of motion, were signifi- cantly reduced in all the groups compared with baseline (all P≤0.001). Nevertheless, considering the change data from	The results of the between-groups effect showed, there were no statistically significant dif- ferences among the four groups in the visual analog scale ($p > 0.05$) after 4 weeks of interven- tion. Also, no significant differences were found among the three traction groups in passive range of motion ($p > 0.05$) after 4 weeks or after 8 weeks. However, passive range of motion was sig- nificantly increased in the three traction groups compared with the control group ($P < 0.05$). Both traction groups (C and D) were signifi- cantly different from the control group and group B in WOMAC(pain, stiffness, physical function, and total scores) after 4 weeks and after the 8 weeks ($P<0.05$). Also, both traction groups (C and D) were significantly different from the control group and group B in visual analog scale after the 8 weeks. However, group B was signifi- cantly different from the control in the same	

	considering the change data from baseline to week 7, both traction groups were significantly different from the control group in the pain scores, WOMAC physical function and WOMAC total scores, while only the continuous group was significantly dif- ferent from the control in the stiffness scores (P=0.014) (Table 3). Compared with baseline at weeks 3 and 7, range of motion values significantly increased in both traction groups but not in the control. Also, the continuousgroupwassignificantlydiffe rentfrom the other two groups in terms of the change data from baseline to week 3 (Table 2). However, there were no significant differences among the three groups considering the change data from baseline to week 7 in range of motion values (P=0.300) (Table 3).	different from the control in the same outcome measures except for the WOMAC stiff- ness scores (p = 0.99). There were no statistically significant differ- ences between group C and D in WOMAC (pain, stiffness, physical function, and total scores) after 4 weeks or 8 weeks (p=0.99) as in Tables 2, 3 and 4. Regarding the within-group comparison, all the outcome measures were significantly improved in all groups after 4 weeks and after 8 weeks measurements compared with baseline (p < 0.001) as in Table 5.	

Key findings (use Results and Conclusion in Abstract)	Outcome measurements: The values of the Turkish version of the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), visual analog scale, and knee passive range of motion were measured at baseline, three-week and seven-week follow-up. Results: Compared with baseline at weeks 3 and 7, all the outcome measures, except range of motion, were significantly reduced in all groups (all P≤0.001). In terms of the change data from baseline to week 3, both traction groups were significantly superior to the control in the WOMAC physical function scores. Considering the change data from baseline to week 7, both traction groups were significantly superior to the control in the pain scores, physical function and total scores, while only the continuous group was significantly better than the control in the stiffness scores (control: 1.17 ± 1.64; continuous: 2.38 ± 1.44)	Results: After eight weeks, the mean (SD) for VAS scores were 30.97 ± 8.68, 24.0 ± 8.8, 15.43 ± 6.31, and 16.17 ± 6.11 mm; for total WOMAC scores were 26.77 ± 9.19, 20.3 ± 8.52, 13.27 ± 6.25, and 13.43 ± 7.14 for groups A, B, C and D, respectively. The three traction groups showed statistically significant changes in pain scores, physical function, and total WOMAC, but not for knee passive range of motion, in favor of traction groups C and D than the conventional group (P < 0.05). Conclusions: Traction from 90°and 20° of knee flexion was found superior to full extension knee in improving pain and physical function, but not for knee passive range of motion, in patients with knee osteoarthritis.	

	1.64, continuous: 2.83 ± 1.44) (P=0.014). Compared with baseline at weeks 3 and 7, range of motion values significantly increased in both traction groups (P<0.05) but not in the control (P>0.05). However, there were no significant differences among the three groups considering the change data from baseline to week 7 in range of motion values (P=0.300). Conclusions: Joint traction was found to be beneficial for the improvement of pain and physical function loss related to knee osteoarthritis.		
Type of Study	Randomised controlled trial (ROBII	Randomised controlled trial (ROBII	
Assessment tool	ROBII	ROBII	
Overall Assessment	High (RoB)	Low (RoB)	
What is the lowest evidence study included in the SR?			
Level of evidence (Oxford 2011)	Level 3, downgraded due to high risk of bias	Level 1, upgraded due to low risk of bias	

1. Schlüsselfrage und PICO Format	
Clinical key question	Does isolated or adjuvant manual traction treatments improve outcomes in knees with clinically and/or radiographically confirmed OA?
Population	Adults with isolated medial or lateral: • symptomatic knee OA (clinically confirmed), and • K/L stage 2/3/4 (radiographically confirmed)
Intervention	Isolated or adjuvant manual traction treatments
Comparison	NA
Outcome	• Progression of OA (within same/other compartments) • Adverse events requiring readmission, reoperation, or arthroplasty • Clinical and functional scores (validated PROMS): o Pain o Physical function o Health related quality of life o Satisfaction

2. Recherche Zusammenfassung

Identifier	*ID Ordinal 148*
PICO(T) question	Does isolated or adjuvant manual traction treatments improve outcomes in knees with clinically and/or radiographically confirmed OA?
Search characteristics	
Date of search	24/01/2024
Initials of primary reader	BG
Database(s)	*PubMed*
Keywords	*Knee* *osteoarthritis; arthritis; osteoarthros*; gonitis; gonarthritis; gonarthros** manual traction, traction therapy, traction
Search strings	*#1 Animals[Title] OR Cadaver[Title] OR animal*[Title] OR dog[Title] OR dogs[Title] OR canine[Title] OR cats[Title] OR feline[Title] OR horse*[Title] OR equine[Title] OR mouse[Title] OR mice[Title] OR rat[Title] OR rats[Title] OR rabbit*[Title] OR sheep[Title] OR porcine[Title] OR pig[Title] OR pigs[Title] OR rodent*[Title] OR monkey*[Title] OR cadaver*[Title/Abstract] OR "in vitro"[Title/Abstract] OR comment[Publication Type] OR editorial[Publication Type] OR letter[Publication Type] OR "historical article"[Publication Type] OR address[Publication Type] OR news[Publication Type] OR "newspaper article" [Publication Type] OR "case reports"[Publication Type] OR case report*[Title] OR abstracts[Title] OR editorial[Title] OR reply[Title] OR comment*[Title] OR commentary[Title] OR letter[Title] OR biomechanic*[Title]* *#2 "randomized-controlled-trial" OR "Randomized-Controlled-Trials" OR "random-allocation" OR random*[Title] OR RCT* *#3 (systematic* AND review*) OR meta-analys*[Title/Abstract] OR meta-analysis OR systematic-review* *#4 (Knee)* *#5 (Osteoarthritis OR arthritis OR osteoarthros* OR gonitis OR gonarthritis OR gonarthros*)*

	#6 "manual traction" OR "traction therapy" OR traction #7 (#4 AND #5 AND #6) NOT #1 #8 (#7 AND #2) #9 (#7 AND #3)
Number of hits	
RCTs (#8)	5
SR(+MA) (#9)	3
Studies published before 2003	0
Articles to consider	
DOIs MAs	
DOIs SRs	10.1016/j.joca.2014.08.011
DOIs RCTs	10.1177/0269215512459062
Include/Excluded after FT screening	
SRs excluded: mechanical traction treatment	10.1016/j.joca.2014.08.011
RCTs excluded: mechanical traction treatment	10.1177/0269215512459062

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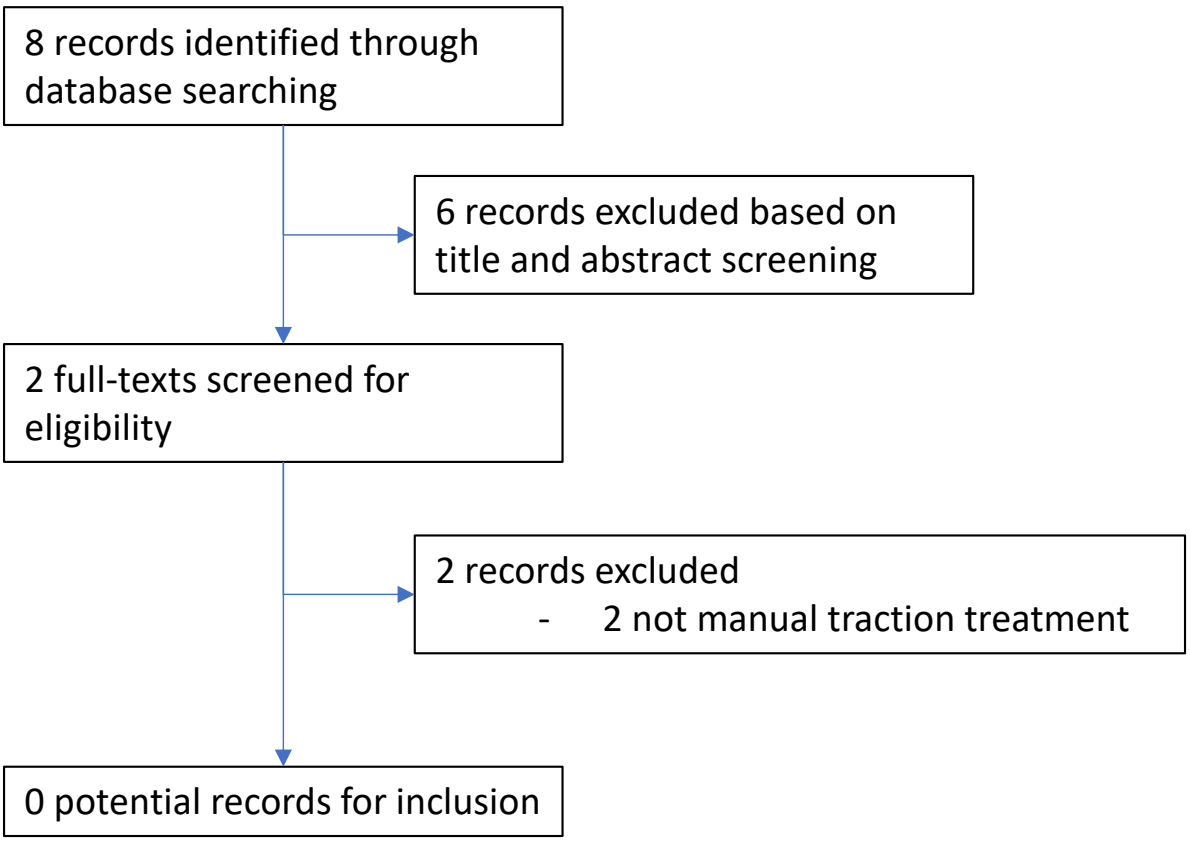
Search	Actions	Details	Query	Results	Time
#9	•••		Search: **(#7 AND #3)** Sort by: **Most Recent**	3	11:25:21
#8	•••		Search: **(#7 AND #2)** Sort by: **Most Recent**	5	11:25:11
#7	•••		Search: **(#4 AND #5 AND #6) NOT #1** Sort by: **Most Recent**	72	11:25:02
#6	•••		Search: **"manual traction" OR "traction therapy" OR traction** Sort by: **Most Recent**	31,050	11:24:54
#5	•••		Search: **(Osteoarthritis OR arthritis OR osteoarthros* OR gonitis OR gonarthritis OR gonarthros*)** Sort by: **Most Recent**	431,150	11:07:51
#4	•••		Search: **(Knee)** Sort by: **Most Recent**	214,460	11:07:44
#3	•••		Search: **(systematic* AND review*) OR meta-analys* [Title/Abstract] OR meta-analysis OR systematic-review** Sort by: **Most Recent**	574,020	11:07:37
#2	•••		Search: **"randomized-controlled-trial" OR "Randomized-Controlled-Trials" OR "random-allocation" OR random*[Title] OR RCT** Sort by: **Most Recent**	1,025,844	11:07:29
#1	•••		Search: **Animals[Title] OR Cadaver[Title] OR animal*[Title] OR dog[Title] OR dogs[Title] OR canine[Title] OR cats[Title] OR feline[Title] OR horse*[Title] OR equine[Title] OR mouse[Title] OR mice[Title] OR rat[Title] OR rats[Title] OR rabbit*[Title] OR sheep[Title] OR porcine[Title] OR pig[Title] OR pigs[Title] OR rodent*[Title] OR monkey*[Title] OR cadaver*[Title/Abstract] OR "in vitro"[Title/Abstract] OR comment[Publication Type] OR editorial[Publication Type] OR letter[Publication Type] OR "historical article"[Publication Type] OR address[Publication Type] OR news[Publication Type] OR "newspaper article" [Publication Type] OR "case reports"[Publication Type] OR case report*[Title] OR abstracts[Title] OR editorial[Title] OR reply[Title] OR comment*[Title] OR commentary[Title] OR letter[Title] OR biomechanic*[Title]** Sort by: **Most Recent**	8,664,994	11:07:22

4. Studienselektion: Flowchart

PubMed Search: Does isolated or adjuvant manual traction treatments improve outcomes in knees with clinically and/or radiographically confirmed OA? (24/01/2024)



39. Empfehlung	Modifiziert 2024
Empfehlungsgrad ⇓⇓	Wir empfehlen, die folgenden elektrotherapeutischen Interventionen bei Personen mit Gonarthrose aufgrund unzureichender Belege für einen Nutzen nicht durchzuführen: • Transkutane elektrische Nervenstimulation (TENS) • Ultraschalltherapie • Interferenzstrom • Lasertherapie • gepulste Kurzwellentherapie • Neuromuskuläre elektrische Stimulation (NMES)
Level of Evidence (GRADE) Auszugsweise NMES vs. keine Behandlung: Schmerz ≤ 3 Monate: ⊕ Funktion ≤ 3 Monate: ⊕ Lebensqualität ≤ 3 Monate: ⊕ Ultraschalltherapie vs. keine Behandlung: Schmerz ≤ 3 Monate: ⊕ Funktion ≤ 3 Monate: ⊕ Lebensqualität ≤ 3 Monate: ⊕	Adoption einer evidenzbasierten Empfehlung aus: NICE Guideline NG226 (Punkt 1.3.9) (1)
Konsensstärke	89 % (Konsens)

Schlüsselfrage und PICO Format sind dem Evidence Review G der Quellleitlinie zu entnehmen hier:

https://www.nice.org.uk/guidance/ng226/evidence/g-clinical-and-cost-effectiveness-of-electrotherapy-for-the-management-of-osteoarthritis-pdf-11250452852 (ab Seite 7)

Suchhistorie und Recherche Flowchart sind den Appendices B-C des Evidence Review G zu entnehmen hier:

https://www.nice.org.uk/guidance/ng226/evidence/g-clinical-and-cost-effectiveness-of-electrotherapy-for-the-management-of-osteoarthritis-pdf-11250452852 (ab Seite 233)

Evidenztabellen nach GRADE sind dem Appendix F des Evidence Review G der Quellleitlinie zu entnehmen hier:

https://www.nice.org.uk/guidance/ng226/evidence/g-clinical-and-cost-effectiveness-of-electrotherapy-for-the-management-of-osteoarthritis-pdf-11250452852 (ab Seite 577)

Empfehlung der zugrundeliegenden Quellleitlinie:

Leitlinie (Erscheinungsjahr)	NICE NG226 (2022) (1)
Empfehlung:	1.3.9 „Do not offer any of the following electrotherapy treatments to people with osteoarthritis because there is insufficient evidence of benefit: • transcutaneous electrical nerve stimulation (TENS) • ultrasound therapy • interferential therapy • laser therapy • pulsed short-wave therapy • neuromuscular electrical stimulation (NMES).“
Empfehlungsgrad:	„strong“
Evidenzgrad:	Kein Gesamtevidenzgrad angegeben. GRADE Profile siehe Appendix F des Evidence Review G ab Seite 577
Referenzen:	Siehe Evidence Review G Tabelle 2 ab Seite 12 https://www.nice.org.uk/guidance/ng226/evidence/g-clinical-and-cost-effectiveness-of-electrotherapy-for-the-management-of-osteoarthritis-pdf-11250452852

1. (NICE), National Institute for Health and Care Excellence. Osteoarthritis in over 16s: diagnosis and management (NICE Guideline NG226). London: National Institute for Health and Care Excellence; 2022 Oct 19.https://www.nice.org.uk/guidance/ng226 [Date Accessed: 02.07.2024].

40. Statement	Modifiziert 2024
Die derzeitige Evidenz ist nicht ausreichend, um den Einsatz von Ergotherapie bei Gonarthrose beurteilen zu können.	
Level of Evidence (Oxford 2011) 3	Murphy et al. (2018)
Konsensstärke	100% (starker Konsens)

1. Schlüsselfrage und PICO Format	
Clinical key question	Does isolated or adjuvant occupational therapy improve outcomes in knees with clinically and radiographically confirmed OA?
Population	Adults with isolated medial or lateral: • symptomatic knee OA (clinically confirmed), and • K/L stage 2/3/4 (radiographically confirmed)
Intervention	Isolated or adjuvant occupational therapy
Comparison	NA

Outcome	• Progression of OA (within same/other compartments)
	• Adverse events requiring readmission, reoperation, or arthroplasty
	• Clinical and functional scores (validated PROMS):
	  ○ Pain
	  ○ Physical function
	  ○ Health related quality of life
	  ○ Satisfaction

2. Recherche Zusammenfassung

Identifier	*ID Ordinal*
PICO(T) question	Does isolated or adjuvant **occupational therapy** improve outcomes in knees with clinically and radiographically confirmed OA?
Search characteristics	
Date of search	04/07/2023
Initials of primary reader	BG
Database(s)	*PubMed*
Keywords	*Knee* *osteoarthritis; arthritis; osteoarthros*; gonitis; gonarthritis; gonarthros** occupational, therapy, treatment
Search strings	*#1 Animals[Title] OR Cadaver[Title] OR animal*[Title] OR dog[Title] OR dogs[Title] OR canine[Title] OR cats[Title] OR feline[Title] OR horse*[Title] OR equine[Title] OR mouse[Title] OR mice[Title] OR rat[Title] OR rats[Title] OR rabbit*[Title] OR sheep[Title] OR porcine[Title] OR pig[Title] OR pigs[Title] OR rodent*[Title] OR monkey*[Title] OR cadaver*[Title/Abstract] OR "in vitro"[Title/Abstract] OR comment[Publication Type] OR editorial[Publication Type] OR letter[Publication Type] OR "historical article"[Publication Type] OR address[Publication Type] OR news[Publication Type] OR "newspaper article" [Publication Type] OR "case reports"[Publication Type] OR case report*[Title] OR abstracts[Title] OR editorial[Title] OR reply[Title] OR comment*[Title] OR commentary[Title] OR letter[Title] OR biomechanic*[Title]* *#2 "randomized-controlled-trial" OR "Randomized-Controlled-Trials" OR "random-allocation" OR random*[Title] OR RCT* *#3 (systematic* AND review*) OR meta-analys*[Title/Abstract] OR meta-analysis OR systematic-review* *#4 (Knee)*

	#5 (Osteoarthritis OR arthritis OR osteoarthros OR gonitis OR gonarthritis OR gonarthros*)* #6 (occupational AND (treatment OR therapy)) #7 (#4 AND #5 AND #6) NOT #1 #8 (#7 AND #2) #9 (#7 AND #3)
Number of hits	
RCTs (#8)	131
SR(+MA) (#9)	75
Studies published before 2003	1
Articles to consider	
DOIs MAs	0
DOIs SRs	0
DOIs RCTs	1. Isaramalai 2018: 10.2147/CIA.S144288 2. Murphy 2018: 10.5014/ajot.2018.027870 3. Murphy 2016: 10.1097/j.pain.0000000000000549 4. Murphy 2008: 10.1002/art.24105
Include/Excluded after FT screening	
Include	Isaramalai 2018: 10.2147/CIA.S144288
Include	Murphy 2018: 10.5014/ajot.2018.027870
Include	Murphy 2016: 10.1097/j.pain.0000000000000549
Include	Murphy 2008: 10.1002/art.24105

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History and Search Details

Download Delete

Search	Actions	Details	Query	Results	Time
#9	•••	›	Search: **(#7 AND #3)**	75	10:16:09
#10	•••	›	Search: **(#7 AND #2)** Filters: **from 2003 - 2023**	130	10:16:02
#8	•••	›	Search: **(#7 AND #2)**	131	10:15:57
#7	•••	›	Search: **(#4 AND #5 AND #6) NOT #1**	641	10:15:29
#6	•••	›	Search: **(occupational AND (treatment OR therapy))**	171,421	10:15:22
#5	•••	›	Search: **(Osteoarthritis OR arthritis OR osteoarthros* OR gonitis OR gonarthritis OR gonarthros*)**	419,912	10:15:15
#4	•••	›	Search: **(Knee)**	208,127	10:15:08
#3	•••	›	Search: **(systematic* AND review*) OR meta-analys*[Title/Abstract] OR meta-analysis OR systematic-review**	539,639	10:15:02
#2	•••	›	Search: **"randomized-controlled-trial" OR "Randomized-Controlled-Trials" OR "random-allocation" OR random*[Title] OR RCT**	998,955	10:14:56
#1	•••	›	Search: **Animals[Title] OR Cadaver[Title] OR animal*[Title] OR dog[Title] OR dogs[Title] OR canine[Title] OR cats[Title] OR feline[Title] OR horse*[Title] OR equine[Title] OR mouse[Title] OR mice[Title] OR rat[Title] OR rats[Title] OR rabbit*[Title] OR sheep[Title] OR porcine[Title] OR pig[Title] OR pigs[Title] OR rodent*[Title] OR monkey*[Title] OR cadaver*[Title/Abstract] OR "in vitro"[Title/Abstract] OR comment[Publication Type] OR editorial[Publication Type] OR letter[Publication Type] OR "historical article"[Publication Type] OR address[Publication Type] OR news[Publication Type] OR "newspaper article" [Publication Type] OR "case reports"[Publication Type] OR case report*[Title] OR abstracts[Title] OR editorial[Title] OR reply[Title] OR comment*[Title] OR commentary[Title] OR letter[Title] OR biomechanic*[Title]**	8,509,364	10:14:51

Showing 1 to 10 of 10 entries

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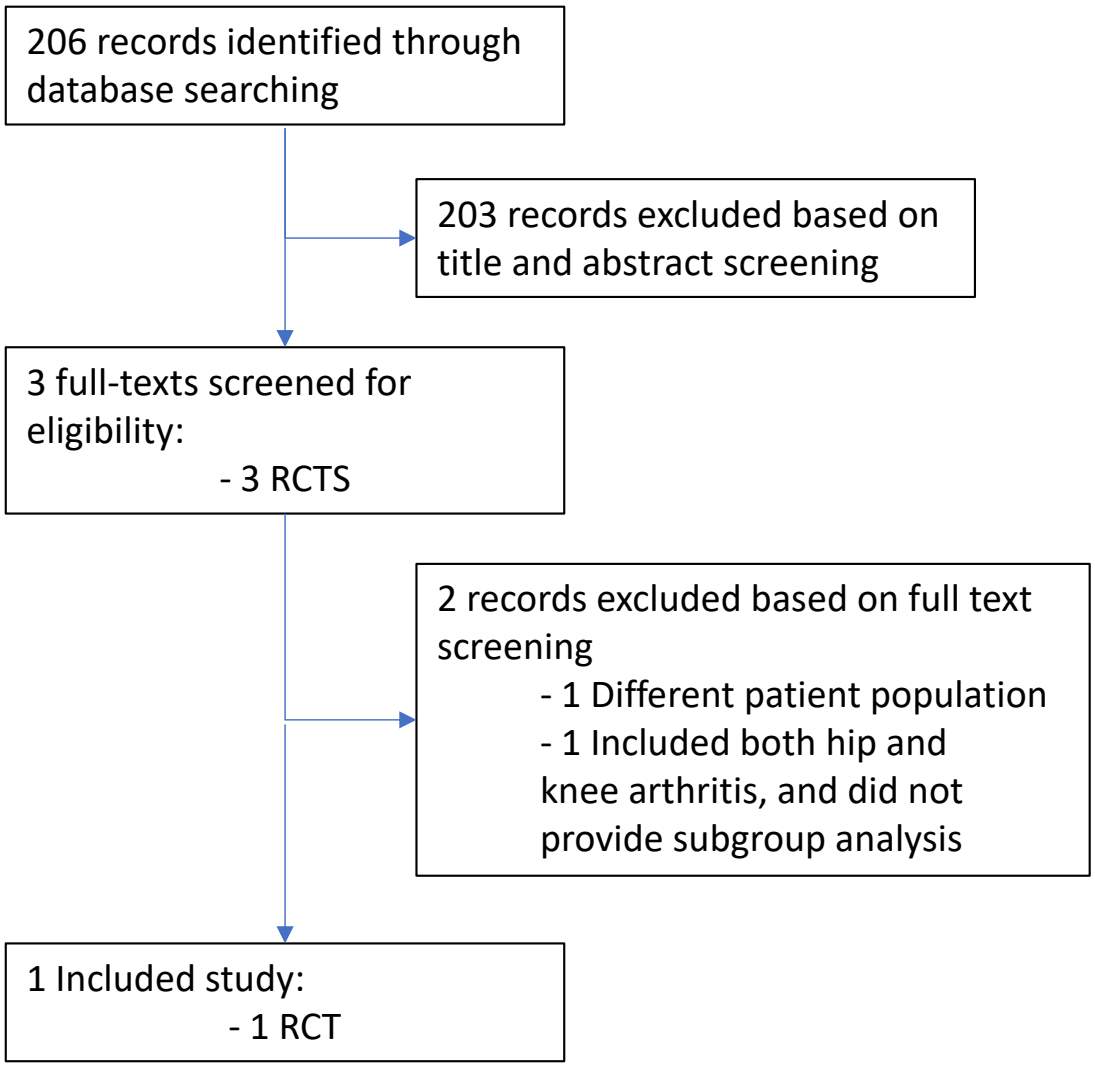
4. Studienselektion: Flowchart

PubMed Search: Does isolated or adjuvant **occupational therapy** improve outcomes in knees with clinically and radiographically confirmed OA?
(04/07/2023)



Included RCTs

(1)

1. Murphy SL, Janevic MR, Lee P, Williams DA. Occupational Therapist-Delivered Cognitive-Behavioral Therapy for Knee Osteoarthritis: A Randomized Pilot Study. Am J Occup Ther. 2018;72(5):7205205040p1-p9.

5. Charakteristika der eingeschlossenen Studien			
PICO number:	82	82	82
PICO Question:	Does isolated or adjuvant occupational therapy improve outcomes in knees with clinically and radiographically confirmed OA?	Does isolated or adjuvant occupational therapy improve outcomes in knees with clinically and radiographically confirmed OA?	Does isolated or adjuvant occupational therapy improve outcomes in knees with clinically and radiographically confirmed OA?
Article name:	Occupational Therapist–Delivered Cognitive–Behavioral Therapy for Knee Osteoarthritis: A Randomized Pilot Study	NO STUDIES FOUND	NO STUDIES FOUND
Lead author	Murphy		
Year published	2018		
Number of included studies (if SR with or without MA)	0		
Description of intervention group (optional for SRs)	Patients following the engage treatment program		
Description of control group (optional for SRs)	Patients following the usual care treatment program		
Number of patients in intervention group	31		
Number of patients in control group	15		
Mean age with range of intervention group	64.8 ± 8		
Mean age with range of control group	60.7 ± 8.5		

Inclusion criteria (on patient-level if clinical study; on article-level if SR) **Examples:** **Clinical study: "The inclusion criteria were (i) primary ACLR in (ii) patients aged over 50 years. The exclusion criteria were (iii) severe concomitant ligament injury (grade 3), (iv) tibiofemoral osteoarthritis visible on weight-bearing anteroposterior and/or sagittal radiographs (> 50% joint space narrowing), and (v) history of intra- or extra-articular ligament surgery in either knee."** **SR: "Studies comparing the diagnostic accuracy of physical examination (clinical tests or ultrasound) versus arthroscopy for the assessment of LHBT pathologies"**	Participants were included if they met American College of Rheumatology (ACR) clinical criteria for KOA and reported knee pain of 33 mo duration with pain severity of 3 of 10 on the numerical rating scale at least 50% of days. Other inclusion criteria included having computer access and being ambulatory with or without a cane. People were excluded if they had a severe physical impairment, report of a psychiatric disorder, or other issues that could in- terfere with completion of study procedures; had cancer (other than skin) in the past year; had undergone invasive procedures for KOA in the past 3 mo; had participated in CBT or KOA rehabilitation within the past 12 mo; or were taking long-acting opioids.		
Follow-up period	6 months		

Main results	In the Engage group, the mean WOMAC–PF score, representing difficulty in daily activities, decreased from 21.0 at baseline to 15.3 at follow-up, with a smaller decrease in the usual-care group (from 22.9 to 18.5). The observed power to detect this effect was low at 0.11. For both the BPI and the BFI, indicating degree of pain and fatigue, respectively, mean scores dropped slightly in the Engage group (2.7 to 2.2 for BPI and 2.5 to 2.3 for BFI) and increased slightly in the usual-care group. For the WOMAC–PF, 58% of Engage participants vs. 47% of controls met the criteria for the minimally important clinical difference of 17% (Chi2 =0.53, p = .34). This threshold was set at 30% improvement for pain (according to BPI score; achieved by 39% of Engage participants vs. 33% of controls; Chi2 = 0.13, p = .49) and for fatigue (according to BFI score; 29% of Engage participants vs. 13% of controls; Chi2 = 1.37, p = .22). On the Patient Global Impression of Change measure, 45% of Engage participants compared with 13% of controls indicated that they were very much or much improved (Chi2 = 4.5, p = .03).		

Key findings (use Results and Conclusion in Abstract)	RESULTS. Data were analyzed on 46 completers. Engage was associated with a small effect (n2 = 0.01) on the WOMAC–PF. More Engage participants than controls reported much or very much improvement (45% vs. 13%; p = .03). Satisfaction was high, and 30 of 31 participants attended six sessions or more. CONCLUSION. An online-supported cognitive–behavioral program for people with KOA delivered by occupational therapists is feasible and may contribute to improved physical function.		
Type of Study	Randomised controlled trial (ROBII		
Assessment tool	ROBII		
Overall Assessment	High (RoB)		
What is the lowest evidence study included in the SR?			
Level of evidence (Oxford 2011)	Level 3, downgraded due to high risk of bias		

41. Empfehlung	Neu 2024
Empfehlungsgrad ⇑	Wir schlagen vor, Bewegungstherapie in Kombination mit einem Edukationsprogramm oder Maßnahmen zur Verhaltensänderung durchzuführen, um regelmäßige konsequente Bewegung beizubehalten.
Level of Evidence (GRADE) Auszugsweise Kombinierte Programme vs. Bewegungstherapie: Schmerz ≤ 3 Monate: ⊕ Schmerz > 3 Monate: ⊕⊕⊕ Funktion ≤ 3 Monate: ⊕ Funktion ≤ 3 Monate: ⊕⊕⊕ Lebensqualität ≤ 3 Monate: ⊕⊕⊕ Lebensqualität > 3 Monate: ⊕⊕⊕	Adoption einer evidenzbasierten Empfehlung aus: NICE Guideline NG226 (Punkt 1.3.4) (1)
Konsensstärke	94,7 % (Konsens)

Schlüsselfrage und PICO Format sind dem Evidence Review K der Quellleitlinie zu entnehmen hier:

https://www.nice.org.uk/guidance/ng226/evidence/k-clinical-and-cost-effectiveness-of-treatment-packages-for-the-management-of-osteoarthritis-pdf-405016302424 (ab Seite 6)

Suchhistorie und Recherche Flowchart sind den Appendices B-C des Evidence Review K zu entnehmen hier:

https://www.nice.org.uk/guidance/ng226/evidence/k-clinical-and-cost-effectiveness-of-treatment-packages-for-the-management-of-osteoarthritis-pdf-405016302424 (ab Seite 136)

Evidenztabellen nach GRADE sind dem Appendix F des Evidence Review K der Quellleitlinie zu entnehmen hier:

https://www.nice.org.uk/guidance/ng226/evidence/k-clinical-and-cost-effectiveness-of-treatment-packages-for-the-management-of-osteoarthritis-pdf-405016302424 (ab Seite 407)

Empfehlung der zugrundeliegenden Quellleitlinie:

Leitlinie (Erscheinungsjahr)	NICE NG226 (2022) (1)
Empfehlung:	1.3.4 „Consider combining therapeutic exercise with an education programme or behaviour change approaches in a structured treatment package.“
Empfehlungsgrad:	„weak“
Evidenzgrad:	Kein Gesamtevidenzgrad angegeben. GRADE Profile siehe Appendix F des Evidence Review K ab Seite 407
Referenzen:	Siehe Evidence Review K Tabelle 2 ab Seite 9 https://www.nice.org.uk/guidance/ng226/evidence/k-clinical-and-cost-effectiveness-of-treatment-packages-for-the-management-of-osteoarthritis-pdf-405016302424

1. (NICE), National Institute for Health and Care Excellence. Osteoarthritis in over 16s: diagnosis and management (NICE Guideline NG226). London: National Institute for Health and Care Excellence; 2022 Oct 19.https://www.nice.org.uk/guidance/ng226 [Date Accessed: 02.07.2024].

43. Statement	Geprüft 2024
Die derzeitige Beleglage ist nicht ausreichend, um den Einsatz von Blutegeln bei Gonarthrose empfehlen zu können.	
Level of Evidence (GRADE) Niedrig	Stange et al. 2012 Andereya et al. 2008 Michalsen et al. 2003 Michaelsen et al. 2002 Isik et al. 2017
Konsensstärke	83,3 % (Konsens)

1. Schlüsselfrage und PICO Format	
clinical key question	Does isolated or adjuvant **leech therapy** improve outcomes in knees with clinically and radiographically confirmed OA?
population	Adults with: • symptomatic knee OA (clinically confirmed) at any stage
intervention	• Isolated or adjuvant leech therapy
comparison	• Any other conservative treatment (including topical NSAIDs) • No Intervention • Placebo
outcome	• Pain (critical) • Function (critical) • Serious adverse events requiring treatment (important)

GRADE Summary of Findings table Statement #43

Endpunkt Zeitrahmen	**Ergebnisse und Messwerte**	**Absolute Effektschätzer** any other conservative treatment	**Absolute Effektschätzer** Leech therapy	**Gewissheit der Evidenz** (Vertrauenswürdigkeit der Evidenz)	**Zusammenfassung**
Serious adverse events requiring treatment long-term (> 1 month)	Odds ratio (CI 95% -) Basierend auf Daten von 326 patienter und 5 Studien[1]	**0** pro 1000	**0** pro 1000 Differenz: **weniger pro 1000**	**Sehr niedrig** Due to very serious risk of bias[2]	Unter Berücksichtigung der zu erwartenden Nebenwirkungen - Nachbluten, Juckreiz, Bisstellen - ist die Behandlung nebenwirkungsarm.
Function (WOMAC Function, change to baseline) short-term (<= 1 month)	Gemessen mit: WOMAC Function Skala: 0 - 100 Höher ist besser Basierend auf Daten von 332 patienter und 2 Studien[3] Beobachtzungszeit <= 1 month	**6.3** Mittelwert	**14.7** Mittelwert Differenz: **SMD 0.56 Größer** (CI 95% 0.34 Größer - 0.79 Größer)	**Moderat** Due to serious risk of bias[4]	Die unmittelbaren und kurzfristigen Auswirkungen der Blutegeltherapie auf die Funktionsverbesserung der Patienten werden als mittel (medium) angesehen.
Function (WOMAC Function, change to baseline) long-term (> 1 month)	Gemessen mit: WOMAC Function Skala: 0 - 100 Höher ist besser Basierend auf Daten von 158 patienter und 2 Studien[5] Beobachtzungszeit > 1 month	**7.8** Mittelwert	**14.8** Mittelwert Differenz: **SMD 0.36 Größer** (CI 95% 0.04 Größer - 0.69 Größer)	**Moderat** Due to serious risk of bias[6]	Die mittelfristigen Auswirkungen (6 Monate) der Blutegeltherapie auf die Funktionsverbesserung der Patienten werden als gering angesehen.
Function (WOMAC Stiffness, change to baseline)[7] short-term (<= 1 month)	Gemessen mit: Skala: 0 - 100 Höher ist besser Basierend auf Daten von 336 patienter und 2 Studien[8] Beobachtzungszeit <= 1 month	**1.8** Mittelwert	**11.2** Mittelwert Differenz: **SMD 0.65 Größer** (CI 95% 0.42 Größer - 0.88 Größer)	**Niedrig** Due to serious risk of bias, Due to serious inconsistency[9]	Die unmittelbaren und kurzfristigen Auswirkungen der Blutegeltherapie auf die Besserung der Steifigkeit der Patienten werden als mittel (medium) angesehen.
Function (WOMAC Stiffness, change to baseline)[10] long-term (> 1 month)	Gemessen mit: WOMAC Stiffness Skala: 0 - 100 Höher ist besser Basierend auf Daten von 160 patienter und 2 Studien[11] Beobachtzungszeit > 1 month	**3.0** Mittelwert	**10.2** Mittelwert Differenz: **SMD 0.60 Größer** (CI 95% 0.28 Größer - 0.93 Größer)	**Moderat** Due to serious risk of bias[12]	Die mittelfristigen (bis 6 Monate) Auswirkungen der Blutegeltherapie auf die Besserung Steifigkeit der Patienten werden als gering angesehen.
Function (WOMAC Function) baseline	Gemessen mit: WOMAC Function Skala: 0 - 100 Höher ist besser Basierend auf Daten von 90 patienter und 1 Studien[13]	**63.2** Mittelwert	**56.3** Mittelwert Differenz: **MD 6.90 kleiner** (CI 95% 10.92 kleiner - 2.88 kleiner)	**Niedrig** Due to serious risk of bias, Due to serious imprecision[14]	Die unmittelbaren und kurzfristigen Auswirkungen der Blutegeltherapie auf die Funktionsverbesserung der Patienten werden als mittel (medium) angesehen.
Function (WOMAC Function)[15] short-term (<= 1 month)	Gemessen mit: WOMAC Function Skala: 0 - 100 Höher ist besser Basierend auf Daten von 90 patienter und 1 Studien[16]	**69.2** Mittelwert	**60.9** Mittelwert Differenz: **MD 8.30 kleiner** (CI 95% 17.54 kleiner - 0.94 Größer)	**Niedrig** Due to serious risk of bias, Due to serious imprecision[17]	Die unmittelbaren und kurzfristigen Auswirkungen der Blutegeltherapie auf die Funktion der Patienten werden als groß angesehen.
	Gemessen mit: WOMAC Function	**63.4** Mittelwert	**59.2** Mittelwert	**Niedrig**	Die mittelfristigen Auswirkungen (bis 6

Function (WOMAC Function)[18] long-term (> 1 month)	Skala: 0 - 100 Höher ist besser Basierend auf Daten von 90 patienter und 1 Studien[19]	Differenz: **MD 4.20 kleiner** (CI 95% 13.15 kleiner - 4.75 Größer)	Due to serious risk of bias, Due to serious imprecision[20]	Monate) der Blutegeltherapie auf die Funktion der Patienten werden als gering angesehen.
Function (WOMAC Stiffness) baseline	Gemessen mit: WOMAC Stiffness Skala: 0 - 100 Höher ist besser Basierend auf Daten von 90 patienter und 1 Studien[21]	**46.3** Mittelwert **66.3** Mittelwert Differenz: **MD 20.0 Größer** (CI 95% 12.85 Größer - 27.15 Größer)	**Niedrig** Due to serious risk of bias, Due to serious imprecision[22]	Die unmittelbaren und kurzfristigen Auswirkungen der Blutegeltherapie auf die Steifigkeit der Patienten werden als groß angesehen.
Function (WOMAC Stiffness)[23] short-term (<= 1 month)	Gemessen mit: WOMAC Stiffness Skala: 0 - 100 Höher ist besser Basierend auf Daten von 90 patienter und 1 Studien[24]	**71.3** Mittelwert **75.0** Mittelwert Differenz: **MD 3.70 Größer** (CI 95% 5.09 kleiner - 12.49 Größer)	**Niedrig** Due to serious risk of bias, Due to serious imprecision[25]	Die unmittelbaren und kurzfristigen Auswirkungen der Blutegeltherapie auf die Funktion der Patienten werden als gering angesehen.
Function (WOMAC Stiffness)[26] long-term (> 1 month)	Gemessen mit: WOMAC Stiffness Skala: 0 - 100 Höher ist besser Basierend auf Daten von 90 patienter und 1 Studien[27]	**56.3** Mittelwert **68.8** Mittelwert Differenz: **MD 12.5 Größer** (CI 95% 1.47 Größer - 23.53 Größer)	**Niedrig** Due to serious risk of bias, Due to serious imprecision[28]	Die mittelfristigen Auswirkungen (bis 6 Monate) der Blutegeltherapie auf die Funktion der Patienten werden als großangesehen.
Pain (VAS Pain, change to baseline)[29] short-term (<= 1 month)	Gemessen mit: VAS Pain Skala: 0 - 100 Niedriger ist besser Basierend auf Daten von 266 patienter und 2 Studien[30]	**0.4** Mittelwert **-1.5** Mittelwert Differenz: **SMD 0.72 kleiner** (CI 95% 0.99 kleiner - 0.45 kleiner)	**Sehr niedrig** Due to very serious risk of bias, Due to very serious inconsistency[31]	Die unmittelbaren und kurzfristigen Auswirkungen der Blutegeltherapie auf die Schmerzverbesserung der Patienten werden als groß angesehen.
Pain (VAS Pain, change to baseline)[32] long-term (> 1 month)	Gemessen mit: VAS Pain Skala: 0 - 100 Niedriger ist besser Basierend auf Daten von 160 patienter und 2 Studien[33]	**12.3** Mittelwert **8.2** Mittelwert Differenz: **SMD 0.45 kleiner** (CI 95% 0.78 kleiner - 0.13 kleiner)	**Sehr niedrig** Due to very serious risk of bias[34]	Die unmittelbaren und kurzfristigen Auswirkungen der Blutegeltherapie auf die Schmerzverbesserung der Patienten werden als mittel (medium) angesehen.
Pain (WOMAC Pain, change to baseline)[35] short-term (<= 1 month)	Gemessen mit: WOMAC Pain Skala: 0 - 100 Höher ist besser Basierend auf Daten von 100 patienter und 1 Studien[36]	**23.0** Mittelwert **42.4** Mittelwert Differenz: **MD 19.45 kleiner** (CI 95% 25.82 kleiner - 13.08 kleiner)	**Moderat** Due to serious risk of bias[37]	Die unmittelbaren und kurzfristigen Auswirkungen der Blutegeltherapie auf die Schmerzverbesserung der Patienten werden als groß angesehen.
Pain (VAS Pain) baseline	Gemessen mit: VAS Pain Skala: 0 - 100 Niedriger ist besser Basierend auf Daten von 142 patienter und 2 Studien[38]	**74.8** Mittelwert **72.6** Mittelwert Differenz: **SMD 0.10 Größer** (CI 95% 0.23 kleiner - 0.43 Größer)	**Moderat** Due to serious risk of bias[39]	Die unmittelbaren und kurzfristigen Auswirkungen der Blutegeltherapie auf die Schmerzen der Patienten werden als gering angesehen.
Pain (VAS Pain)[40] short-term (<= 1 month)	Gemessen mit: VAS Pain Skala: 0 - 100 Niedriger ist besser Basierend auf Daten von 142 patienter und 2 Studien[41]	**46.4** Mittelwert **49.0** Mittelwert Differenz: **SMD 0.11 kleiner** (CI 95% 0.45 kleiner - 0.22 Größer)	**Niedrig** Due to serious risk of bias, Due to serious inconsistency[42]	Die unmittelbaren und kurzfristigen Auswirkungen der Blutegeltherapie auf die Schmerzen der Patienten werden als gering angesehen.

Pain (VAS Pain)[43] long-term (> 1 month)	Gemessen mit: VAS Pain Skala: 0 - 100 Niedriger ist besser Basierend auf Daten von 90 patienter und 1 Studien[44]	**48.0** Mittelwert **59.0** Mittelwert Differenz: **MD 11.0 Größer** (CI 95% 1.86 kleiner - 23.86 Größer)	**Moderat** Due to serious risk of bias[45]	Die mittelfristigen Auswirkungen (bis 6 Monate) der Blutegeltherapie auf die Schmerzen der Patienten werden als groß angesehen.
Pain (WOMAC Pain) baseline	Gemessen mit: WOMAC Pain Skala: 0 - 100 Höher ist besser Basierend auf Daten von 90 patienter und 1 Studien[46]	**59.0** Mittelwert **66.0** Mittelwert Differenz: **MD 7.0 Größer** (CI 95% 0.37 kleiner - 14.37 Größer)	**Niedrig** Due to serious risk of bias, Due to serious imprecision[47]	Die unmittelbaren und kurzfristigen Auswirkungen der Blutegeltherapie auf die Schmerzverbesserung der Patienten werden als groß angesehen.
Pain (WOMAC Pain)[48] short-term (<= 1 month)	Gemessen mit: WOMAC Pain Skala: 0 - 100 Höher ist besser Basierend auf Daten von 90 patienter und 1 Studien[49]	**36.5** Mittelwert **38.0** Mittelwert Differenz: **MD 1.5 Größer** (CI 95% 8.52 kleiner - 11.52 Größer)	**Niedrig** Due to serious risk of bias, Due to serious imprecision[50]	Die unmittelbaren und kurzfristigen Auswirkungen der Blutegeltherapie auf die Schmerzen der Patienten werden als groß angesehen.
Pain (WOMAC Pain)[51] long-term (> 1 month)	Gemessen mit: WOMAC Pain Skala: 0 - 100 Höher ist besser Basierend auf Daten von 90 patienter und 1 Studien[52]	**40.0** Mittelwert **43.0** Mittelwert Differenz: **MD 3.0 Größer** (CI 95% 7.96 kleiner - 13.96 Größer)	**Niedrig** Due to serious risk of bias, Due to serious imprecision[53]	Die mittelfristigen Auswirkungen (bis 6 Monate) der Blutegeltherapie auf die Schmerzen der Patienten werden als groß angesehen.

1. Systematic review [535] mit eingeschlossenen Studien: Andereya 2007, Stange 2012, [555], Michalsen 2003, Michalsen 2002, Isik 2017, [559], [558], [557], [556] **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
2. **Risiko für Bias: sehr schwerwiegend.** Inadequate/lack of blinding of participants and personnel, resulting in potential for performance bias, Inadequate/lack of blinding of outcome assessors, resulting in potential for detection bias, Missing intention-to-treat analysis;
3. Systematic review [535] mit eingeschlossenen Studien: Andereya 2007, Andereya 2007, Michalsen 2003, Michalsen 2003, [559], [557], [556] **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
4. **Risiko für Bias: schwerwiegend.** Inadequate/lack of blinding of participants and personnel, resulting in potential for performance bias, Missing intention-to-treat analysis; **Inkonsistenz: keine.** The magnitude of statistical heterogeneity was high, with I^2:... %.;
5. Systematic review [535] mit eingeschlossenen Studien: Andereya 2007, Michalsen 2003, [557], [556] **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
6. **Risiko für Bias: schwerwiegend.** Inadequate/lack of blinding of participants and personnel, resulting in potential for performance bias, Missing intention-to-treat analysis;
7. undefined
8. Systematic review [535] mit eingeschlossenen Studien: [557], [556], Andereya 2007, Andereya 2007, Michalsen 2003, Michalsen 2003 **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
9. **Risiko für Bias: schwerwiegend.** Inadequate/lack of blinding of participants and personnel, resulting in potential for performance bias, Missing intention-to-treat analysis; **Inkonsistenz: schwerwiegend.** The confidence interval of some of the studies do not overlap with those of most included studies/ the point estimate of some of the included studies., The magnitude of statistical heterogeneity was high, with I^2:... %.;
10. undefined
11. Systematic review [535] mit eingeschlossenen Studien: [557], [556], Andereya 2007, Michalsen 2003 **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
12. **Risiko für Bias: schwerwiegend.** Inadequate/lack of blinding of participants and personnel, resulting in potential for performance bias, Missing intention-to-treat analysis;
13. Systematic review [535] mit eingeschlossenen Studien: Isik 2017, [558] **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
14. **Risiko für Bias: schwerwiegend.** Inadequate/lack of blinding of participants and personnel, resulting in potential for performance bias, Missing intention-to-treat analysis; **Unzureichende Präzision: schwerwiegend.** Only data from one study;
15. undefined
16. Systematic review [535] mit eingeschlossenen Studien: Isik 2017, [558] **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
17. **Risiko für Bias: schwerwiegend.** Inadequate/lack of blinding of participants and personnel, resulting in potential for performance bias, Missing intention-to-treat analysis; **Unzureichende Präzision: schwerwiegend.** Only data from one study;
18. undefined
19. Systematic review [535] mit eingeschlossenen Studien: Isik 2017, [558] **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
20. **Risiko für Bias: schwerwiegend.** Inadequate/lack of blinding of participants and personnel, resulting in potential for performance bias, Missing intention-to-treat analysis; **Unzureichende Präzision: schwerwiegend.** Only data from one study;
21. Systematic review [535] mit eingeschlossenen Studien: Isik 2017, [558] **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
22. **Risiko für Bias: schwerwiegend.** Inadequate/lack of blinding of participants and personnel, resulting in potential for performance bias, Missing intention-to-treat analysis; **Unzureichende Präzision: schwerwiegend.** Only data from one study;

23. undefined
24. Systematic review [535] mit eingeschlossenen Studien: [558], Isik 2017 **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
25. **Risiko für Bias: schwerwiegend.** Inadequate/lack of blinding of participants and personnel, resulting in potential for performance bias, Missing intention-to-treat analysis; **Unzureichende Präzision: schwerwiegend.** Only data from one study;
26. undefined
27. Systematic review [535] mit eingeschlossenen Studien: [558], Isik 2017 **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
28. **Risiko für Bias: schwerwiegend.** Inadequate/lack of blinding of participants and personnel, resulting in potential for performance bias, Missing intention-to-treat analysis; **Unzureichende Präzision: schwerwiegend.** Only data from one study;
29. undefined
30. Systematic review [535] mit eingeschlossenen Studien: [556], Andereya 2007, Andereya 2007, Michalsen 2002, Michalsen 2002, [559] **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
31. **Risiko für Bias: sehr schwerwiegend.** Inadequate/lack of blinding of participants and personnel, resulting in potential for performance bias, Inadequate/lack of blinding of outcome assessors, resulting in potential for detection bias, Missing intention-to-treat analysis; **Inkonsistenz: sehr schwerwiegend.** Point estimates vary widely, The confidence interval of some of the studies do not overlap with those of most included studies/ the point estimate of some of the included studies., The magnitude of statistical heterogeneity was high, with I^2:… %.;
32. undefined
33. Systematic review [535] mit eingeschlossenen Studien: Andereya 2007, Michalsen 2002, [559], [556] **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
34. **Risiko für Bias: sehr schwerwiegend.** Inadequate/lack of blinding of participants and personnel, resulting in potential for performance bias, Inadequate/lack of blinding of outcome assessors, resulting in potential for detection bias, Missing intention-to-treat analysis;
35. undefined
36. Systematic review [535] mit eingeschlossenen Studien: Michalsen 2003, [557], Michalsen 2003 **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
37. **Risiko für Bias: schwerwiegend.** Inadequate/lack of blinding of participants and personnel, resulting in potential for performance bias, Missing intention-to-treat analysis;
38. Systematic review [535] mit eingeschlossenen Studien: [558], [555], Isik 2017, Stange 2012 **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
39. **Risiko für Bias: schwerwiegend.** Inadequate/lack of blinding of participants and personnel, resulting in potential for performance bias, Inadequate/lack of blinding of outcome assessors, resulting in potential for detection bias, Incomplete data and/or large loss to follow up, Missing intention-to-treat analysis;
40. undefined
41. Systematic review [535] mit eingeschlossenen Studien: Isik 2017, Stange 2012, [558], [555] **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
42. **Risiko für Bias: schwerwiegend.** Inadequate/lack of blinding of participants and personnel, resulting in potential for performance bias, Inadequate/lack of blinding of outcome assessors, resulting in potential for detection bias, Incomplete data and/or large loss to follow up, Missing intention-to-treat analysis; **Inkonsistenz: schwerwiegend.** The direction of the effect is not consistent between the included studies, The magnitude of statistical heterogeneity was high, with I^2:... %.;
43. undefined
44. Systematic review [535] mit eingeschlossenen Studien: Isik 2017, [558] **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
45. **Risiko für Bias: schwerwiegend.** Inadequate/lack of blinding of participants and personnel, resulting in potential for performance bias, Missing intention-to-treat analysis;
46. Systematic review [535] mit eingeschlossenen Studien: Isik 2017, [558] **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
47. **Risiko für Bias: schwerwiegend.** Inadequate/lack of blinding of participants and personnel, resulting in potential for performance bias, Missing intention-to-treat analysis; **Unzureichende Präzision: schwerwiegend.** Only data from one study;
48. undefined
49. Systematic review [535] mit eingeschlossenen Studien: Isik 2017, [558] **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
50. **Risiko für Bias: schwerwiegend.** Inadequate/lack of blinding of participants and personnel, resulting in potential for performance bias, Missing intention-to-treat analysis; **Unzureichende Präzision: schwerwiegend.** Only data from one study;
51. undefined
52. Systematic review [535] mit eingeschlossenen Studien: Isik 2017, [558] **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
53. **Risiko für Bias: schwerwiegend.** Inadequate/lack of blinding of participants and personnel, resulting in potential for performance bias, Missing intention-to-treat analysis; **Unzureichende Präzision: schwerwiegend.** Only data from one study;

Referenzen

1. Stange, R., Moser, C., Hopfenmueller, W., et al. Randomised controlled trial with medical leeches for osteoarthritis of the knee. Complement Ther Med. 2012;20(1-2):1-7.

2. Andereya, S., Stanzel, S., Maus, U., et al. Assessment of leech therapy for knee osteoarthritis: a randomized study. Acta Orthop. 2008;79(2):235-243.

3. Michalsen, A., Klotz, S., Lüdtke, R., et al. Effectiveness of leech therapy in osteoarthritis of the knee: a randomized, controlled trial. Ann Intern Med. 2003;139(9):724-730.

4. Michalsen, A., Moebus, S., Spahn, G., et al. Leech therapy for symptomatic treatment of knee osteoarthritis: results and implications of a pilot study. Altern Ther Health Med. 2002;8(5):84-88.

5. Isik, M., Ugur, M., Yakisan, R. S., et al. Comparison of the effectiveness of medicinal leech and TENS therapy in the treatment of primary osteoarthritis of the knee : A randomized controlled trial. Z Rheumatol. 2017;76(9):798-805.

Operative Therapie (Gelenkerhaltende Therapie)

45. Empfehlung	Geprüft 2024
Empfehlungsgrad ⇓⇓	Die alleinige Arthroskopie mit Lavage und/oder Débridement wird Patient*innen mit klinisch und radiologisch gesicherter Gonarthrose nicht empfohlen.
Level of Evidence „moderate"	Adoption einer evidenzbasierten Empfehlung aus AAOS Management of Osteoarthritis of the Knee (Non-Arthroplasty) (1)
Konsensstärke	100 % (starker Konsens)

Die PICO-Frage sowie die Standard- und angepassten Einschlusskriterien sind dem e-Appendix 1 der Quellleitlinie (S. 3 ff) zu entnehmen:

https://www.aaos.org/globalassets/quality-and-practice-resources/osteoarthritis-of-the-knee/oak-cpg-eappendix-1.pdf

Die Literatursuchhistorie und -strategie sind dem e-Appendix 1 der Quellleitlinie (S. 5 ff) zu entnehmen:

https://www.aaos.org/globalassets/quality-and-practice-resources/osteoarthritis-of-the-knee/oak-cpg-eappendix-1.pdf

Evidenztabellen sind e-Appendix 2 der Quellleitlinie (S. 1417-1428) zu entnehmen:

https://www.aaos.org/globalassets/quality-and-practice-resources/osteoarthritis-of-the-knee/oak-cpg-eappendix-2.pdf

Empfehlung der zugrundeliegenden Quellleitlinie:

Leitlinie (Erscheinungsjahr)	Management of Osteoarthritis of the Knee (Non-Arthroplasty) - Evidence-Based Clinical Practice Guideline (August 2021) (1)
Empfehlung:	Arthroscopy with lavage and/or debridement in patients with a primary diagnosis of knee osteoarthritis is not recommended.
Empfehlungsgrad:	„moderate"
Evidenzgrad:	„moderate" *Description: Evidence from two or more "Moderate" quality studies with consistent findings, or evidence from a single "High" quality study for recommending for or against the intervention. Also requires no or only minor concerns addressed in the EtD framework.*
Referenzen:	• „Supplement to the Clinical Practice Guideline for the Management of Osteoarthritis of the Knee (Non-Arthroplasty)" – e-Appendix 1 • „Supplement to the Clinical Practice Guideline for the Management of Osteoarthritis of the Knee (Non-Arthroplasty)" – e-Appendix 2

1. (AAOS), American Academy of Orthopaedic Surgeons. Management of Osteoarthritis of the Knee (Nonarthroplasty) Evidence-Based Clinical Practice Guideline. Rosemont, IIlinois: American Academy of Orthopaedic Surgeons; 2021 [Third Edition].https://www.aaos.org/globalassets/quality-and-practice-resources/osteoarthritis-of-the-knee/oak3cpg.pdf [Date Accessed: 02.07.2024].

46. Empfehlung*

***Um eine Dopplung zu vermeiden, wurde das Kapitel zur Arthroskopie bei Meniskusschäden, inkulsive der Empfehlung 46, im Rahmen der Konsultationsphase gestrichen.

47. Statement	Modifiziert 2024
Aufgrund fehlender Evidenz kann keine Empfehlung für knorpelregenerative Operationen bei Patient*innen mit Gonarthrose abgegeben werden.	
Konsensstärke	93,3 % (Konsens)

1. Schlüsselfrage und PICO Format	
Clinical key question	Should cartilage treatments (microfracture, drilling, abrasion arthroplasty, osteochondral autograft transplantation, osteochondral allograft transplantation, autologous chondrocyte implantation) be performed to treat knees with OA?
Population	Adults with isolated medial or lateral: • symptomatic knee OA (clinically confirmed), and • K/L stage 2/3/4 (radiographically confirmed)
Intervention	Cartilage treatments

Comparison	• Surgical intervention
	  o Corrective osteotomy (HTO, DFO, and DLO)
	  o Total knee arthroplasty
	  o Arthroscopic lavage and/or debridement
	• Conservative treatment (e.g. exercises)
	• Medical treatment (e.g. analgesics)

Outcome	• Progression of OA (within same/other compartments)
	• Adverse events requiring readmission, reoperation, or arthroplasty
	• Clinical and functional scores (validated PROMS):
	  o Pain
	  o Physical function
	  o Health related quality of life
	  o Satisfaction

2. Recherche Zusammenfassung

Identifier	*ID Ordinal 19*
PICO(T) question	Should cartilage treatments (microfracture, drilling, abrasion arthroplasty, osteochondral autograft transplantation, osteochondral allograft transplantation, autologous chondrocyte implantation) be performed to treat knees with OA?
Search characteristics	
Date of search	16 08 2023
Initials of primary reader	CA
Database(s)	*PubMed*
Keywords	*Knee* microfracture; drilling; abrasion arthroplasty; osteochondral autograft transplantation; osteochondral allograft transplantation; autologous chondrocyte implantation; cartilage; focal chondral lesions
Search strings	*#1 Animals[Title] OR Cadaver[Title] OR animal*[Title] OR dog[Title] OR dogs[Title] OR canine[Title] OR cats[Title] OR feline[Title] OR horse*[Title] OR equine[Title] OR mouse[Title] OR mice[Title] OR rat[Title] OR rats[Title] OR rabbit*[Title] OR sheep[Title] OR porcine[Title] OR pig[Title] OR pigs[Title] OR rodent*[Title] OR monkey*[Title] OR cadaver*[Title/Abstract] OR "in vitro"[Title/Abstract] OR comment[Publication Type] OR editorial[Publication Type] OR letter[Publication Type] OR "historical article"[Publication Type] OR address[Publication Type] OR news[Publication Type] OR "newspaper article" [Publication Type] OR "case reports"[Publication Type] OR case report*[Title] OR abstracts[Title] OR editorial[Title] OR reply[Title] OR comment*[Title] OR commentary[Title] OR letter[Title] OR biomechanic*[Title]* *#2 "randomized-controlled-trial" OR "Randomized-Controlled-Trials" OR "random-allocation" OR random*[Title] OR RCT* *#3 (systematic* AND review*) OR meta-analys*[Title/Abstract] OR meta-analysis OR systematic-review* *#4 (Knee)*

	#5 (("microfracture" OR "drilling" OR "abrasion arthroplasty" OR "osteochondral autograft transplantation" OR osteochondral allograft transplantation" OR autologous chondrocyte implantation" OR cartilage) AND ("focal chondral lesions") #6 (#4 AND #5) NOT #1 #7 (#6 AND #2) #8 (#6 AND #3)
Number of hits	
RCTs (#7)	3
SR(+MA) (#8)	3
Studies published before 2003	
Articles to consider	
DOIs MAs	
DOIs SRs	
DOIs RCTs	

An official website of the United States government
Here's how you know

PubMed Advanced Search Builder

Add terms to the query box

All Fields

Enter a search term

ADD

Show Index

Query box

Enter / edit your search query here

Search

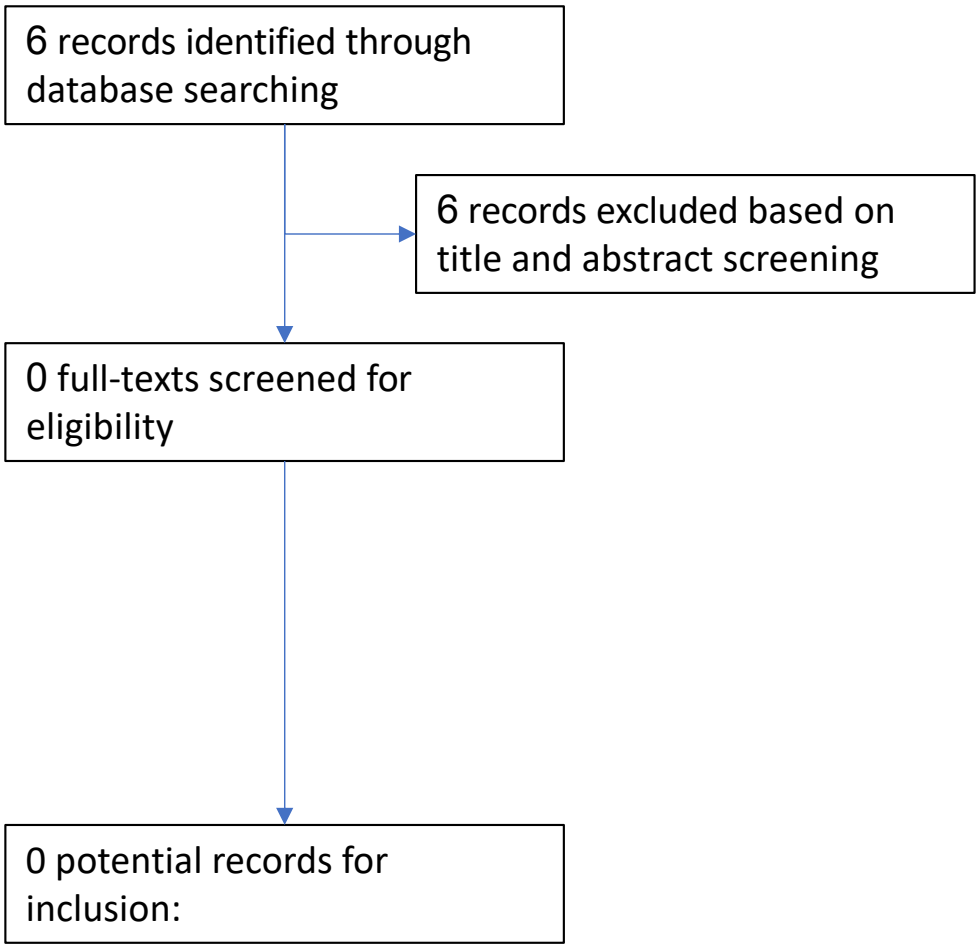
History and Search Details

Search	Actions	Details	Query	Results	Time
#8	•••		Search: **(#15 AND #2)**	3	08:28:41
#7	•••		Search: **(#15 AND #3)**	3	08:28:35
#6	•••		Search: **(#4 AND #11) NOT #1**	39	08:15:02
#5	•••		Search: **("microfracture" OR "drilling" OR "abrasion arthroplasty" OR "osteochondral autograft transplantation" OR "osteochondral allograft transplantation" OR "autologous chondrocyte implantation" OR cartilage) AND ("focal chondral lesions")**	58	08:13:18
#4	•••		Search: **(Knee)** Sort by: **Most Recent**	219,706	08:11:08
#3	•••		Search: **(systematic* AND review*) OR meta-analys* [Title/Abstract] OR meta-analysis OR systematic-review** Sort by: **Most Recent**	600,674	08:11:03
#2	•••		Search: **"randomized-controlled-trial" OR "Randomized-Controlled-Trials" OR "random-allocation" OR random*[Title] OR RCT** Sort by: **Most Recent**	1,048,024	08:10:54
#1	•••		Search: **Animals[Title] OR Cadaver[Title] OR animal*[Title] OR dog[Title] OR dogs[Title] OR canine[Title] OR cats[Title] OR feline[Title] OR horse*[Title] OR equine[Title] OR mouse[Title] OR mice[Title] OR rat[Title] OR rats[Title] OR rabbit*[Title] OR sheep[Title] OR porcine[Title] OR pig[Title] OR pigs[Title] OR rodent*[Title] OR monkey*[Title] OR cadaver*[Title/Abstract] OR "in vitro"[Title/Abstract] OR comment[Publication Type] OR editorial[Publication Type] OR letter[Publication Type] OR "historical article"[Publication Type] OR address[Publication Type] OR news[Publication Type] OR "newspaper article"[Publication Type] OR "case reports"[Publication Type] OR case report*[Title] OR abstracts[Title] OR editorial[Title] OR reply[Title] OR comment*[Title] OR commentary[Title] OR letter[Title] OR biomechanic*[Title]** Sort by: **Most Recent**	8,781,865	08:10:41

Showing 1 to 8 of 8 entries

4. Studienselektion: Flowchart

PubMed Search: Should cartilage treatments (microfracture, drilling, abrasion arthroplasty, osteochondral autograft transplantation, osteochondral allograft transplantation, autologous chondrocyte implantation) be performed to treat knees with OA? (16/08/2023)



48. Empfehlung	Neu 2024
Empfehlungsgrad ⇔	Bei Patient*innen mit klinisch und radiologisch bestätigter Gonarthrose (Kellgren Lawrence ≤ III.°) **und** tibialer extraartikulärer Varusfehlstellung kann eine korrigierende hohe Tibiakopfosteotomie (HTO) durchgeführt werden.
Level of Evidence „limited“	Adoption einer evidenzbasierten Empfehlung aus AAOS Management of Osteoarthritis of the Knee (Non-Arthroplasty) (1)
Konsensstärke	100% (starker Konsens)

Die PICO-Frage sowie die Standard- und angepassten Einschlusskriterien sind dem e-Appendix 1 der Quellleitlinie (S. 3 ff) zu entnehmen:

https://www.aaos.org/globalassets/quality-and-practice-resources/osteoarthritis-of-the-knee/oak-cpg-eappendix-1.pdf

Die Literatursuchhistorie und -strategie sind dem e-Appendix 1 der Quellleitlinie (S. 5 ff) zu entnehmen:

https://www.aaos.org/globalassets/quality-and-practice-resources/osteoarthritis-of-the-knee/oak-cpg-eappendix-1.pdf

Evidenztabellen sind e-Appendix 2 der Quellleitlinie (S. 1441ff) zu entnehmen:

https://www.aaos.org/globalassets/quality-and-practice-resources/osteoarthritis-of-the-knee/oak-cpg-eappendix-2.pdf

Empfehlung der zugrundeliegenden Quellleitlinie:

Leitlinie (Erscheinungsjahr)	Management of Osteoarthritis of the Knee (Non-Arthroplasty) - Evidence-Based Clinical Practice Guideline (August 2021) (1)
Empfehlung:	High tibial osteotomy may be considered to improve pain and function in properly indicated patients with unicompartmental knee osteoarthritis.
Empfehlungsgrad:	„limited“
Evidenzgrad:	„limited“ *Description: Evidence from one or more “Low” quality studies with consistent findings or evidence from a single “Moderate” quality study recommending for or against the intervention. Also, higher strength evidence can be downgraded to limited due to major concerns addressed in the EtD Framework.*
Referenzen:	• „Supplement to the Clinical Practice Guideline for the Management of Osteoarthritis of the Knee (Non-Arthroplasty)“ – e-Appendix 1 • „Supplement to the Clinical Practice Guideline for the Management of Osteoarthritis of the Knee (Non-Arthroplasty)“ – e-Appendix 2

1. (AAOS), American Academy of Orthopaedic Surgeons. Management of Osteoarthritis of the Knee (Nonarthroplasty) Evidence-Based Clinical Practice Guideline. Rosemont, IIlinois: American Academy of Orthopaedic Surgeons; 2021 [Third Edition].https://www.aaos.org/globalassets/quality-and-practice-resources/osteoarthritis-of-the-knee/oak3cpg.pdf [Date Accessed: 02.07.2024].

Operative Therapie (Gelenkersetzende Therapie)

49. Empfehlung	Neu 2024
Empfehlungsgrad **EK ⇑⇑**	Bei Patient*innen mit Gonarthrose, welche vor der Entscheidung zur Implantation einer Knieendoprothese stehen, empfehlen wir eine Aufklärung über • das Prinzip der Knieendoprothese, • die im individuellen Fall empfohlene Technik (inkl. Implantattyp, Patellaersatz, Ausrichtung), • den typischen Behandlungsablauf und • das erwartbare Ergebnis. Wir empfehlen, die Patient*innenerwartungen explizit zu erfragen und gemeinsam die Wahrscheinlichkeit der Realisierung dieser Erwartungen an die Knieendoprothese zu besprechen.
	Orientiert an einer evidenzbasierten Leitlinie „Evidenz- und konsensbasierte Indikationskriterien zur Hüfttotalendoprothese bei Coxarthrose“
Konsensstärke	100 % (starker Konsens)

1. Schlüsselfrage und PICO Format	
Clinical key question	Does the extent of information that patients receive about options and choices regarding knee arthroplasty (implant fixation, alignment, patellar resurfacing, FB vs. MB), before deciding to have surgery (by a specific surgeon), improve clinical and functional outcomes.
Population	Adults with isolated medial or lateral: • symptomatic knee OA (clinically confirmed), and • K/L stage 2/3/4 (radiographically confirmed)
Intervention	Knee arthroplasty

Comparison	• Surgical intervention
	  o Corrective osteotomy (HTO, DFO, and DLO)
	  o Total knee arthroplasty
	  o Arthroscopic lavage and/or debridement
	• Conservative treatment (e.g. exercises)
	• Medical treatment (e.g. analgesics)

Outcome	• Progression of OA (within same/other compartments)
	• Adverse events requiring readmission, reoperation, or arthroplasty
	• Clinical and functional scores (validated PROMS):
	  o Pain
	  o Physical function
	  o Health related quality of life
	  o Satisfaction

2. Recherche Zusammenfassung

Identifier	*ID Ordinal 10*
PICO(T) question	Does the extent of information that patients receive about options and choices regarding knee arthroplasty (implant fixation, alignment, patellar resurfacing, FB vs. MB), before deciding to have surgery (by a specific surgeon), improve clinical and functional outcomes.
Search characteristics	
Date of search	07 08 2023
Initials of primary reader	
Database(s)	*PubMed*
Keywords	*Knee* *osteoarthritis; arthritis; osteoarthros*; gonitis; gonarthritis; gonarthros** Knee arthroplasty; knee replacement; shared decision-making
Search strings	*#1 Animals[Title] OR Cadaver[Title] OR animal*[Title] OR dog[Title] OR dogs[Title] OR canine[Title] OR cats[Title] OR feline[Title] OR horse*[Title] OR equine[Title] OR mouse[Title] OR mice[Title] OR rat[Title] OR rats[Title] OR rabbit*[Title] OR sheep[Title] OR porcine[Title] OR pig[Title] OR pigs[Title] OR rodent*[Title] OR monkey*[Title] OR cadaver*[Title/Abstract] OR "in vitro"[Title/Abstract] OR comment[Publication Type] OR editorial[Publication Type] OR letter[Publication Type] OR "historical article"[Publication Type] OR address[Publication Type] OR news[Publication Type] OR "newspaper article" [Publication Type] OR "case reports"[Publication Type] OR case report*[Title] OR abstracts[Title] OR editorial[Title] OR reply[Title] OR comment*[Title] OR commentary[Title] OR letter[Title] OR biomechanic*[Title]* *#2 "randomized-controlled-trial" OR "Randomized-Controlled-Trials" OR "random-allocation" OR random*[Title] OR RCT* *#3 (systematic* AND review*) OR meta-analys*[Title/Abstract] OR meta-analysis OR systematic-review* *#4 (Knee)*

	#5 (Osteoarthritis OR arthritis OR osteoarthros OR gonitis OR gonarthritis OR gonarthros*)* #6 ("knee arthroplasty" OR "knee replacement" OR KA OR KR OR UKA OR "unilateral knee arthroplasty" OR "uni-lateral knee arthroplasty" OR "unicompartmental knee arthroplasty" OR "uni-compartmental knee arthroplasty" OR "medial knee arthroplasty " OR "medial knee replacement" OR "medial condyle replacement" OR "unicondylar knee replacement") AND ("shared decision-making") #7 (#4 AND #5 AND #6) NOT #1 #8 (#7 AND #2) #9 (#7 AND #3)
Number of hits	
RCTs (#8)	21
SR(+MA) (#9)	11
Studies published before 2003	0
Articles to consider	
DOIs MAs	
DOIs SRs	Riddle 2021: 10.1002/acr.24240 Barlow 2015: 10.1302/2046-3758.410.2000420
DOIs RCTs	Marshall 2023: 10.1111/jep.13804 Sepucha 2022: 10.2106/JBJS.21.00064 Rivero-Santana 2021: 10.1016/j.joca.2021.06.005
Include/Excluded after FT screening	
Could not retrieve	Riddle 2021: 10.1002/acr.24240
Exclude: not about information delivery but external factors	Barlow 2015: 10.1302/2046-3758.410.2000420
Could not retrieve	Marshall 2023: 10.1111/jep.13804
Could not retrieve	Sepucha 2022: 10.2106/JBJS.21.00064
Include	Rivero-Santana 2021: 10.1016/j.joca.2021.06.005

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PubMed Advanced Search Builder

Add terms to the query box

All Fields

Enter a search term

ADD Show Index

Query box

Enter / edit your search query here

Add to History

Quoted phrases not found in phrase index: "uni-lateral knee arthroplasty", "medial knee arthroplasty", "medial condyle replacement"

History and Search Details

Search	Actions	Details	Query	Results	Time
#9	•••		Search: **(#7 AND #3)** Sort by: **Most Recent**	11	09:15:59
#8	•••		Search: **(#7 AND #2)** Sort by: **Most Recent**	21	09:15:15
#7	•••		Search: **(#4 AND #5 AND #6) NOT #1** Sort by: **Most Recent**	74	09:15:07
#6	•••		Search: **("knee arthroplasty" OR "knee replacement" OR KA OR KR OR UKA OR "unilateral knee arthroplasty" OR "uni-lateral knee arthroplasty" OR "unicompartmental knee arthroplasty" OR "uni-compartmental knee arthroplasty" OR "medial knee arthroplasty " OR "medial knee replacement" OR "medial condyle replacement" OR "unicondylar knee replacement") AND ("shared decision-making")** Sort by: **Most Recent**	235	09:14:33
#5	•••		Search: **(Osteoarthritis OR arthritis OR osteoarthros* OR gonitis OR gonarthritis OR gonarthros*)** Sort by: **Most Recent**	421,674	05:08:59
#4	•••		Search: **(Knee)** Sort by: **Most Recent**	209,042	03:38:14
#3	•••		Search: **(systematic* AND review*) OR meta-analys* [Title/Abstract] OR meta-analysis OR systematic-review** Sort by: **Most Recent**	544,774	03:38:08
#2	•••		Search: **"randomized-controlled-trial" OR "Randomized-Controlled-Trials" OR "random-allocation" OR random*[Title] OR RCT** Sort by: **Most Recent**	1,003,090	03:37:58
#1	•••		Search: **Animals[Title] OR Cadaver[Title] OR animal*[Title] OR dog[Title] OR dogs[Title] OR canine[Title] OR cats[Title] OR**	8,533,280	03:37:49

feline[Title] OR horse*[Title] OR equine[Title] OR mouse[Title] OR mice[Title] OR rat[Title] OR rats[Title] OR rabbit*[Title] OR sheep[Title] OR porcine[Title] OR pig[Title] OR pigs[Title] OR rodent*[Title] OR monkey*[Title] OR cadaver*[Title/Abstract] OR "in vitro"[Title/Abstract] OR comment[Publication Type] OR editorial[Publication Type] OR letter[Publication Type] OR "historical article"[Publication Type] OR address[Publication Type] OR news[Publication Type] OR "newspaper article" [Publication Type] OR "case reports"[Publication Type] OR case report*[Title] OR abstracts[Title] OR editorial[Title] OR reply[Title] OR comment*[Title] OR commentary[Title] OR letter[Title] OR biomechanic*[Title] Sort by: **Most Recent**

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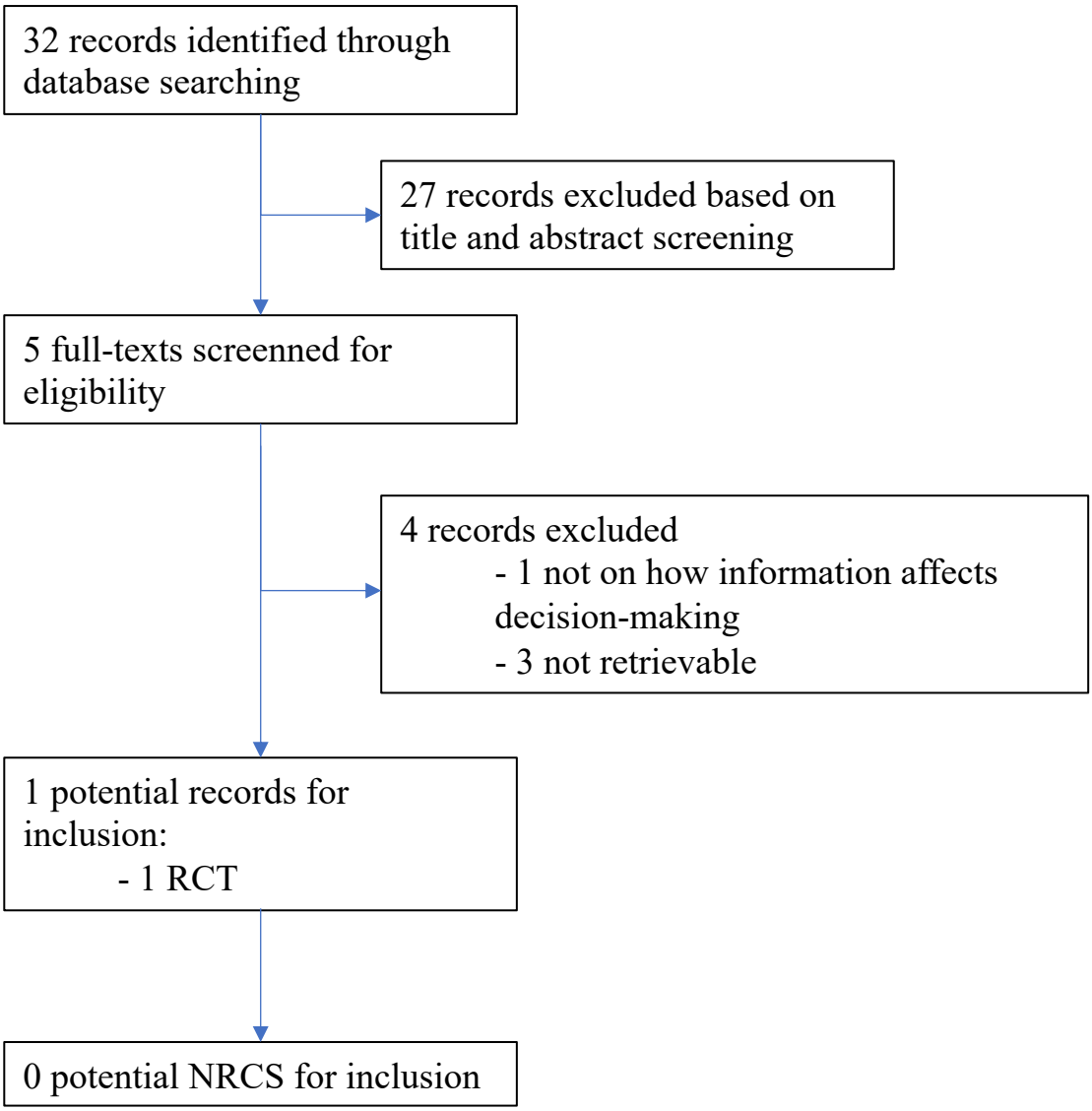
4. Studienselektion: Flowchart

PubMed Search: Does the extent of information that patients receive about options and choices regarding knee arthroplasty (implant fixation, alignment, patellar resurfacing, FB vs. MB), before deciding to have surgery (by a specific surgeon), improve clinical and functional outcomes? (07/08/2023)



Included RCTs

(1)

1. Rivero-Santana A, Torrente-Jiménez RS, Perestelo-Pérez L, Torres-Castaño A, Ramos-García V, Bilbao A, et al. Effectiveness of a decision aid for patients with knee osteoarthritis: a randomized controlled trial. Osteoarthritis Cartilage. 2021;29(9):1265-74. doi: 10.1016/j.joca.2021.06.005

5. Charakteristika der eingeschlossenen Studien

PICO number:	10	10	10
PICO Question:	Does the extent of information that patients receive about options and choices regarding knee arthroplasty (implant fixation, alignment, patellar resurfacing, FB vs. MB), before deciding to have surgery (by a specific surgeon), improve clinical and functional outcomes.	Does the extent of information that patients receive about options and choices regarding knee arthroplasty (implant fixation, alignment, patellar resurfacing, FB vs. MB), before deciding to have surgery (by a specific surgeon), improve clinical and functional outcomes.	Does the extent of information that patients receive about options and choices regarding knee arthroplasty (implant fixation, alignment, patellar resurfacing, FB vs. MB), before deciding to have surgery (by a specific surgeon), improve clinical and functional outcomes.
Article name:	Effectiveness of a decision aid for patients with knee osteoarthritis: a randomized controlled trial	NO OTHER STUDIES AVAILABLE	NO OTHER STUDIES AVAILABLE
Lead author	Rivero-Santana		
Year published	2021		
Number of included studies (if SR with or without MA)	0		
Description of intervention group (optional for SRs)	reviewing the Patient Decision Aids accompanied by a researcher		
Description of control group (optional for SRs)	Usual care		
Number of patients in intervention group	97		
Number of patients in control group	96		
Mean age with range of intervention group	67.61 (8.02)		
Mean age with range of control group	65.97 (8.78)		

Inclusion criteria (on patient-level if clinical study; on article-level if SR) **Examples:** **Clinical study: "The inclusion criteria were (i) primary ACLR in (ii) patients aged over 50 years. The exclusion criteria were (iii) severe concomitant ligament injury (grade 3), (iv) tibiofemoral osteoarthritis visible on weight-bearing anteroposterior and/or sagittal radiographs (> 50% joint space narrowing), and (v) history of intra- or extra-articular ligament surgery in either knee."** **SR: "Studies comparing the diagnostic accuracy of physical examination (clinical tests or ultrasound) versus arthroscopy for the assessment of LHBT pathologies"**	Patients with knee OA aged 18-90 years, who were candidates for TKR, based on the clinical judgement of the collaborating phy- sicians, were included. The exclusion criteria were: having unde gone TKR in the past, people with severe mental disorder, psychiatric or sensory alterations that made it difficult to answer the questionnaires, or that hindered the ability to make decisions, and non-fluent Spanish language.		
Follow-up period	6 months		

Main results	Table II shows the results obtained for the continuous variables. The control group showed a moderate level of decisional conflict (M = 42.61, SD = 13.2), and scores around the mid-point of the scale in knowledge (M = 50.89, SD = 18.89) and satisfaction (M = 49.85, SD = 14.13). Immediately after the PtDA application, the intervention group showed a significantly lower score than the control group in the DCS (MD = -11.65, 95%CI: -14.92,-8.38) and all its subscales (Table II). There were also significant differences favoring the PtDA group in knowledge (MD = 10.37, 95%CI: 4.90, 15.85) and the SDMP scale (MD = 6.77, 95%CI: 2.54, 10.99). The largest difference was observed in the DCS subscale informed (MD = -30.66, 95% CI: -36.52, -24.79). The within-group improvement in knowledge in the PtDA group was 8.91 (95%CI: 5.53, 12.29)		

	12.29). At 6 months, there were seven patients lost to follow up, five (5.2%) in the PtDA group and two (2.1%) in the control group (p = 0.254). Compared to those who completed the follow-up, they showed better post-intervention scores in decisional conflict, satisfaction and quality of life (appendix, Table A2). The surgical status (non-operated) could be obtained for four of these patients (two in each group). Given the low rate of dropouts, we did not impute missed data. The intervention had no effect on surgery rates at 6 months: 24 (25.5%) vs 26 (27.1%) patients in the PtDA and control groups, respectively (Risk ratio = 0.94, 95%CI: 0.59, 1.52; Risk difference = -0.02, 95%CI: -0.14, 0.11; chi2 = 0.06, p= 0.808). In non-operated patients (n = 136), there were no between-group significant differences in the DCS, knowledge or		

	satisfaction (Table II). Repeated-measures ANOVA showed significantly different changes from post-intervention to follow up for the DCS total score and all but one subscale (support), and a non-significant result, slightly higher than the alpha value, for knowledge ($p = 0.051$) (Table II). In the PtDA group, scores significantly worsened over time for the DSC subscale informed ($MD = 20.5$, $p < 0.001$) and knowledge ($MD = -6.3$, $p=0.043$), whereas the control group did not show significant changes on these measures (Table II). For the remaining variables, the PtDA group did not change whereas the control group showed significant improve- ments (P-values < 0.004). There were no significant differences in treatment preferences (Table III).		

Key findings (use Results and Conclusion in Abstract)	Results: The PtDA produced a significant immediate improvement of decisional conflict (MD 1⁄4 11.65, 95%CI: 14.93, 8.37), objective knowledge (MD 1⁄4 10.37, 99%IC: 3.15, 17.70) and satisfaction (MD 1⁄4 6.77, 99%CI: 1.19, 12.34), and a different distribution of preferences (c2 1⁄4 8.74, p 1⁄4 0.033). Patients with less than secondary education obtained a stronger effect on decisional conflict (p 1⁄4 0.015 for the interaction) but weaker for knowledge (p 1⁄4 0.051). At 6 months, there were no significant differences in any variable, including the rate of total knee replacement. Operated patients showed a low level of regret, which was not affected by the intervention. Conclusion: The PtDA is effective immediately after its application, but it shows no effects in the me- dium-term. Future research should investigate which subgroups of patients could benefit more from this intervention, as well as the longitudinal evolution of decision-related psychological variables.		
Type of Study	Randomised controlled trial (ROBII		

Assessment tool	ROBII		
Overall Assessment	High (RoB)		
What is the lowest evidence study included in the SR?			
Level of evidence (Oxford 2011)	Level 3, downgraded due to high risk of bias		

50. Empfehlung	Neu 2024
Empfehlungsgrad ⇑⇑	Bei Patient*innen mit Gonarthrose, welche sich der Implantation einer Knieendoprothese unterziehen, empfehlen wir auf das Rauchen zu verzichten. Eine mindestens vierwöchige Nikotinkarenz vor OP ist empfohlen*.
Level of Evidence (Oxford 2011) 4 3 3	 Sattler et al. 2020 (50) He et al. 2022 (51) Bedard et al. 2019 (52) *Orientiert an einer evidenzbasierten Empfehlung aus: Evidenz- und konsensbasierte Indikationskriterien zur Hüfttotalendoprothese bei Coxarthrose (Punkt 5.1.1)
Konsensstärke	100 % (starker Konsens)

1. Schlüsselfrage und PICO Format	
clinical key question	In adult currently tobacco-smoking patients with osteoarthritis undergoing KA, are outcomes diminished and/or complications increased compared with non-currently tobacco-smoking patients undergoing KA?
population	Adults with: • symptomatic knee OA (clinically confirmed), AND • K/L stage 2/3/4 (radiographically confirmed), AND
intervention	• Tobacco-smoking patient that undergo KA
comparison	• Con-currently tobacco-smoking patients that undergo KA

outcome	• Adverse events and complications
	• Clinical and functional scores (validated PROMS):
	  ○ Pain
	  ○ Physical function
	  ○ Health related quality of life
	  ○ Satisfaction

2. Recherche Zusammenfassung

Identifier	*ID Ordinal 43*
PICO(T) question	In adult currently tobacco-smoking patients with osteoarthritis undergoing KA, are outcomes diminished and/or complications increased compared with non-currently tobacco-smoking patients undergoing KA?
Search characteristics	
Date of search	02 05 2023
Initials of primary reader	CA
Database(s)	*PubMed*
Keywords	*Knee* *osteoarthritis; arthritis; osteoarthros*; gonitis; gonarthritis; gonarthros** knee arthroplasty; knee replacement; smoking; cessation; tobacco
Search strings	*#1 Animals[Title] OR Cadaver[Title] OR animal*[Title] OR dog[Title] OR dogs[Title] OR canine[Title] OR cats[Title] OR feline[Title] OR horse*[Title] OR equine[Title] OR mouse[Title] OR mice[Title] OR rat[Title] OR rats[Title] OR rabbit*[Title] OR sheep[Title] OR porcine[Title] OR pig[Title] OR pigs[Title] OR rodent*[Title] OR monkey*[Title] OR cadaver*[Title/Abstract] OR "in vitro"[Title/Abstract] OR comment[Publication Type] OR editorial[Publication Type] OR letter[Publication Type] OR "historical article"[Publication Type] OR address[Publication Type] OR news[Publication Type] OR "newspaper article" [Publication Type] OR "case reports"[Publication Type] OR case report*[Title] OR abstracts[Title] OR editorial[Title] OR reply[Title] OR comment*[Title] OR commentary[Title] OR letter[Title] OR biomechanic*[Title]* *#2 "randomized-controlled-trial" OR "Randomized-Controlled-Trials" OR "random-allocation" OR random*[Title] OR RCT* *#3 (systematic* AND review*) OR meta-analys*[Title/Abstract] OR meta-analysis OR systematic-review* *#4 (Knee)*

	#5 (Osteoarthritis OR arthritis OR osteoarthros OR gonitis OR gonarthritis OR gonarthros*)* #6 ("knee arthroplasty" OR "knee replacement" OR KA) AND (smoking OR smokers OR cessation OR tobacco) #7 (#4 AND #5 AND #6) NOT #1 #8 (#7 AND #2) #9 (#7 AND #3)
Number of hits	
RCTs (#8)	8
SR(+MA) (#9)	6
Studies published before 2003	1 RCT
Articles to consider	
DOIs MAs	He 2022: 10.17305/bjbms.2021.6538 Sattler 2020 : 10.1186/s12891-020-03499-5 Bedard 2019: 10.1016/j.arth.2018.09.089 Kunutsor 2016 : 10.1371/journal.pone.0150866
DOIs SRs	
DOIs RCTs	
Include/Excluded after FT screening	
Excluded	Kunutsor 2016 : 10.1371/journal.pone.0150866
Included	Bedard 2019: 10.1016/j.arth.2018.09.089
Include (look at studies in SR)	He 2022: 10.17305/bjbms.2021.6538
Include (look at studies in SR)	Sattler 2020 : 10.1186/s12891-020-03499-5

Query box

Enter / edit your search query here

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History and Search Details

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		Query	Results
#9	••• >	Search: **(#7 AND #3)** Sort by: **Most Recent**	6
#8	••• >	Search: **(#7 AND #2)** Sort by: **Most Recent**	8
#7	••• >	Search: **(#4 AND #5 AND #6) ...** Sort by: **Most Recent**	182
#6	••• >	Search: **("knee arthroplasty" ...** Sort by: **Most Recent**	1,239
#5	••• >	Search: **(Osteoarthritis OR ar...** Sort by: **Most Recent**	416,566
#4	••• >	Search: **Knee** Sort by: **Most Recent**	206,109
#3	••• >	Search: **(systematic* AND re...** Sort by: **Most Recent**	528,984
#2	••• >	Search: **"randomized-control...** Sort by: **Most Recent**	990,448
#1	••• >	Search: **Animals[Title] OR Ca...** Sort by: **Most Recent**	8,458,750

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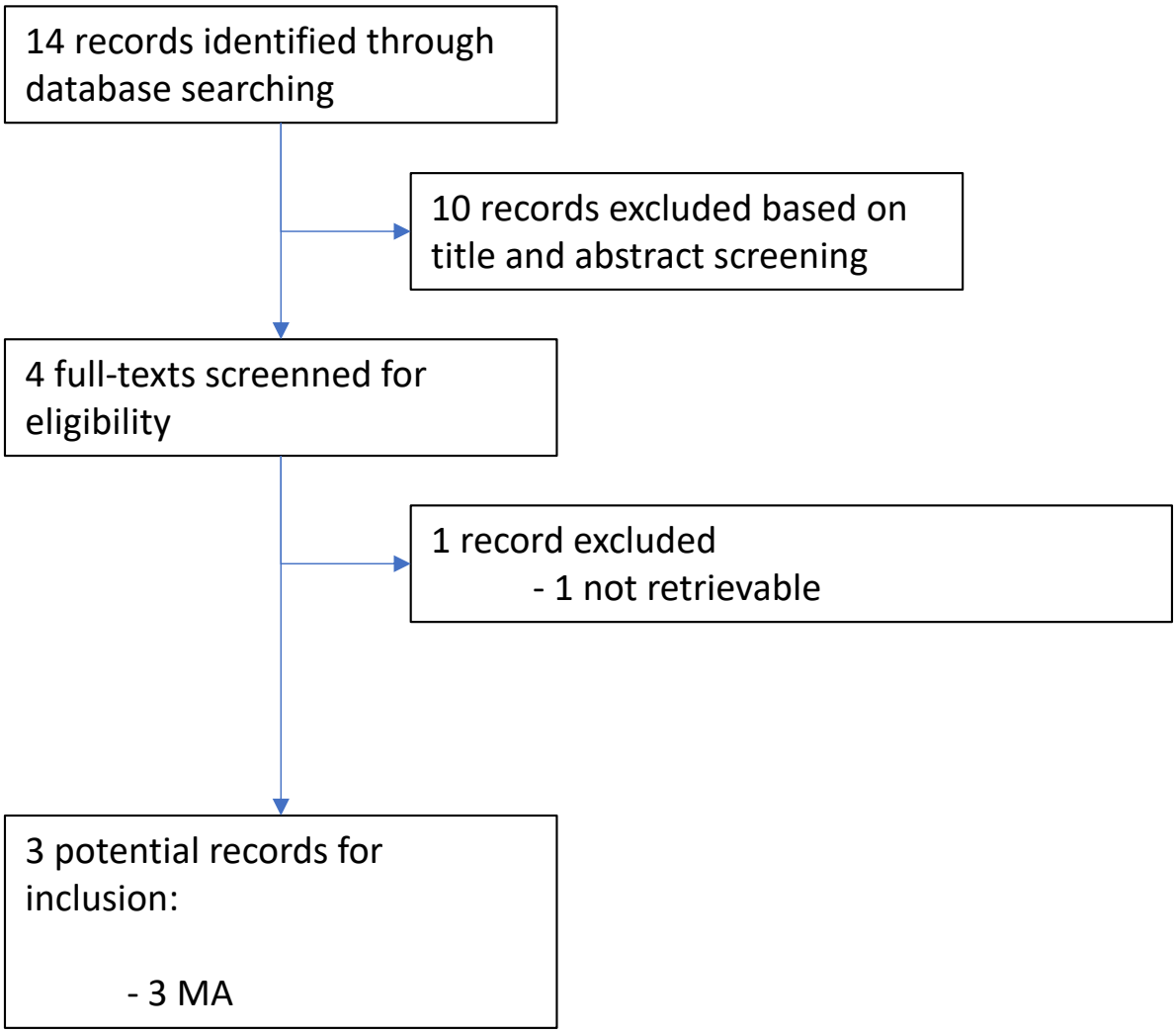
4. Studienselektion: Flowchart

PubMed Search: In adult currently tobacco-smoking patients with osteoarthri6s undergoing KA, are outcomes diminished and/or complica6ons increased compared with non- currently tobacco-smoking pa6ents undergoing KA? (03/05/2023)



Inlcuded SRs and MAs

(1-3)

1. Bedard NA, DeMik DE, Owens JM, Glass NA, DeBerg J, Callaghan JJ. Tobacco Use and Risk of Wound Complications and Periprosthetic Joint Infection: A Systematic Review and Meta-Analysis of Primary Total Joint Arthroplasty Procedures. J Arthroplasty. 2019;34(2):385-96.e4. doi: 10.1016/j.arth.2018.09.089
2. He Y, Omar M, Feng X, Neunaber C, Jagodzinski M. Impact of smoking on the incidence and post-operative complications of total knee arthroplasty: A systematic review and meta-analysis of cohort studies. Bosn J Basic Med Sci. 2022;22(3):353-65. doi: 10.17305/bjbms.2021.6538
3. Sattler L, Hing W, Rathbone E, Vertullo C. Intrinsic patient factors predictive of inpatient rehabilitation facility discharge following primary total knee arthroplasty: a systematic review and meta-analysis. BMC Musculoskelet Disord. 2020;21(1):481. doi: 10.1186/s12891-020-03499-5

5. Charakteristika der eingeschlossenen Studien

PICO number:	43	43	43
PICO Question:	In adult currently tobacco-smoking patients with osteoarthritis undergoing KA, are outcomes diminished and/or complications increased compared with non-currently tobacco-smoking patients undergoing KA?	In adult currently tobacco-smoking patients with osteoarthritis undergoing KA, are outcomes diminished and/or complications increased compared with non-currently tobacco-smoking patients undergoing KA?	In adult currently tobacco-smoking patients with osteoarthritis undergoing KA, are outcomes diminished and/or complications increased compared with non-currently tobacco-smoking patients undergoing KA?
Article name:	Intrinsic patient factors predictive of inpatient rehabilitation facility discharge following primary total knee arthroplasty: a systematic review and meta-analysis	Impact of smoking on the incidence and post-operative complications of total knee arthroplasty: A systematic review and meta-analysis of cohort studies	Tobacco Use and Risk of Wound Complications and Periprosthetic Joint Infection: A Systematic Review and Meta-Analysis of Primary Total Joint Arthroplasty Procedures
Lead author	Sattler	He	Bedard
Year published	2020	2022	2018
Number of included studies (if SR with or without MA)	9 quantitative (4 in MA)	13	9
Description of intervention group (optional for SRs)	Smoking	Smoking TKA patients (Current OR Former)	Smokers
Description of control group (optional for SRs)	Non-smoking	Non-smoking TKA patients	Non-smokers
Number of patients in intervention group	5563 overall	432021	38502 current smokers,19028 former smokers
Number of patients in control group		1659728	158707
Mean age with range of intervention group	63-70 overall in 3 smoking studies	45-74 overall	NA
Mean age with range of control group			

Inclusion criteria (on patient-level if clinical study; on article-level if SR) **Examples:** **Clinical study: "The inclusion criteria were (i) primary ACLR in (ii) patients aged over 50 years. The exclusion criteria were (iii) severe concomitant ligament injury (grade 3), (iv) tibiofemoral osteoarthritis visible on weight-bearing anteroposterior and/or sagittal radiographs (> 50% joint space narrowing), and (v) history of intra- or extra-articular ligament surgery in either knee."** **SR: "Studies comparing the diagnostic accuracy of physical examination (clinical tests or ultrasound) versus arthroscopy for the assessment of LHBT pathologies"**	We included all articles of any study design investigating pre-operative patient factors for their level of predictivity of IRF discharge following primary TKA. Key inclusion criteria were that the article be available in full text English, a search term was required in the title or abstract, the population studied was primary unilateral knee replacement patients, a pre-operative intrinsic patient factor was a variable in the study and an outcome included discharge destination. Intrinsic factors were defined as those inherent to the individual, including demographic characteristics age, gender, ethnicity, socioeconomic status as well as clinical factors such as presence of comorbidity. Behavioural factors such as smoking and alcohol consumption, and patient reported outcome measures that capture the patient's perspective were also considered intrinsic factors and included. Non-	Inclusion criteria for the meta-analysis were as follows: (1) cohort study design including retrospective and prospective studies, (2)evaluated the impact of smoking on both incidence of and complications after TKA, and (3) provided sufficient data for calculating the risk ratio (RR) or hazard ratio (HR) with a 95% confidential interval (CI). Exclusion criteria were as follows: (1) non-English articles, (2) studies without a non-smoking control group, (3) studies with incomplete data, and (4) study objective or intervention measures that failed to meet the inclusion criteria.	Full-text articles were then analyzed by both reviewers to identify which studies met the following inclusion criteria: (1) study evaluated the association between tobacco and SSI after primary THA or TKA, (2) provided sufficient data for calculating pooled odds ratios (OR) with a 95% confidence interval. Studies that included surgical procedures other than primary THA and TKA were excluded in order to minimizing potential confounding from nonprimary THA and TKA procedures. Review articles, letters, commentaries, and editorials were excluded.

	intrinsic factors and included. Non-intrinsic factors were excluded, where the patient was subject to an intervention such as participation in a pre-operative exercise class or education session. Additional exclusion criteria were post-operative variables including length of stay (LOS), readmission status and other post-operative complications. Studies that did not separate the reporting of primary TKA were also excluded, as were studies that took place after discharge from the post-acute hospital setting, such as outpatient or inpatient rehabilitation.		
Follow-up period	NA	2-26 years	4 weeks-5 years

Main results	Smoking status (non-smoker or currently smoking) was reported on in 3 studies and was included in meta-analysis [22, 23, 27]. Smoking showed an overall decreased likelihood of IRF discharge (OR = 0.80; 95% CI 0.42,Äì1.50), however, heterogeneity of the studies was moderate (I2 = 68.5%) (Fig. 6).	Total complications Four of the included studies have compared the total complications, including a total of 66 825 patients. Due to a significant heterogeneity between the studies (I2 = 60%), a random-effects model was used for the meta-analysis. The results showed that smoking can increase total complications after TKA (summary RR=1.22, 95% CI [1.04, 1.44], p = 0.01, Figure 3). Surgical complications The surgical complications were analyzed in six studies with a total of 72 535 patients. A random-effects model was used because of significant heterogeneity (I2 = 80%). The results revealed that smoking can increase surgical complications after TKA (summary RR = 1.71, 95% CI [1.15, 2.55], p < 0.01, Figure 4A). We divided the data on surgical complications into three subgroups for comparison between the two	All 14 studies were included in the As Defined meta-analysis evaluating the odds of any wound complication after primary TJA among tobacco users vs nonetobacco users [8e21]. The results of this analysis demonstrated significantly increased odds of any wound complication for tobacco users, with an OR of 1.78 (1.32- 2.39) (Fig. 2, P < .001). To evaluate the impact of tobacco use on odds of PJI, 13 studies were included in the meta-analysis [8e19,21] and demonstrated a significantly increased odds of PJI for tobacco users when compared to nonetobacco users (OR, 2.02 [1.47-2.77], P < .001, Fig. 3). Furthermore, when patients were further categorized into current, former, and nonetobacco users in the As Defined meta-analysis, both current tobacco and former tobacco users were significantly more likely to have a wound complication than nonetobacco users with OR of 1.85 (1.41-2.43; P < .001) and 1.16 (1.01-

			for comparison between the two throngs to reduce the heterogeneity. The subgroups were deep wound infection and superficial wound infection. Three studies reported the specific classification of surgical complications, including 23,525 patients, with three studies involving deep wound infec- tion, and two studies containing superficial wound infection. Since the heterogeneity between the studies and subgroups was not significant (I2 < 50%), a fixed-effects model was used for the meta-analysis. The results of the analysis revealed that deep wound infection (summary RR = 2.05, 95% CI [1.43, 2.94], p < 0.01) and superficial wound infection (summary RR = 2.39, 95% CI [1.26, 4.56], p < 0.01) were more present in the smoking group than in the non-smoking group (Figure 4B). Internal medicine complications Pneumonia Three studies with a total of	(1.41-2.48, P < .001) and 1.16 (1.01-1.33; P 1,ÅÑ4 .032), respectively (Figs. 4 and 5). Additionally, current tobacco users had greater odds of any wound complication when compared to former tobacco users (OR, 1.36 [1.16-1.60], P < .001, Fig. 6). These same subgroup As Defined meta-analyses were performed for the end point of PJI and demonstrated odds were significantly higher for current tobacco users compared to nonetobacco users (OR, 2.16 [1.57-2.97], P < .001, Fig. 7), former tobacco users compared to nonetobacco users (OR, 1.52 [1.16-1.99], P 1,ÅÑ4 .003, Fig. 8), and current tobacco users compared to former tobacco users (OR, 1.52 [1.07-2.14], P 1,ÅÑ4 .018, Fig. 9). For the Re-Defined meta-analysis, we evaluated the odds of any wound complication for never vs ever tobacco users (10 studies included [8,10,11,13e18,21]), nonecurrent tobacco users vs current tobacco users (6 studies included

		3,335,043 patients were included, and the post-operative clinical outcome of pneumo- nia in the smoking and non-smoking groups was compared. A random-effects model was employed in the meta-analysis because the heterogeneity was significant (I2 > 50%). The result indicated that smoking increased the risk of pneumonia after TKA (summary RR = 1.45, 95% CI [1.16, 1.80], p < 0.01). Sensitivity analysis was also conducted, which produced sim- ilar results (Figure 5). Blood transfusion In three studies involving a total of 1,811,012 patients, blood transfusion after TKA was compared. Since the heterogeneity between the studies was significant (I2 > 50%), a random-effects model was used for the meta-analysis. We found that there were no statistical differences between the two groups in terms of the blood transfusion (summary RR = 1.25, 95%	[8,9,12,16,19,20]), and never vs current tobacco users (2 studies included [8,16]). Results of these analyses demonstrated ever tobacco users were significantly more likely to experience wound complications than never tobacco users (OR, 1.41 [1.31-1.51], P < .001, Fig. 10), as were current tobacco users relative to nonecurrent tobacco users (OR, 2.00 [1.27-3.17], P 1,ÅÑ4 .003, Fig. 11). There were no significant differences when comparing current tobacco users to never tobacco users for the end point any wound complication (OR, 1.40 [0.98-2.01], P = .064). For the end point of PJI in the Re-Defined meta-analysis, 9 studies were included for the never vs ever tobacco user comparison [8,11,13e18,21], 6 studies were included for the nonecurrent tobacco user vs current tobacco user comparison [8,9,12,16,19,20], and 2 studies were included for the never vs current tobacco user comparison

		translation (summary HR = 1.23, 95% CI [0.73, 2.11], p = 0.42, Figure 6). Sensitivity analysis detected that if Nicholas A,Äôs study was excluded, heterogeneity would be greatly reduced (I2 = 0%) and the result would be different (p < 0.01). Deep vein thrombosis Three of the included studies compared deep vein throm- bosis after TKA in the smoking and non-smoking groups with a total of 1,858,448 patients. A random-effects model was employed in the meta-analysis owing to significant heteroge-neity (I2 > 50%). The results indicated that there were no statis- tical differences between the two groups concerning deep vein thrombosis (summary RR = 1.74, 95% CI [0.59, 5.12], p = 0.31, Figure 7). Sensitivity analysis showed that excluding Gulraj,Äôs study, heterogeneity would be greatly reduced (I2 = 0%), and the result would be changed (p <	current tobacco use. Comparison [8,16]. Ever tobacco users were significantly more likely to have a PJI than never tobacco users with an OR of 1.67 (1.25-2.21, P < .001, Fig. 12). Current tobacco users were also significantly more likely to have a PJI than nonecurrent tobacco users with an OR of 2.31 (1.74-3.08, P < .001, Fig. 13). Additionally, current tobacco users were more likely to have PJI than never tobacco users (OR, 2.25 [1.35-3.73], P = .002). Of the 14 studies included in this systematic review, 9 studies performed additional analyses to control for confounding variables through multivariate analysis or matching [8-11,14,18-21]. Tischler et al [8] used an institutional database to retrospectively evaluate the association between smoking and postoperative complications following 17,394 primary TJA procedures. Of the entire cohort, 9.0% were current smokers, 34.0%

			0.01). Pulmonary embolism Three studies, including a total of 1,858,448 patients, reported the number of patients who experienced pulmonary embolism after TKA. Since the heterogeneity was significant (I2 > 50%), a random-effects model was used for the meta-analysis. The results showed that there was no statistical difference between the two groups in terms of the pulmonary embolism (summary RR = 1.68, 95% CI [0.54, 5.84], p = 0.34, Figure 8). Sensitivity analysis elucidated that except for Gulraj's analysis; there was a low heterogeneity (I2 = 0%) and the result would be statistically significant (p < 0.01). Urinary tract infection Urinary tract infection was mentioned in four studies, including a total of 1,858,448 patients. Due to the high heterogeneity (I2 > 50%), we used a random-effects model to	were former smokers, and 57.0% were nonsmokers. Using a series of 3 stacked multiple regression to evaluate the effect of smoking on septic reoperations within 90 days of surgery, they demonstrated current smokers remained significantly more likely than nonsmokers to undergo septic reoperation (1.2% vs 0.56%; OR, 1.82 [1.03-3.23]). However, in this analysis, former smokers and calculated packs per decade were not significant predictors of septic reoperation. Two additional studies both used the American College of Surgeons National Surgical Quality Improvement Program to evaluate differences in 30-day morbidity and mortality following primary TJA [11,18]. Duchman et al [11] evaluated 78,191 primary TJA patients using multivariate logistic regression analysis to adjust for confounding variables and found current smoking status significantly increased the risk of any wound complication following

		analyze. Meta-analysis of the included studies suggested that no signif- icant difference in the risk of implant dislocation was found between smokers and non-smokers (summary RR = 1.51, 95% CI [0.50, 4.51], p = 0.46, Figure 9). Sensitivity analysis showed that excluding Gulraj's study, heterogeneity would be greatly reduced (I2 = 0%), and the result would be altered (p < 0.01). Revision In three studies involving a total of 15,747 patients, revision of the TKA by bacterial infection or removal of components for other causes were reported. There was no significant heterogeneity among these studies (I2 = 37%); hence, the fixed-effects model was employed in the meta-analysis. The results indicated a significantly increased risk of revision in the smokers after TKA (summary RR = 1.31, 95% CI [1.06, 1.63], p = 0.01,	primary TJA compared to nonsmokers (1.8% vs 1.1%; OR, 1.47 [1.21-1.78]). Similar to Tischler et al [8], they did not find an association between former smokers and increased wound complications in their multivariate analysis. Sahota et al [18] performed a propensity scoreematched analysis of 1251 current smokers and 1251 non- smokers and demonstrated that current smokers have a significantly higher incidence of deep SSI (1.1% vs 0.2%, P = .007) compared to nonsmokers. There was not a significant difference in the incidence of superficial SSI [18]. Of the remaining 6 studies that controlled for confounding variables through matching or multivariate analyses, 3 studies identified a significant association between smoking and wound-related complications/SSI [9,10,19] and 3 studies did not find an association between smoking and wound complication/SSI in their

		Figure 10). Mortality The mortality after TKA was reported in four studies with a total of 1,867,999 patients. Because of the strong heterogeneity of these experiments (I2 > 50%), a random-effects model was employed. Meta-analysis results indicated that there were no statistical differences between the two groups in mortality (summary RR=1.83, 95% CI [0.46, 7.31], p = 0.39, Figure 11). Sensitivity analysis revealed that excluding Sean's study would significantly decrease heterogeneity (I2 = 0%), and the outcome would be altered (p < 0.01).	multivariate analyses [14,20,21].

Key findings (use Results and Conclusion in Abstract)	Results: A total of 9 articles published between 2011 to 2018 with 218,151 TKA patients were included. Of the 13 intrinsic patient factors reported, 6 met the criteria for synthesised review: age, obesity, comorbidity, gender, SF-12/VR-12 survey, and smoking. Due to the heterogeneity of statistical analysis and reporting 2 variables could undergo meta-analysis, gender and smoking. Female gender increased the likelihood of IRF discharge by 78% (OR = 1.78; 95%CI = 1.43-2.20; I2 = 33.3%), however, the relationship between smoking status and discharge destination was less certain (OR = 0.80; 95%CI = 0.42-1.50; I2 = 68.5%). Conclusion: In this systematic literature review and meta-analysis female gender was shown to be predictive of IRF discharge after total knee arthroplasty. There was also a trend for those of older age and increased comorbidity, as measured by the Charlson Comorbidity Index, or	Compared to non-smokers, smokers had a significantly lower incidence of TKA ($p < 0.01$). However, smokers had a higher incidence of total complications ($p = 0.01$), surgical complications ($p < 0.01$), pneumonia ($p < 0.01$), and revision surgery ($p = 0.01$). No significant difference in the risk of blood transfusion ($p = 0.42$), deep vein thrombosis ($p = 0.31$), pulmonary embolism ($p = 0.34$), urinary tract infection ($p = 0.46$), or mortality ($p = 0.39$) was found between smokers and non-smokers. In conclusion, the study indicated that tobacco has two diametrically opposite effects on TKA patients: (1) Tobacco increases the incidence of surgical complications, pneumonia and revision after TKA; (2) It decreases the overall risk of being a candidate for TKA.	Results: Fourteen studies were included in the meta-analysis. Tobacco users had a significantly higher risk of wound complications (OR, 1.78 [1.32-2.39]) and PJI (OR, 2.02 [1.47-2.77]) compared to non etobacco users. Compared to nonetobacco users, there was an increased risk of PJI among current (OR, 2.16 [1.57-2.97] and former (OR, 1.52 [1.16-1.99]) tobacco users. Current tobacco users also had a significantly increased risk of PJI compared to former tobacco users (OR, 1.52 [1.07-2.14]). Conclusion: Tobacco use before total hip and total knee arthroplasty significantly increases the risk of wound complications and PJI. This increased risk is present for both current and former tobacco users. However, former tobacco users had a significantly lower risk of wound complications and PJI compared to current tobacco users, suggesting that cessation of tobacco use before

	by the Charlson Comorbidity Index, of the severely obese to have an increased likelihood of IRF discharge. The marked heterogeneity of statistical methods and reporting in existing literature made pooled analysis challenging for intrinsic patient factors predictive of IRF discharge after TKA. Further, high quality studies of prospective design on predictive factors are warranted, to enable early discharge planning and optimise resource allocation on post-acute care following TKA.		that cessation of tobacco use before TJA can help to mitigate these observed risks.
Type of Study	Systematic review with or without meta-analysis (AMSTARII)	Systematic review with or without meta-analysis (AMSTARII)	Systematic review with or without meta-analysis (AMSTARII)
Assessment tool	AMSTAR	AMSTAR	AMSTAR
Overall Assessment	Critically low (Quality assessment)	Low (Quality assessment)	Low (Quality assessment)
What is the lowest evidence study included in the SR?	Retrospective comparative study or case series, Level 3	Retrospective comparative study or case series, Level 3	Retrospective comparative study or case series, Level 3
Level of evidence (Oxford 2011)	Level 4, downgraded due to critically low AMSTAR	Level 3	Level 3

51. Empfehlung	Neu 2024
Empfehlungsgrad ⇑⇑	Wir empfehlen bei Patient*innen mit Diabetes mellitus die Blutzuckerwerte vor der Implantation einer Knieendoprothese entsprechend der individuell vereinbarten Therpieziele* einzustellen.
Level of Evidence (Oxford 2011) 4 4 3	 Yang et al. 2014 (53) Yang et al. 2017 (54) Shohat et al. 2018 (55)
Konsensstärke:	100 % (starker Konsens)

1. Schlüsselfrage und PICO Format	
clinical key question	In diabetic adult patients with osteoarthritis undergoing KA, are outcomes diminished and/or complications increased
population	Adults with: • symptomatic knee OA (clinically confirmed), AND • K/L stage 2/3/4 (radiographically confirmed), AND
intervention	• Diabetic patients that undergo KA
comparison	• Non-diabetic patients that undergo KA
outcome	• Adverse events and complications • Clinical and functional scores (validated PROMS): o Pain o Physical function o Health related quality of life o Satisfaction

*orientiert an Nationaler VersorgungsLeitlinie Typ II Diabetes 2023 (Version 3.0) AWMF Reg.nr.:nvl-001

2. Recherche Zusammenfassung

Identifier	*ID Ordinal 44*
PICO(T) question	In diabetic adult patients with osteoarthritis undergoing KA, are outcomes diminished and/or complications increased compared with non-diabetic patients undergoing KA?
Search characteristics	
Date of search	03/05/23
Initials of primary reader	CA
Database(s)	*PubMed*
Keywords	*Knee* *osteoarthritis; arthritis; osteoarthros*; gonitis; gonarthritis; gonarthros** knee arthroplasty; knee replacement; diabetic; diabetes; insuline; blood sugar; hyperglycemia
Search strings	*#1 Animals[Title] OR Cadaver[Title] OR animal*[Title] OR dog[Title] OR dogs[Title] OR canine[Title] OR cats[Title] OR feline[Title] OR horse*[Title] OR equine[Title] OR mouse[Title] OR mice[Title] OR rat[Title] OR rats[Title] OR rabbit*[Title] OR sheep[Title] OR porcine[Title] OR pig[Title] OR pigs[Title] OR rodent*[Title] OR monkey*[Title] OR cadaver*[Title/Abstract] OR "in vitro"[Title/Abstract] OR comment[Publication Type] OR editorial[Publication Type] OR letter[Publication Type] OR "historical article"[Publication Type] OR address[Publication Type] OR news[Publication Type] OR "newspaper article" [Publication Type] OR "case reports"[Publication Type] OR case report*[Title] OR abstracts[Title] OR editorial[Title] OR reply[Title] OR comment*[Title] OR commentary[Title] OR letter[Title] OR biomechanic*[Title]* *#2 "randomized-controlled-trial" OR "Randomized-Controlled-Trials" OR "random-allocation" OR random*[Title] OR RCT* *#3 (systematic* AND review*) OR meta-analys*[Title/Abstract] OR meta-analysis OR systematic-review* *#4 (Knee)*

	#5 (Osteoarthritis OR arthritis OR osteoarthros OR gonitis OR gonarthritis OR gonarthros*)* #6 ("knee arthroplasty" OR "knee replacement" OR KA) AND (diabetic OR diabetes OR hyperglycemia OR insuline OR "blood sugar" OR glucose OR glycemic) #7 (#4 AND #5 AND #6) NOT #1 #8 (#7 AND #2) #9 (#7 AND #3)
Number of hits	
RCTs (#8)	15
SR(+MA) (#9)	18
Studies published before 2003	1 RCT
Articles to consider	
DOIs MAs	Shohat 2021: 10.1016/j.arth.2018.02.020 Yang 2017: 10.1097/MD.0000000000008805 Yang 2014: 10.1302/0301-620X.96B12.34378
DOIs SRs	Kunutsor 2016 : 10.1371/journal.pone.0150866
DOIs RCTs	
Include/Excluded after FT screening	
Include	Shohat 2021: 10.1016/j.arth.2018.02.020
Excluded: not focused on diabetes	Kunutsor 2016 : 10.1371/journal.pone.0150866
Include	Yang 2014: 10.1302/0301-620X.96B12.34378
Include	Yang 2017: 10.1097/MD.0000000000008805

Query box

Enter / edit your search query here

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History and Search Details

Download Delete

		Query	Results
#9	••• >	Search: **(#7 AND #3)** Sort by: **Most Recent**	18
#8	••• >	Search: **(#7 AND #2)** Sort by: **Most Recent**	15
#7	••• >	Search: **(#4 AND #5 AND #6) ...** Sort by: **Most Recent**	316
#6	••• >	Search: **("knee arthroplasty" ...** Sort by: **Most Recent**	4,672
#5	••• >	Search: **(Osteoarthritis OR ar...** Sort by: **Most Recent**	416,566
#4	••• >	Search: **Knee** Sort by: **Most Recent**	206,109
#3	••• >	Search: **(systematic* AND re...** Sort by: **Most Recent**	528,984
#2	••• >	Search: **"randomized-control...** Sort by: **Most Recent**	990,448
#1	••• >	Search: **Animals[Title] OR Ca...** Sort by: **Most Recent**	8,458,750

Showing 1 to 9 of 9 entries

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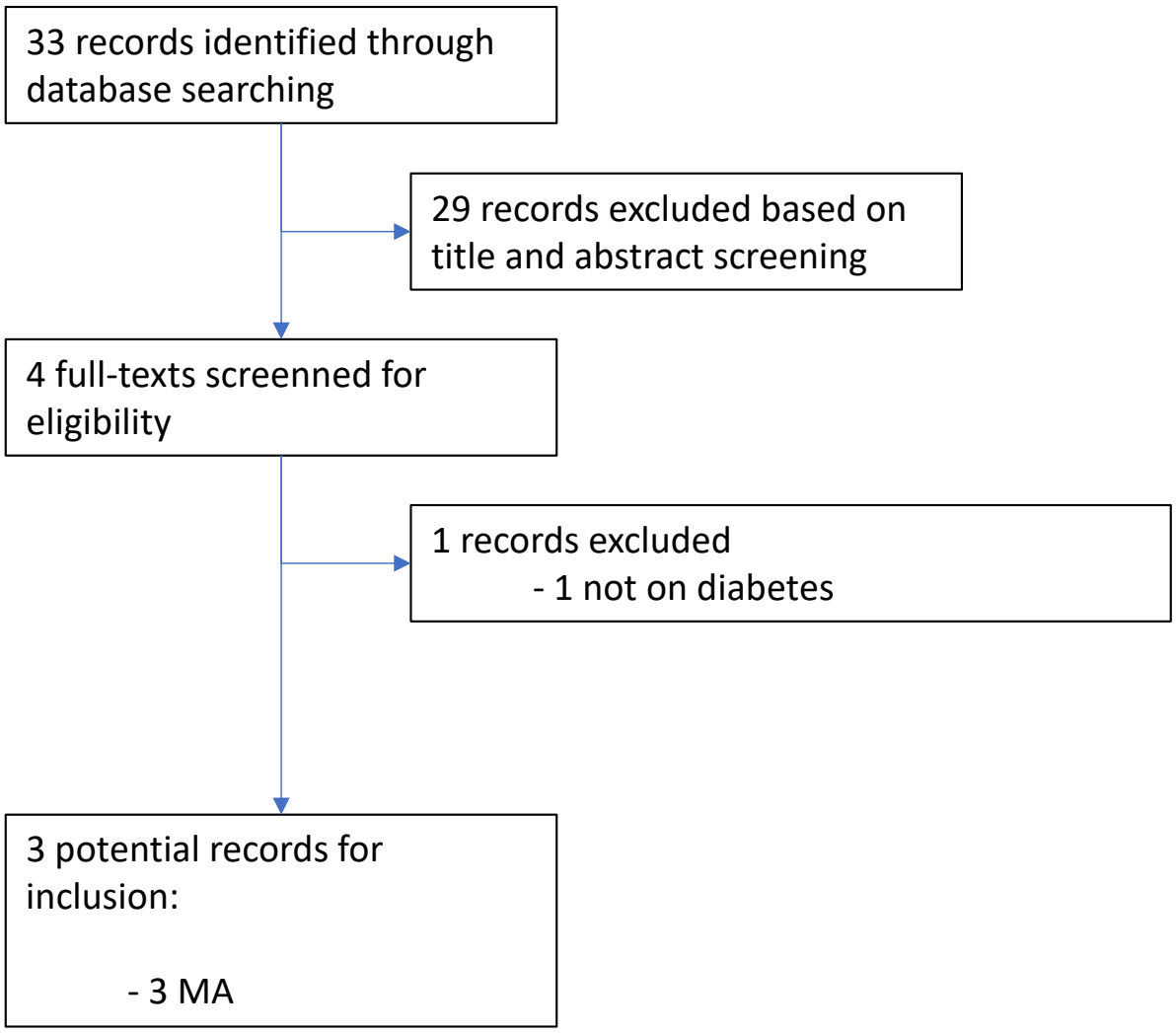
4. Studienselektion: Flowchart

PubMed Search: In diabetic adult patients with osteoarthritis undergoing KA, are outcomes diminished and/or complications increased compared with non-diabetic patients undergoing KA? (26/04/2023)



Included SRs and MAs

(1-3)

1. Shohat N, Muhsen K, Gilat R, Rondon AJ, Chen AF, Parvizi J. Inadequate Glycemic Control Is Associated With Increased Surgical Site Infection in Total Joint Arthroplasty: A Systematic Review and Meta-Analysis. J Arthroplasty. 2018;33(7):2312-21.e3. doi: 10.1016/j.arth.2018.02.020
2. Yang L, Sun Y, Li G, Liu J. Is hemoglobin A1c and perioperative hyperglycemia predictive of periprosthetic joint infection following total joint arthroplasty?: A systematic review and meta-analysis. Medicine (Baltimore). 2017;96(51):e8805. doi: 10.1097/md.0000000000008805
3. Yang Z, Liu H, Xie X, Tan Z, Qin T, Kang P. The influence of diabetes mellitus on the post-operative outcome of elective primary total knee replacement: a systematic review and meta-analysis. Bone Joint J. 2014;96-b(12):1637-43. doi: 10.1302/0301-620x.96b12.34378

5. Charakteristika der eingeschlossenen Studien

PICO number:	44	44	44
PICO Question:	In diabetic adult patients with osteoarthritis undergoing KA, are outcomes diminished and/or complications increased compared with non-diabetic patients undergoing KA?	In diabetic adult patients with osteoarthritis undergoing KA, are outcomes diminished and/or complications increased compared with non-diabetic patients undergoing KA?	In diabetic adult patients with osteoarthritis undergoing KA, are outcomes diminished and/or complications increased compared with non-diabetic patients undergoing KA?
Article name:	Is hemoglobin A1c and perioperative hyperglycemia predictive of periprosthetic joint infection following total joint arthroplasty?	The influence of diabetes mellitus on the post-operative outcome of elective primary total knee replacement	Inadequate Glycemic Control Is Associated With Increased Surgical Site Infection in Total Joint Arthroplasty: A Systematic Review and Meta-Analysis
Lead author	Yang	Yang	Shohat
Year published	2017	2014	2018
Number of included studies (if SR with or without MA)	6	14	10
Description of intervention group (optional for SRs)	infected (PJI)	0	controlled glycemic level (not always split into cohorts for each study)
Description of control group (optional for SRs)	non infected	0	uncontrolled glycemic level (not always split into cohorts for each study)
Number of patients in intervention group	26,901 patients total	853071 total	44697 overall
Number of patients in control group	0	0	0
Mean age with range of intervention group	64.7-73.9	67.1-72.2 overall	64-73 overall

Mean age with range of control group	62.9-72.6	0	0
Inclusion criteria (on patient-level if clinical study; on article-level if SR) **Examples:** **Clinical study: "The inclusion criteria were (i) primary ACLR in (ii) patients aged over 50 years. The exclusion criteria were (iii) severe concomitant ligament injury (grade 3), (iv) tibiofemoral osteoarthritis visible on weight-bearing anteroposterior and/or sagittal radiographs (> 50% joint space narrowing), and (v) history of intra- or extra-articular ligament surgery in either knee."** **SR: "Studies comparing the diagnostic accuracy of physical examination (clinical tests or ultrasound) versus arthroscopy for the assessment of LHBT pathologies"**	Studies were considered eligible if they meet the following criteria: published clinical retrospective study; a study that was performed to explore the relationship between perioperative hyperglycemia and postoperative periprosthetic joint infection for patient undergoing TKA or THA surgery; cases and controls are defined on the basis of presence or absence of periprosthetic joint infection. Studies will be excluded from present meta- analysis for incomplete data, cases report, conference abstract, or review articles.	Criteria for inclusion Observational studies (either prospective or retrospective study) Patients undergoing elective primary total knee replacement At least one post-operative outcome of interest reported Studies providing sufficient information to calculate risk estimate and corresponding 95% confidence intervals Criteria for exclusion Case report, review or conference abstract Exposure combining diabetes mellitus with other factors Data unable to be extracted Studies without a control group	Predefined eligibility criteria were observational studies (case-control and cohort studies) or clinical trials that examined associations between glycemic control and SSI following primary or revision total hip (THA) and total knee (TKA) arthroplasty. We included studies with a minimum of 30 days of follow-up after implantation. We excluded studies (1) not providing any objective findings on perioperative glycemic control (mean glucose or HbA1C levels); (2) that had no comparison or control group (mainly case reports and case series); (3) that did not specifically report SSI or did not differentiate between SSI from other adverse outcomes; and/or (4) that involved patients who had undergone hemiarthroplasty.
Follow-up period	12-24 months	14 days - 10 years	30 days - >2 years

Main results	3.6.1. Perioperative random blood glucose level. All stud- ies[12–17] report perioperative random blood glucose level following total joint arthroplasty. There is no significant heterogeneity (x2 = 4.82, df = 5, I2 = 0.0%, P = .438); therefore, a fixed-effects model is used. The result of meta-analysis shows that perioperative random blood glucose level in experimental groups is significantly higher than in control groups (WMD= 2.365, 95% CI: 1.802–2.929, P=.000; Fig. 4). 3.6.2. Perioperative hemoglobin A1c level. Four studies[12– 14,16] report postoperative A1c level. There is no significant heterogeneity among these studies (x2 = 6.33, df = 3, I2 = 52.6%, P = .097); therefore, a fixed-effects model is used. Pooled results demonstrate that the perioperative HbA1c level in experimental groups is significantly higher than in control groups (WMD= 3.266, 95% CI: 2.858–3.674, P= .000; Fig. 5)	Of the 14 studies, there were three matched cohort stud- ies 16-18 which could not be included to calculate the preva- lence of DM in the specific cohort. Based on the data available from the remaining 11 studies, the prevalence of DM in TKR population was estimated to be 12.2% (8.3% to 25.7%) (Table IV). Our results found patients with DM had an increased risk of deep infection (OR = 1.61, 95% CI 1.38 to 1.88), periprosthetic fracture (OR = 1.89, 95% CI 1.04 to 3.45), aseptic loosening (OR = 9.36, 95% CI 4.63 to 18.90), and a poorer Knee Society function subscore (MD = -5.86, 95% CI, -10.27 to -1.46; Table V). For the summary analysis of DVT, the heterogeneity could not be ignored (Q = 19.22, p < 0.001, I2 = 74%), suggesting the result should be interpreted with caution. So we performed a subgroup analysis according to the location of the study population, and found an increased	Preoperative HbA1C Levels Overall, 14 studies assessed the association between HbA1C levels and SSI [16,17,20,23e33]. Of these, 11 studies assessed deep SSI/periprosthetic joint infection (PJI) [16,17,20,23e29,32], 8 assessed wound complications including superficial SSI [17,23,28e33], and 5 assessed both deep and superficial SSIs [17,28,29,32]. Thirteen were retrospective cohort studies [16,17,20,23e30,32,33] and 1 was a nested case-control [31]. There were no randomized controlled trials. Eleven studies were con- ducted in the USA [16,17,20,23,25e28,31,33], 2 were from South Korea [30,32], and 1 from Finland [24]. Five studied included only TKA patients [16,24,27,30,32], 1 study included only THA patients [26], and 8 studies included both TKA and THA patients [17,20,23,25,28,29,31,33]. Nine studies included only primary TJA and excluded revision cases

	2.838-3.074, P<.000, Fig. 3).	population, and found an increased risk of DVT for Asian diabetics undergoing TKRs (OR = 2.57, 95% CI, 1.58 to 4.20) with acceptable heterogeneity. Forest plots for deep infection and DVT are shown in Figures 2 and 3.	excluded revision cases [16,20,24,26e29,31,33]. HbA1C and Periprosthetic Joint Infection There were 4 studies suggesting an association between high HbA1C levels and PJI [24,26,27,29]. Ja€msen et al [24] investigated 1565 patients undergoing primary TKA between 2002 and 2006 using a single institution database. Notably, the authors were un- able to differentiate known diabetic patients from those without diabetes. HbA1C levels were not the primary focus of the study, but were available for 381 patients. The average HbA1C levels were significantly higher (P 1⁄4 .02) in patients with PJI (7.3%) compared to patients who did not develop PJI (6.2%). Although patients with HbA1C <6.5% (n 1⁄4 205) did not develop PJI, 5 patients (2.8%) with HbA1C !6.5% (n 1⁄4 176) developed PJI (P 1⁄4 .02). Importantly, these findings were not

				adjusted in a multivariate analysis; given that these findings were based on only 5 patients with PJI significantly reduces their impact. Two other studies that showed an association between HbA1C and PJI were based on the Humana database [26,27]. They included diabetic patients who underwent primary THA (7736) and TKA (17,435) and reported HbA1C levels between 7.0% and 7.5% for THA and 8.0% for TKA as thresholds above which the risk for PJI increases. However, the low area under the curve [AUC] values (0.68 for THA and 0.55 for TKA) precluded them from making distinct thresholds. Nevertheless, the OR for PJI was statistically significant using these thresholds, indicating that higher HbA1C levels correlated with PJI. Notably, the demographic characteristics of the patient population were missing or lacking, and although they attempted to adjust for common demographic

				adjust for common demographic confounders (age, gender, body mass index [BMI], tobacco use, alcohol use, and medical comorbidities), they did not control for important factors such as operative time. A recent multicenter study [29] examining 1645 diabetic patients undergoing primary TKA and THA found similar results to these studies; using the Youden index, HbA1C at a threshold of 7.7% was distinct for predicting PJI (AUC 1⁄4 0.65). In the regression model, higher HbA1C levels were the only independent variables significantly associated with PJI (P 1⁄4 .0001). There were 7 studies that showed no association between HbA1C levels and SSI [16,17,20,23,25,28,32]; 2 of them [17,28] did not differentiate PJI from superficial SSI in the analysis and 5 did [16,20,23,25,32]. Two of these studies included 13,272 and 6088 diabetic patients, and were based on a large veteran database

				from multiple centers which resulted in a population of 96% male patients [20,23]. Both looked at HbA1C as a categorical variable, considering 7% as cut-off for uncontrolled DM, and they both found no association between uncontrolled or controlled DM and PJI or SSI. Adams et al [16] retrieved data from medical records of patients undergoing primary TKA in 5 regions of Kaiser Permanente. They also grouped diabetic patients (n 1⁄4 7567) by controlled and uncontrolled groups based on 7% as a threshold, and found no association with PJI or revision TKA. Han and Kang [32] looked at a significantly smaller group of diabetic patients (n 1⁄4 155) undergoing TKA (not specified as primary), using 8% as a cut-off for glycemic control. They were also unable to show an association between high HbA1C levels and PJI. Kremers et al [25] assessed HbA1C levels as a continuous variable. They included a large cohort of 20,171 patients

				undergoing primary and revision TJA for which HbA1C was available in 1513 cases. PJI was based on the Infectious Diseases Society of America criteria, which were more reliable than the above studies, where PJI was defined by diagnostic codes. In the multivariate analysis, there was no association between HbA1C levels (as a continuous variable or with a cut-off of 7% and the risk for developing PJI. HbA1C and Superficial SSI Overall, 8 studies assessed the association between HbA1c and superficial SSI [17,23,28e33]. Two of these studies analyzed the results in combination with PJI [17,28]. Of the 5 studies which looked at superficial SSI as a separate identity from PJI, 3 included superficial SSI as part of a bigger group including all wound complications [29,31,32] and 2 reported specifically on superficial

				SSI [23,30]. The 2 studies examining superficial SSIs reported conflicting results; Hwang et al [30] used an HbA1C cut-off of 8% in their study on 462 diabetic patients (96% female) undergoing TKA, and showed a significant association with superficial SSI (OR 6.1, 95% CI 1.6-23.4, P 1⁄4 .008) but not with other wound complications. Importantly, these results were based on only 10 superficial SSIs. Conversely, Harris et al [23] examined a much larger group of diabetic patients (6088) undergoing TJA and showed no association between superficial SSI and uncontrolled diabetes using an HbA1C level of 7% as a cut-off (36/3961, 0.9% vs 18/2127, 0.9%). Although the total number of superficial SSI in this study was markedly higher, the information was derived from a large veteran's database (96% male). In a well-designed case-control study, Stryker et al compared 30 diabetic TJA

				patients (1 had shoulder arthroplasty who developed wound complications at 30 days to 1:1 matched controls without wound complications. Only 3 patients had a superficial SSI. Although there was no statistically significant difference in average HbA1C levels between groups, patients with HbA1C >6.7% were at higher risk for wound complications (OR 9.0, 95% CI 1.14-71.20, P 1⁄4 .03). This study was limited by its small sample size, and by the absence of controlling for comorbidities. Han et al [32] reported on wound complications of 155 diabetic patients (91% female) undergoing TKA. In a multivariate analysis, uncontrolled DM (HbA1C !8%) was associated with wound complications (adjusted OR 6.07, 95% CI 1.12-33.0). Notably, this group consisted of only 11 patients, of which only 3 of them had superficial SSI. This small population made the multivariable analysis unreliable

				multivariable analysis unreliable. Tarabichi et al [29] found only a slight correlation between higher HbA1C levels and 90-day wound complications, and this was not significant (P 1⁄4 .14). Perioperative Hyperglycemia Overall, 8 studies assessed the association between periopera- tive hyperglycemia and SSI [20,24,25,30,31,34e36]. Of these, 5 assessed PJIs [20,24,25,34,36] and 3 assessed wound complications, including superficial SSI [30,31,35]. Table 1 describes the charac- teristics of these studies and their key findings. Six studies [20,24,25,30,35,36] were retrospective cohort studies and 2 were case-controls [31,34]. There were no randomized control studies. Four studies were conducted in the USA [20,25,31,34], 2 from Finland [24,36], 1 from France [35], and 1 from South Korea [30]. Two studies only

			included TKA patients [24,30] and 6 studies included both TKA and THA patients [20,25,31,34e36]. Five studies included only primary TJA and excluded revision cases [20,24,31,34,36]. Hyperglycemia and PJI All 5 studies [20,24,25,34,36] that specifically assessed for PJI showed some association with hyperglycemia, which was attenu-ated after adjusting to covariates in most cases. Ja€msen et al [24] studied 1565 patients who underwent TKA and demonstrated that patients with glucose levels (mean 6 weeks prior to surgery) equal to or above 126 mg/dL had higher rates of PJI than patients with glucose levels below 110 mg/dL (2.42% vs 0.44%). Although this remained statistically significant after adjusting for age and gender (HR 4.41, 95% CI 1.31-14.83), it was no longer statistically significant after

Key findings (use Results and Conclusion in Abstract)	Results: Six retrospective studies including 26,901 patients meet the inclusion criteria. The present meta-analysis indicates that there are significant differences between groups in terms of perioperative random blood glucose level [weighted mean difference (WMD)=2.365, 95% confidence interval (95% CI): 1.802–2.929, P=.000] and perioperative hemoglobin A1c level (WMD=3.266, 95% CI: 2.858–3.674, P=.000). No significant difference is found regarding body mass index (BMI) condition between groups (WMD=0.027, 95% CI: -0.487 to 0.541, P=.919). Conclusion: The present meta-analysis shows that high HbA1c and perioperative hyperglycemia are associated with a higher risk of periprosthetic joint infection following total joint arthroplasty. Screening of HbA1c and perioperative blood glucose is therefore an effective method to predict deep infection.	Our results showed the prevalence of diabetes mellitus among patients undergoing TKR was 12.2%. Patients with diabetes mellitus had an increased risk of deep infection (OR = 1.61, 95% confidence interval (CI), 1.38 to 1.88), deep vein thrombosis (in Asia, OR = 2.57, 95% CI, 1.58 to 4.20), periprosthetic fracture (OR = 1.89, 95% CI, 1.04 to 3.45), aseptic loosening (OR = 9.36, 95% CI, 4.63 to 18.90), and a poorer Knee Society function subscore (MD = -5.86, 95% CI, -10.27 to -1.46). Surgeons should advise patients specifically about these increased risks when obtaining informed consent and be meticulous about their peri-operative care.	Results: Seventeen studies were included in this study. Meta-analysis of 10 studies suggested that elevated HbA1C levels were associated with a higher risk of SSI after TJA (pooled odds ratio 1.49, 95% confidence interval 0.94-2.37, P 1⁄4 .09) with significant heterogeneity between studies (I2 1⁄4 81.32%, P < .0001). In a subgroup analysis of studies considering HbA1C with a cut-off of 7% as uncontrolled, this association was no longer noticed (P 1⁄4 .50). All 5 studies that specifically assessed for SSI and periop- erative hyperglycemia showed a significant association, which was usually attenuated after adjusting for covariates. Conclusion: Inadequate glycemic control was associated with increased risk for SSI after TJA. However, the optimal HbA1C threshold remains contentious. Pooled data does not support the conventional 7% cut-off for risk stratification. Future studies should examine new markers for determining adequate glycemic control.
Type of Study	Systematic review with or without meta-analysis (AMSTARII)	Systematic review with or without meta-analysis (AMSTARII)	Systematic review with or without meta-analysis (AMSTARII)
Assessment tool	AMSTAR	AMSTAR	AMSTAR

Overall Assessment	Critically low (Quality assessment)	Critically low (Quality assessment)	Low (Quality assessment)
What is the lowest evidence study included in the SR?	Retrospective comparative study or case series, Level 3	Retrospective comparative study or case series, Level 3	Retrospective comparative study or case series, Level 3
Level of evidence (Oxford 2011)	Level 4, downgraded due to critically low AMSTAR	Level 4, downgraded due to critically low AMSTAR	Level 3

53. Empfehlung	Neu 2024
Empfehlungsgrad ⇑	Wir schlagen vor, dass Patient*innen mit Depression oder schlechtem mentalem Gesundheitsstatus über ein höheres Risiko für ein schlechteres postoperatives Ergebnis hinsichtlich Schmerz und Funktion nach Implantation einer Knieendoprothese aufgeklärt werden.
Level of Evidence (Oxford 2011) 3 3 4	 Alattas et al. 2017 (56) Sorel et al. 2019 (57) Vitaloni et al. 2019 (58)
Konsensstärke	Online: 100 % (starker Konsens) (16 FGs, 16 Zustimmungen)

1. Schlüsselfrage und PICO Format	
clinical key question	In depressed adult patients with osteoarthritis undergoing KA, are outcomes diminished and/or complications increased compared with non-depressed patients undergoing KA?
population	Adults with: • symptomatic knee OA (clinically confirmed), AND • K/L stage 2/3/4 (radiographically confirmed), AND
intervention	• Depressed patients that undergo KA
comparison	• Non-depressed patients that undergo KA
outcome	• Adverse events and complications • Clinical and functional scores (validated PROMS): o Pain o Physical function o Health related quality of life o Satisfaction

2. Recherche Zusammenfassung

Identifier	*ID Ordinal 57*
PICO(T) question	In depressed adult patients with osteoarthritis undergoing KA, are outcomes diminished and/or complications increased compared with non-depressed patients undergoing KA?
Search characteristics	
Date of search	04/05/2023
Initials of primary reader	CA
Database(s)	*PubMed*
Keywords	*Knee* *osteoarthritis; arthritis; osteoarthros*; gonitis; gonarthritis; gonarthros** knee arthroplasty; knee replacement; depression ; mental health; mental disorder; mental illness; mental wellbeing
Search strings	*#1 Animals[Title] OR Cadaver[Title] OR animal*[Title] OR dog[Title] OR dogs[Title] OR canine[Title] OR cats[Title] OR feline[Title] OR horse*[Title] OR equine[Title] OR mouse[Title] OR mice[Title] OR rat[Title] OR rats[Title] OR rabbit*[Title] OR sheep[Title] OR porcine[Title] OR pig[Title] OR pigs[Title] OR rodent*[Title] OR monkey*[Title] OR cadaver*[Title/Abstract] OR "in vitro"[Title/Abstract] OR comment[Publication Type] OR editorial[Publication Type] OR letter[Publication Type] OR "historical article"[Publication Type] OR address[Publication Type] OR news[Publication Type] OR "newspaper article" [Publication Type] OR "case reports"[Publication Type] OR case report*[Title] OR abstracts[Title] OR editorial[Title] OR reply[Title] OR comment*[Title] OR commentary[Title] OR letter[Title] OR biomechanic*[Title]* *#2 "randomized-controlled-trial" OR "Randomized-Controlled-Trials" OR "random-allocation" OR random*[Title] OR RCT* *#3 (systematic* AND review*) OR meta-analys*[Title/Abstract] OR meta-analysis OR systematic-review* *#4 (Knee)*

	#5 (Osteoarthritis OR arthritis OR osteoarthros OR gonitis OR gonarthritis OR gonarthros*)* #6 ("knee arthroplasty" OR "knee replacement" OR KA) AND (depression OR depressive OR depressed OR "mental health" OR "mental disorder" OR "mental illness" OR "mental wellbeing") #7 (#4 AND #5 AND #6) NOT #1 #8 (#7 AND #2) #9 (#7 AND #3)
Number of hits	
RCTs (#8)	45
SR(+MA) (#9)	25
Studies published before 2003	0
Articles to consider	
DOIs MAs	Sorel 2019: 10.1302/0301-620X.101B1.BJJ-2018-0672.R1 Kunutsor 2016: 10.1371/journal.pone.0150866
DOIs SRs	Molder 2020: 10.1186/s12891-020-03406-y Vitaloni 2019: 10.1186/s12891-019-2895-3 Alattas 2017: 10.1007/s00167-016-4314-8 Lungu 2016: 10.2174/1874325001610010213 Vissers 2012: 10.1016/j.semarthrit.2011.07.003
DOIs RCTs	Geng 2021: 10.2106/JBJS.20.00169 Noiseux 2014: 10.1016/j.arth.2014.01.034
Include/Excluded after FT screening	
Include	Geng 2021: 10.2106/JBJS.20.00169
Include	Noiseux 2014: 10.1016/j.arth.2014.01.034
Include	Sorel 2019: 10.1302/0301-620X.101B1.BJJ-2018-0672.R1
Exclude: not specific	Kunutsor 2016: 10.1371/journal.pone.0150866
Exclude: not specific	Molder 2020: 10.1186/s12891-020-03406-y
Include	Vitaloni 2019: 10.1186/s12891-019-2895-3
Include	Alattas 2017: 10.1007/s00167-016-4314-8
Include	Lungu 2016: 10.2174/1874325001610010213
Include	Vissers 2012: 10.1016/j.semarthrit.2011.07.003

Query box

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History and Search Details

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		Query	Results
#9	••• >	Search: **#7 AND #3** Sort by: **Most Recent**	25
#8	••• >	Search: **#7 AND #2** Sort by: **Most Recent**	45
#7	••• >	Search: **(#4 AND #5 AND #6) ...** Sort by: **Most Recent**	453
#6	••• >	Search: **("knee arthroplasty" ...** Sort by: **Most Recent**	2,726
#5	••• >	Search: **(Osteoarthritis OR ar...** Sort by: **Most Recent**	416,632
#4	••• >	Search: **(Knee)** Sort by: **Most Recent**	206,142
#3	••• >	Search: **(systematic* AND re...** Sort by: **Most Recent**	529,244
#2	••• >	Search: **"randomized-control...** Sort by: **Most Recent**	990,586
#1	••• >	Search: **1 Animals[Title] OR C...** Sort by: **Most Recent**	8,459,760

Showing 1 to 9 of 9 entries

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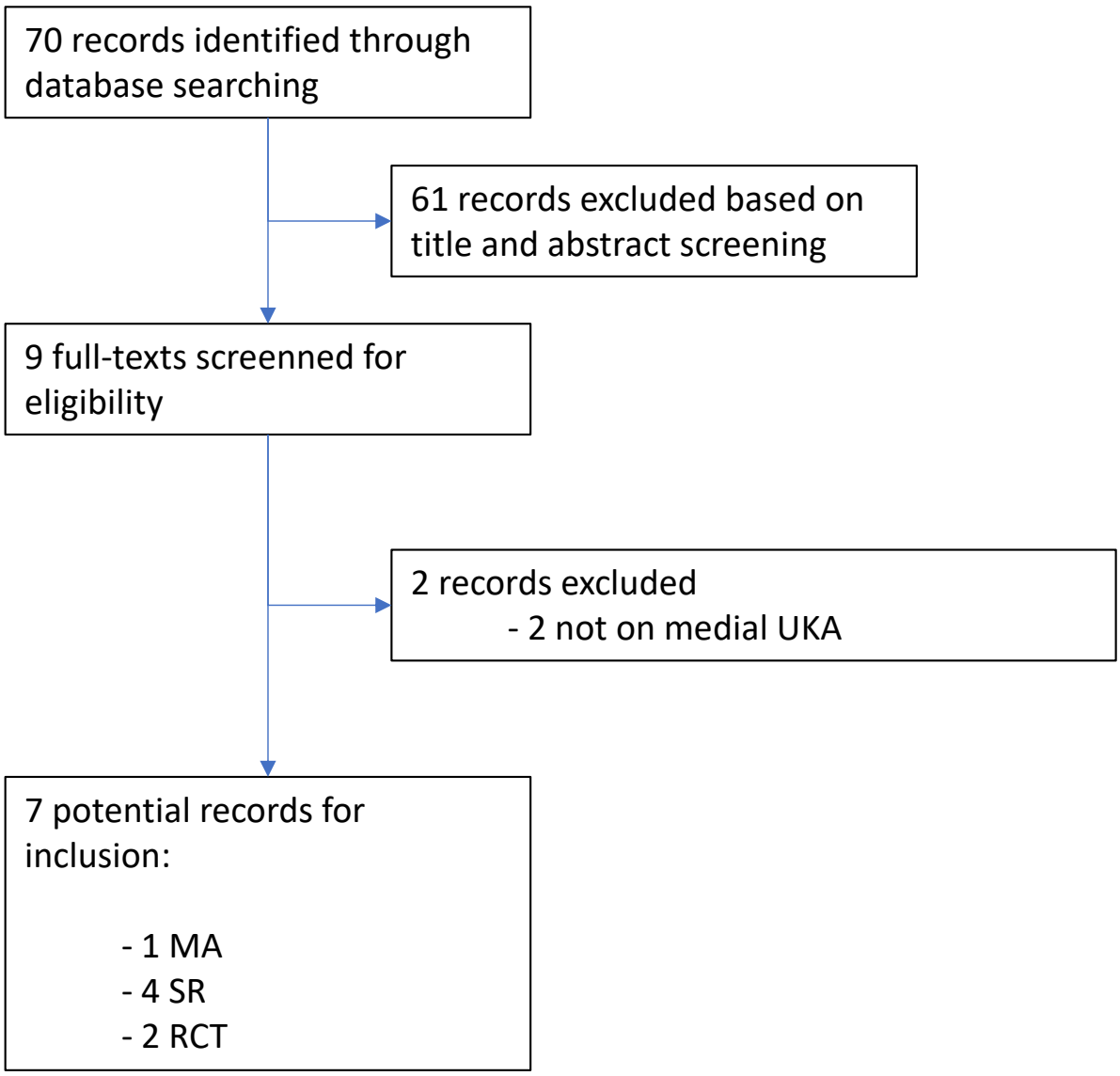
4. Studienselektion: Flowchart

PubMed Search: In depressed adult patients with osteoarthritis undergoing KA, are outcomes diminished and/or complications increased compared with non-depressed patients undergoing KA? (04/05/2023)



Included SRs and MAs

(1-5)

1. Alattas SA, Smith T, Bhatti M, Wilson-Nunn D, Donell S. Greater pre-operative anxiety, pain and poorer function predict a worse outcome of a total knee arthroplasty. Knee Surg Sports Traumatol Arthrosc. 2017;25(11):3403-10. doi: 10.1007/s00167-016-4314-8
2. Lungu E, Vendittoli PA, Desmeules F. Preoperative Determinants of Patient-reported Pain and Physical Function Levels Following Total Knee Arthroplasty: A Systematic Review. Open Orthop J. 2016;10:213-31. doi: 10.2174/1874325001610010213
3. Sorel JC, Veltman ES, Honig A, Poolman RW. The influence of preoperative psychological distress on pain and function after total knee arthroplasty: a systematic review and meta-analysis. Bone Joint J. 2019;101-b(1):7-14. doi: 10.1302/0301-620x.101b1.Bjj-2018-0672.R1
4. Vissers MM, Bussmann JB, Verhaar JA, Busschbach JJ, Bierma-Zeinstra SM, Reijman M. Psychological factors affecting the outcome of total hip and knee arthroplasty: a systematic review. Semin Arthritis Rheum. 2012;41(4):576-88. doi: 10.1016/j.semarthrit.2011.07.003
5. Vitaloni M, Botto-van Bemden A, Sciortino Contreras RM, Scotton D, Bibas M, Quintero M, et al. Global management of patients with knee osteoarthritis begins with quality of life assessment: a systematic review. BMC Musculoskelet Disord. 2019;20(1):493. doi: 10.1186/s12891-019-2895-3

Included RCTs

(1, 2)

1. Geng X, Wang X, Zhou G, Li F, Li Y, Zhao M, et al. A Randomized Controlled Trial of Psychological Intervention to Improve Satisfaction for Patients with Depression Undergoing TKA: A 2-Year Follow-up. J Bone Joint Surg Am. 2021;103(7):567-74. doi: 10.2106/jbjs.20.00169
2. Noiseux NO, Callaghan JJ, Clark CR, Zimmerman MB, Sluka KA, Rakel BA. Preoperative predictors of pain following total knee arthroplasty. J Arthroplasty. 2014;29(7):1383-7. doi: 10.1016/j.arth.2014.01.034

5. Charakteristika der eingeschlossenen Studien

PICO number:	57	57	57
PICO Question:	In depressed adult patients with osteoarthritis undergoing KA, are outcomes diminished and/or complications increased compared with non-depressed patients undergoing KA? (Consider perioperative management of depression – What are the common scores used to classify depression)	In depressed adult patients with osteoarthritis undergoing KA, are outcomes diminished and/or complications increased compared with non-depressed patients undergoing KA? (Consider perioperative management of depression – What are the common scores used to classify depression)	In depressed adult patients with osteoarthritis undergoing KA, are outcomes diminished and/or complications increased compared with non-depressed patients undergoing KA? (Consider perioperative management of depression – What are the common scores used to classify depression)
Article name:	Greater pre-operative anxiety, pain and poorer function predict a worse outcome of a total knee arthroplasty	The influence of preoperative psychological distress on pain and function after total knee arthroplasty	Global management of patients with knee osteoarthritis begins with quality of life assessment: a systematic review
Lead author	Alattas	J. C. Sorel	Vitaloni
Year published	2017	2019	2019
Number of included studies (if SR with or without MA)	10	6	62
Description of intervention group (optional for SRs)	0	Worse mental health group	KOA patients
Description of control group (optional for SRs)	0	Better mental health group,	non-KOA
Number of patients in intervention group	1485 total	1525 in total, number in each cohort not specified	24706
Number of patients in control group	0	0	NA
Mean age with range of intervention group	68	62-72 overall (not specified for each group)	65

Mean age with range of control group	0	0	0
Inclusion criteria (on patient-level if clinical study; on article-level if SR) **Examples:** **Clinical study: "The inclusion criteria were (i) primary ACLR in (ii) patients aged over 50 years. The exclusion criteria were (iii) severe concomitant ligament injury (grade 3), (iv) tibiofemoral osteoarthritis visible on weight-bearing anteroposterior and/or sagittal radiographs (> 50% joint space narrowing), and (v) history of intra- or extra-articular ligament surgery in either knee."** **SR: "Studies comparing the diagnostic accuracy of physical examination (clinical tests or ultrasound) versus arthroscopy for the assessment of LHBT pathologies"**	All articles that met the following criteria were included that: 1. Compared pre-operative against post-operative results. 2. Included one or more outcome measures for depression and anxiety. 3. Evaluated the effects of both depression and anxiety as a predictive variable for the outcome of TKA. 4. Used validated outcome measures. 5. Had osteoarthritis as the primary reason for surgery in more than 90 % of participants. 6. Had the first follow-up period within 6 months of surgery. 7. If in a foreign language, had a published translated copy is made available in English. The following were excluded from the review: 1. Studies that failed to separate results of patients who underwent a TKA and those that had evaluated alterna- tive surgical procedures	Inclusion criteria: • Domain: TKA for OA of the knee • Determinant: preoperative mental health • Outcome: postoperative pain and/or function of the knee • Original studies • Prospective cohort studies • Follow-up > 6 mths Exclusion criteria: • Non-English-/Dutch-language • Not meeting domain or determinant • Study type • Insufficient follow-up	Only abstracts or articles reporting original data on QoL of KOA patients were included. Inclusion criteria were QoL associated to one or more demographic factors (e.g., age, gender), lifestyle factors (e.g., functional inde- pendence), or comorbidity factors (e.g., diabetes, obesity) and compared with a reference population, or control group. The control group was composed of individuals without KOA. There were no other restrictions on the comparison control group. There was no restriction on age, gender, language, or year of publication. Review articles, protocols for clinical trials, commentaries, edito- rials, proceedings summaries, or instrument development summaries were excluded from this review. Articles that described unspecified knee pain, pre-intervention anterior cruciate ligament repair, hip osteoarthritis (OA), spine OA or any study that combined KOA patients

	alterna- tive surgical procedures. 2. A comparison was not made between pre-operative and post-operative results. 3. Papers that focused on either depression or anxiety. 4. Articles that aimed to compare or validate outcome measures. 5. Studies that involved retrospective questionnaires.		study that combined KOA patients with other co- horts of patients and did not collect, analyse, or report KOA-specific data separately (e.g., a population defined as “hip or KOA” or “hip and/or KOA”) were also excluded.
Follow-up period	1-120 months	12 Months	0

Main results	Depression Three studies [5, 10, 23] evaluated the effects of depression as a predictor using the Beck Depression Scale (BDI) (Sup- plementary Table 3). Using the BDI, Brander et al. [5] dem- onstrated that patients with higher levels of depression suf- fered from a greater severity of pain at 1 year after surgery. Hirschmann et al. [10] reported pre-operative depression (using BDI), predicted worse pain (Spearman's rho = 0.29; $p < 0.05$), greater stiffness (Spearman's rho = 0.34; $p < 0.01$) and poorer function (Spearman's rho = 0.37; $p < 0.001$) using WOMAC at 1 year. Using the KSS, both Qi et al. [23] and Hirschmann et al. [10] did not identify a significant association between depression, greater post- operative pain and poorer function at 6 months after sur- gery. Perhaps, baseline depression would predict a worse outcome if different HRQoL outcome measures were used	The size of the study ranged from 67 to 952 patients, with a total of 1525. Bierke et al28,29 reported on the same cohort in two studies with different measures of psychological distress (depression/somatization in 201628 and anxiety and pain cat- astrophizing in 201729). All patients had undergone TKA for OA. The mean age of the patients in these studies was 68 years. Although a minimum follow-up of six months was an inclusion criterion, all studies had a minimum follow-up of 12 months and the results at this time were extracted from these studies. Mental health was assessed preoperatively in the studies. The Patient Health Questionnaire (PHQ) was used by Bierke et al28 and Ellis et al.25 This shortened self-assessment identifies depressive symptoms and somatization.35 The Hospital Anxi- ety and Depression Scale (HADS)36 was used by Duivenvoor- den et al31 to screen for anxiety and depression	QoL and surgical interventions The majority of QoL findings with surgical intervention were reported as dependents of demographic variables, which showed an effect on QoL after surgical outcomes. Williams et al. [47], for example, reported that patient sat- isfaction was lower among patients younger than 55 years of age compared to older patients. Vulcano, reported a higher BMI was associated with worse outcomes [46]. Perez-Prieto, reported patients with depression had less improvement that non- depressed patients after surgical intervention, reporting lower QoL scores [42]. Lower so- cioeconomic groups undergoing surgical intervention also reported worse QoL [45]. Patients participating in sports pre- and post- surgical intervention reported higher QoL scores [40]. QoL and psychosocial factors Higher educational level and higher

	measures were used. The majority of studies [4, 7, 9, 30, 31] used the HAD score to evaluate the effects of depression. Greater pre-operative depression correlated with higher levels of knee disability (coefficient—0.409; p = 0.009) [4] and a reduc- tion in the change of pain [7]. Utrillas-Compaired et al. demonstrated that pre-operative depression had a signifi- cant influence on the change in function after surgery and QoL score at 1 year (beta coefficient—2.024; p = 0.028) [30]. Noiseux et al. [20] and Lopez-Olivo et al. [15] identified a correlation between pre-operative depression and higher levels of pain at 6 months after surgery. In addition, using multiple health-related outcome measures, it was found that a higher depression score predicted poorer function at 6 months [9, 15] and at 1 year after surgery [9]. Only Wylde et al. [31] did not find	to screen for anxiety and depression. This 14-item validated questionnaire includes seven in the anxiety subscale and seven in the depression subscale; a cut-off point of more than eight is indicative of anxiety or depression.36 A modified State-Trait Anxiety Inventory (STAI) was used by Bierke and Petersen29 to evaluate the influence of anxiety on the func- tional outcome. This explores the relationship between anxiety as a state (20 items) and anxiety as a trait (20 items). They also measured the pain catastrophizing scale (PCS), which describes the influence of catastrophizing on the experience of pain. Each of the 13 items in this questionnaire has a five-level scale (0 to 4), with a total minimum of 0 and a maximum of 52 points. A score of more than 30 points indicates significant cat- astrophizing.29 Bistolfi et al37 evaluated the presence of depres- sive symptoms using the observer-based Hamilton	Higher educational level and higher total mindfulness scores were reported to improve patients' perception of QoL [13, 23, 28]. Alkan et al. reported that approxi- mately 70% of the study participants had low-middle education, resulting in poor QoL in this group [38]. An- other study reported lower Health-Related Quality of Life (HRQL) scores for KOA females with chronic phys- ical or mental health conditions [62]. Poverty also wors- ened QoL in KOA patients [45]. Psychological distress and depression worsened QoL [23, 28, 42, 54]. Patients lacking familial relationships reported worse QoL [50].

	depression to predict a poorer post-operative WOMAC pain and function score.	Depression Rating Scale (HDRS). A score of 0 to 7 points on this validated questionnaire was considered non-depressed, while patients with a score of more than 8 had a mild depressive disorder. The preoperative psychological profile was assessed by Lin- gard and Riddle33 using the mental health (MH) score of the 36-Item Short Form Health Survey (SF-36), a quality-of-life assessment questionnaire that divides patients into distressed and non-distressed groups. Pain. Pre- and postoperative pain were measured using of the numeral rating scale (NRS) (Bierke et al;28 Bistolfi et al37), the Knee Osteoarthritis Outcome Score (KOOS) subscale38 for pain (Bierke et al;28,29 Duivenvoorden et al31), the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) pain score39 (Ellis et al;32 Lingard and Riddle33), and the Hos-	

			Lingard and Riddle33), and the Hos- pital for Special Surgery (HSS) knee scoring system (Bistolfi et al37). The data for the outcome measure of pain are shown in Table II. The random effect meta-analysis standardized mean dif- ference (SMD) for pain is shown in Figure 2. Compared with patients with 'better' preoperative mental health, patients with 'poor' preoperative mental health were at a significantly greater risk of higher levels of pain after 12 months. Function. Two main outcome measures for function were used. The KOOS subscale for functioning in activities of daily liv- ing (ADL) was used by Duivenvoorden et al31 and both stud- ies by Bierke et al28,29 to investigate the influence of mental health on function. Ellis et al32 and Lingard and Riddle33 used the WOMAC function score.39 Ellis et al32 also used the Knee Society Score (KSS), the physical component		

		summary score of the SF-36 (SF-36 PCS) and the functional component of the Pain Disability Questionnaire (PDQ) as additional functional outcome measures.32 Bisolfi et al37 assessed postoperative func- tion using the HSS knee scoring system.30 Table III shows the data relating to function extracted from the studies. For postoperative function, the random effects model showed significantly better results for patients with better preoperative psychological health, compared with those with worse preoper- ative psychological health (Fig. 3).	

Key findings (use Results and Conclusion in Abstract)	Results Ten studies met the eligibility criteria. From these, nine patient-related predictors of outcome were identified (depression, anxiety, age at surgery, gender (being female), medical co-morbidities, BMI, level of education, pre- operative pain severity and pre-operative knee function). Greater anxiety, pre-operative pain and function were the most significant factors to predict a poorer outcome of a TKA.Theresultsofdepression,gender(female),medical co-morbidities, BMI and level of education were variable among the included studies. There was very little evidence to support older age at operation as a predictor of poorer outcome. Conclusion Patients experiencing high levels of pain before surgery should be informed of the chances of improvement by having a TKA. A validated psychologi- cal screening tool that separates depression and anxiety is recommended as part of the pre-operative assessment stage. Patients presenting with symptoms of depression and anxi- ety should be identified and consulted before a TKA.	Results Six prospective cohort studies, with a total of 1525 patients, were included. The random effects models showed significantly poorer outcomes in patients who preoperatively had elevated scores on the pain catastrophizing scale, worse 36-Item Short-Form Health Survey (SF-36) mental health score, symptoms of anxiety and/or depression, and somatization dysfunction. After 12 months, the standard mean difference for pain was -0.74 (95% confidence interval (CI) -1.04 to -0.44) and -0.56 (95% CI -0.80 to -0.32) for function. Conclusion Preoperative pain catastrophizing, mental distress, symptoms of anxiety and/or depression, and somatoform disorders appear to adversely affect pain and function after TKA. Some patients undergoing TKA may therefore need psychological support to improve the outcome and quality of life.	Conclusion: KOA has a substantial impact on QoL. In KOA patients, QoL is also influenced by specific individual factors including gender, body weight, physical activity, mental health, and education. Importantly, education and management programs designed to support KOA patients report improved QoL. QoL data is a valuable tool providing health care professionals with a better comprehension of KOA disease to aid implementation of the most effective management plan. Keywords: Osteoarthritis, Knee, Quality of life, Individual factors, Social Determinants of Health, Psychosocial factors, Patient advocacy organizations, Patient Centred

Type of Study	Systematic review with or without meta-analysis (AMSTARII)	Systematic review with or without meta-analysis (AMSTARII)	Systematic review with or without meta-analysis (AMSTARII)
Assessment tool	AMSTAR	AMSTAR	AMSTAR
Overall Assessment	Critically low (Quality assessment)	Critically low (Quality assessment)	Critically low (Quality assessment)
What is the lowest evidence study included in the SR?	Prospective comparative study, Level 2	Prospective comparative study, Level 2	Retrospective comparative study or case series, Level 3
Level of evidence (Oxford 2011)	Level 3, downgraded due to critically low AMSTAR	Level 3, downgraded due to critically low AMSTAR	Level 4, downgraded due to critically low AMSTAR

54. Empfehlung	Neu 2024
Empfehlungsgrad ⇑	Zur Verbesserung des Behandlungsergebnisses schlagen wir vor, dass bei Patienten*innen mit einer diagnostizierten Depression und geplantem Kniegelenksersatz präoperativ eine fachspezifische Vorstellung und ggf. Optimierung der Therapie erfolgt.
Level of Evidence (Oxford 2011) 2 2 3	 Bay et al. 2018 Whale et al. 2019 Geng et al. 2021
Konsensstärke	94,4 % (Konsens)

1. Schlüsselfrage und PICO Format	
clinical key question	Does combined medical and psychological treatment following knee arthroplasty (UKA or TKA) improve outcomes (pain, function, QoL, satisfaction)
population	Adults with: • symptomatic knee OA (clinically confirmed), and • K/L stage 2/3/4 (radiographically confirmed)
intervention	Supervised rehabilitation (defined below) combined with patient education programme • Supervised rehabilitation programme: o exercise (land based, aquatic based) o manual therapy o acupuncture o pharmacological management (including oral, topical, transdermal) o manual lymphatic drainage o Continuous passive motion o treadmill training o cycle ergometer training • Patient education programme**:** o joint protection principles o cognitive-behavioural therapy
comparison	• Supervised rehabilitation without patient education programme • Unsupervised rehabilitation • No treatment
outcome	• Clinical and functional scores (validated PROMS): o Pain o Physical function o Health related quality of life o Satisfaction • Psychological outcomes (validated questionnaires): o Psychological distress o Adherence to protocol

2. Recherche Zusammenfassung

Identifier	*ID Ordinal 12*
PICO(T) question	Does combined medical and psychological treatment following knee arthroplasty (UKA or TKA) improve outcomes (pain, function, QoL, satisfaction)
Search characteristics	
Date of search	07 08 2023
Initials of primary reader	CA
Database(s)	*PubMed*
Keywords	*Knee* *osteoarthritis; arthritis; osteoarthros*; gonitis; gonarthritis; gonarthros** knee arthroplasty; psychological; psychotherapy; mental
Search strings	*#1 Animals[Title] OR Cadaver[Title] OR animal*[Title] OR dog[Title] OR dogs[Title] OR canine[Title] OR cats[Title] OR feline[Title] OR horse*[Title] OR equine[Title] OR mouse[Title] OR mice[Title] OR rat[Title] OR rats[Title] OR rabbit*[Title] OR sheep[Title] OR porcine[Title] OR pig[Title] OR pigs[Title] OR rodent*[Title] OR monkey*[Title] OR cadaver*[Title/Abstract] OR "in vitro"[Title/Abstract] OR comment[Publication Type] OR editorial[Publication Type] OR letter[Publication Type] OR "historical article"[Publication Type] OR address[Publication Type] OR news[Publication Type] OR "newspaper article" [Publication Type] OR "case reports"[Publication Type] OR case report*[Title] OR abstracts[Title] OR editorial[Title] OR reply[Title] OR comment*[Title] OR commentary[Title] OR letter[Title] OR biomechanic*[Title]* *#2 "randomized-controlled-trial" OR "Randomized-Controlled-Trials" OR "random-allocation" OR random*[Title] OR RCT* *#3 (systematic* AND review*) OR meta-analys*[Title/Abstract] OR meta-analysis OR systematic-review* *#4 (Knee)*

	#5 (Osteoarthritis OR arthritis OR osteoarthros OR gonitis OR gonarthritis OR gonarthros*)* #6 ("knee arthroplasty" OR "knee replacement" OR KA OR KR OR UKA OR "unilateral knee arthroplasty" OR "uni-lateral knee arthroplasty" OR "unicompartmental knee arthroplasty" OR "uni-compartmental knee arthroplasty" OR "medial knee arthroplasty " OR "medial knee replacement" OR "medial condyle replacement" OR "unicondylar knee replacement") AND (psychological OR psychotherapy OR mental) #7 (#4 AND #5 AND #6) NOT #1 #8 (#7 AND #2) #9 (#7 AND #3)
Number of hits	
RCTs (#8)	90
SR(+MA) (#9)	33
Studies published before 2003	0 SR/MA + 1 RCT
Articles to consider	
DOIs MAs	
DOIs SRs	Whale 2019: 10.1136/bmjopen-2019-029742 Bay 2018: 10.1186/s12891-018-2121-8 Vissers 2012: 10.1016/j.semarthrit.2011.07.003
DOIs RCTs	Nam 2023: 10.1007/s00167-023-07487-9 Chen 2021: 10.1007/s40520-021-01870-7 Bunvanendran 2021: 10.1136/rapm-2020-102258 Geng 2021: 10.2106/JBJS.20.00169 Birch 2020: 10.1080/17453674.2019.1694312 Dowsey 2019: 10.1016/j.ctim.2019.08.010 Riddle 2018: 10.1007/s11999.0000000000000001 Cai 2018: 10.1016/j.arth.2017.10.035 Rosal 2011: 10.1186/1471-2474-12-226
Include/Excluded after FT screening	
Include	Whale 2019: 10.1136/bmjopen-2019-029742
Include	Bay 2018: 10.1186/s12891-018-2121-8
Exclude: no combination of treatment	Vissers 2012: 10.1016/j.semarthrit.2011.07.003

Include	Nam 2023: 10.1007/s00167-023-07487-9
Could not retrieve	Chen 2021: 10.1007/s40520-021-01870-7
Include	Bunvanendran 2021: 10.1136/rapm-2020-102258
Include	Geng 2021: 10.2106/JBJS.20.00169
Include	Birch 2020: 10.1080/17453674.2019.1694312
Could not retrieve	Dowsey 2019: 10.1016/j.ctim.2019.08.010
Could not retrieve	Cai 2018: 10.1016/j.arth.2017.10.035
Exclude. Preoperative outcomes only	Riddle 2018: 10.1007/s11999.0000000000000001
Exclude: protocol	Rosal 2011: 10.1186/1471-2474-12-226

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Query box

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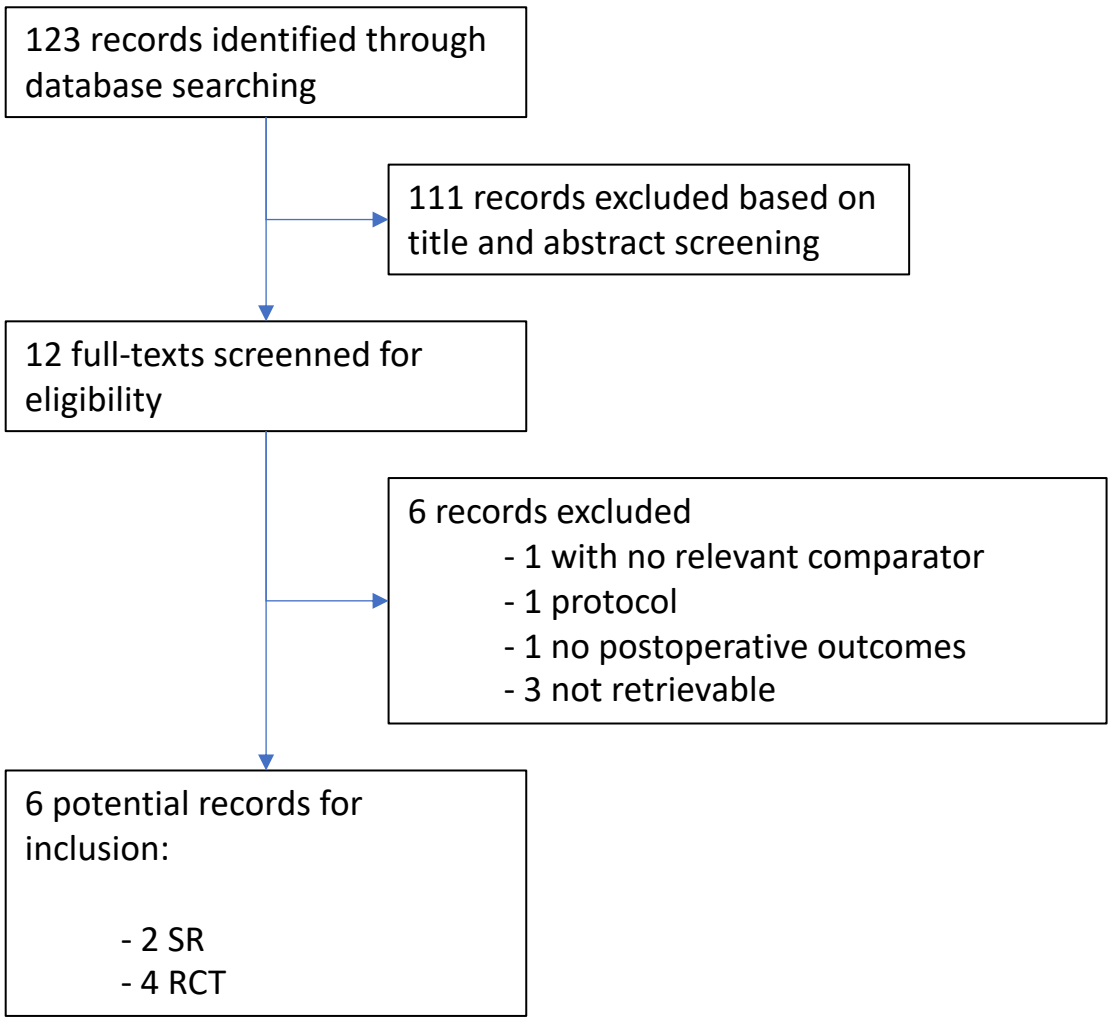
Quoted phrases not found in phrase index: "uni-lateral knee arthroplasty", "medial knee arthroplasty", "medial condyle replacement"

History and Search Details

Search	Actions	Details	Query	Results	Time
#9	•••		Search: **(#7 AND #3)** Sort by: **Most Recent**	33	09:18:54
#8	•••		Search: **(#7 AND #2)** Sort by: **Most Recent**	90	09:18:45
#7	•••		Search: **(#4 AND #5 AND #6) NOT #1** Sort by: **Most Recent**	669	09:18:38
#6	•••		Search: **("knee arthroplasty" OR "knee replacement" OR KA OR KR OR UKA OR "unilateral knee arthroplasty" OR "uni-lateral knee arthroplasty" OR "unicompartmental knee arthroplasty" OR "uni-compartmental knee arthroplasty" OR "medial knee arthroplasty " OR "medial knee replacement" OR "medial condyle replacement" OR "unicondylar knee replacement") AND (psychological OR psychotherapy OR mental)** Sort by: **Most Recent**	6,971	09:18:30
#5	•••		Search: **(Osteoarthritis OR arthritis OR osteoarthros* OR gonitis OR gonarthritis OR gonarthros*)** Sort by: **Most Recent**	421,674	05:08:59
#4	•••		Search: **(Knee)** Sort by: **Most Recent**	209,042	03:38:14
#3	•••		Search: **(systematic* AND review*) OR meta-analys* [Title/Abstract] OR meta-analysis OR systematic-review** Sort by: **Most Recent**	544,774	03:38:08
#2	•••		Search: **"randomized-controlled-trial" OR "Randomized-Controlled-Trials" OR "random-allocation" OR random*[Title] OR RCT** Sort by: **Most Recent**	1,003,090	03:37:58
#1	•••		Search: **Animals[Title] OR Cadaver[Title] OR animal*[Title] OR**	8,533,280	03:37:49

PubMed Search: Does combined medical and psychological treatment following knee arthroplasty (UKA or TKA) improve outcomes (pain, function, QoL, satisfaction) ? (07/08/2023)



Included SRs and MAs

(1, 2)

1. Bay S, Kuster L, McLean N, Byrnes M, Kuster MS. A systematic review of psychological interventions in total hip and knee arthroplasty. BMC Musculoskelet Disord. 2018;19(1):201. doi: 10.1186/s12891-018-2121-8
2. Whale K, Wylde V, Beswick A, Rathbone J, Vedhara K, Gooberman-Hill R. Effectiveness and reporting standards of psychological interventions for improving short-term and long-term pain outcomes after total knee replacement: a systematic review. BMJ Open. 2019;9(12):e029742. doi: 10.1136/bmjopen-2019-029742

Included RCTs

(1-4)

1. Birch S, Stilling M, Mechlenburg I, Hansen TB. No effect of cognitive behavioral patient education for patients with pain catastrophizing before total knee arthroplasty: a randomized controlled trial. Acta Orthop. 2020;91(1):98-103. doi: 10.1080/17453674.2019.1694312
2. Buvanendran A, Sremac AC, Merriman PA, Della Valle CJ, Burns JW, McCarthy RJ. Preoperative cognitive-behavioral therapy for reducing pain catastrophizing and improving pain outcomes after total knee replacement: a randomized clinical trial. Reg Anesth Pain Med. 2021;46(4):313-21. doi: 10.1136/rapm-2020-102258
3. Geng X, Wang X, Zhou G, Li F, Li Y, Zhao M, et al. A Randomized Controlled Trial of Psychological Intervention to Improve Satisfaction for Patients with Depression Undergoing TKA: A 2-Year Follow-up. J Bone Joint Surg Am. 2021;103(7):567-74. doi: 10.2106/jbjs.20.00169
4. Nam HS, Yoo HJ, Ho JPY, Kim YB, Lee YS. Preoperative education on realistic expectations improves the satisfaction of patients with central sensitization after total knee arthroplasty: a randomized-controlled trial. Knee Surg Sports Traumatol Arthrosc. 2023. doi: 10.1007/s00167-023-07487-9

PICO number:	12	12	12
PICO Question:	Does combined medical and psychological treatment following knee arthroplasty (UKA or TKA) improve outcomes (pain, function, QoL, satisfaction)	Does combined medical and psychological treatment following knee arthroplasty (UKA or TKA) improve outcomes (pain, function, QoL, satisfaction)	Does combined medical and psychological treatment following knee arthroplasty (UKA or TKA) improve outcomes (pain, function, QoL, satisfaction)
Article name:	A systematic review of psychological interventions in total hip and knee arthroplasty	Effectiveness and reporting standards of psychological interventions for improving short-term and long-term pain outcomes after total knee replacement: a systematic review	A Randomized Controlled Trial of Psychological Intervention to Improve Satisfaction for Patients with Depression Undergoing TKA
Lead author	Bay	Whale	Geng
Year published	2018	2019	2021
Number of included studies (if SR with or without MA)	7	12	0

Description of intervention group (optional for SRs)	Various psychological interventions	various psychological interventions	Intervention Group The same TKA procedure, pain control, and rehabilitation after surgery were utilized in both the control and intervention groups, but patients in the intervention group participated in psychotherapy, which was conducted according to the psychiatrist's clinical expertise. The psychotherapy included cognitive behavioral therapy (CBT)17 and medication. The psychother- apy interventions are detailed in Table I. Face-to-face CBT, a psychological treatment that has been shown to be effective in treating depression, was carried out 4 times per week during the inpatient period and once every 2 weeks after discharge from the hospital. CBT included (1) pain management training that aimed to help patients control pain, (2) stress management training that primarily focused on managing stress, and (3) psychodynamic interventions that aimed to help patients achieve long-term adaptation to pain and correct their expectations of surgical therapy and rehabilitation. The administration of antidepressants was determined by the psychiatrist at the first visit before surgery, and anti- depressant pharmacotherapy was initiated at that point. In the study period, escitalopram, a selective serotonin reuptake inhibitor (SSRI)18, was used (10 or 20 mg/day for at least 8 weeks).

Description of control group (optional for SRs)	No intervention	no intervention	Control Group Participants in the control group received standard TKA surgery and routine perioperative management, with no type of psychological intervention. All of the patients in both groups received lumbar spinal anesthesia; a midline skin incision was used and a medial parapatellar approach was performed. A pneumatic tourniquet, which was inflated to 300 to 320 mm Hg, remained inflated throughout the surgery. No patellar resurfacing was performed, no drainage device was used, and an elastic bandage was in place for 24 hours after surgery. Rivaroxaban (10 mg/day) was used for thromboembolism prophylaxis, and early functional rehabilitation was carried out. Lower-extremity venous ultrasonography was performed on the fifth day after surgery to identify any potential deep venous thrombosis (DVT)
Number of patients in intervention group	280 total TKA	1299 total both groups	25
Number of patients in control group	0	0	24
Mean age with range of intervention group	65-66.1	53-80	67.12 ± 6.7
Mean age with range of control group	0	45-87	66.28 ± 6.8

Inclusion criteria (on patient-level if clinical study; on article-level if SR) Examples: Clinical study: "The inclusion criteria were (i) primary ACLR in (ii) patients aged over 50 years. The exclusion criteria were (iii) severe concomitant ligament injury (grade 3), (iv) tibiofemoral osteoarthritis visible on weight-bearing anteroposterior and/or sagittal radiographs (> 50% joint space narrowing), and (v) history of intra- or extra-articular ligament surgery in either knee." SR: "Studies comparing the diagnostic accuracy of physical examination (clinical tests or ultrasound) versus arthroscopy for the assessment of LHBT pathologies"	Selection criteria Studies included in this review satisfied the PICOS criteria: Participants: elective orthopaedic patients undergoing knee or hip arthroplasty; Interventions: psychological interventions involving active patient participation; Comparisons: control groups including placebos, sham treatments, treatment as usual, education only or phys- ical exercise only; Outcome: Patient reported joint outcomes including pain, and/or functionality, and/or disability; Study designs: Randomised controlled trials (RCTs). Studies were excluded if participants did not undergo surgery, and/or if psychological intervention was compared to surgery. Studies were also excluded if they did not include a control group, and if a pa- tient reported joint outcome was not measured. Arti- cles that were in languages other than English and German were excluded. Only randomised control tri- als were reviewed.	The following criteria were applied to determine eligi- bility of studies for inclusion in the review: ► ► Population: adults undergoing primary TKR. Intervention: any psychological intervention delivered preoperatively, perioperatively, or postoperatively to patients. Psychological interventions were defined as six categories: behavioural, cognitive, relaxation/ mindfulness, group-based psychological support, 2 Whale K, et al. BMJ Open 2019;9:e029742. doi:10.1136/bmjopen-2019-029742 social skills training, and psychotherapy/counselling. Multimodal and complex interventions with psycho- logical components were also considered eligible. ► Control: active treatment or control treatment (eg, standard care, placebo, no treatment). ► Outcomes: assessment of postoperative pain severity (no time limit placed on assessment duration/ follow-up). ► Study type: RCT.	Inclusion criteria were adult patients with preoperative depression who were ≥18 years old; after receiving both an oral and a written explanation of the study protocol, they provided written informed consent that they were willing to complete all of the assessments and potential interventions. The diagnostic criteria13,14 for depression included sadness or low mood, loss of interest or pleasure in daily activities, and reduced energy nearly every day for >2 weeks, as well as some of the following specific symptoms: reduced self-esteem, feelings of guilt, dis- turbed sleep, change in appetite, problems in concentration, change in activity, ideation of self-harm, and impaired function. The Mini International Neuropsychiatric Interview (MINI)15, a structured clinical interview that was developed to determine the diagnosis of psychiatric disorders in the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV), was used by a trained psychiatrist to confirm the diagnosis of depression. The MINI has been validated for various languages, including Chinese16. Exclu- sion criteria included patients who had known allergies to medications that were used in this study, a history of or current drug addiction or abuse, and a cognitive or com- prehensive disorder during the study, as well as those who did not receive lumbar anesthesia or any type of psychological disorder severe enough to require psychological therapies before the TKA.

Follow-up period	1 day - 12 months post surgery	72hrs-12 months	2 years
Main results	Effectiveness of interventions Patient reported outcomes included pain, physical health status, physical function, stiffness and fatigue. The most common parameter was pain, either measured on a numerical rating scale, visual analogue rating scale (VAS), or as part of the Western Ontario and McMaster Universities Arthritis Index (WOMAC). Overall, two out of seven studies (total n = 126, 65 treated) found psychological interventions to be effective in improving at least one patient reported joint outcome [32, 36]. Of these two studies, one study (total n = 44, 23 treated) used a combination of cognitive behaviour ther- apy and relaxation therapy and was found to signifi- cantly improve hip function at the 12 month follow-up [32], and one study (total n = 82, 42 treated) used guided imagery and was found to significantly decrease knee pain 3 weeks after surgery [36]. Psycho-education, guided imagery, and motivational interviewing were amongst the types of interventions that were found to be ineffective in improving patient outcomes after TKA and THA. The number of sessions of interventions varied widely, ranging from 1 to 35 sessions. Interventions that were effective in improving patient reported joint	Music Five single-centre RCTs with 256 participants evalu- ated the effectiveness of music therapy for reducing acute postoperative pain during the inpatient stay after surgery.37 38 40 42 47 All studies had high or unclear risk of bias for two or more domains, with blinding of partici- pants and personnel being a high or unclear risk of bias for all studies. Four studies had high or unclear risk of bias for selective reporting. A 2-arm RCT with 75 partic- ipants compared listening to a compact disc of 'easy listening' music on headphones for 20 min before and after first postsurgical ambulation to a 20 min quiet rest period found no differences in mean VAS pain score between groups at any timepoint.38 A 2-arm RCT with 30 participants which compared listening to soothing piano and Chinese violin music through broadcast speakers for 30 min in the preoperative ward, 30 min in the surgical room waiting area, and 1 hour in postoperative recovery to usual care found no differences in VAS pain score between groups on the ward after surgery.40 A 5-arm RCT with 89 participants which compared listening to 12–15 min of instrument only music with varying degrees of harmonicity and rhythmicity on headphones once per day for 3 days post surgery to wearing	The primary outcome, patient satisfaction (the prevalence of very satisfied and satisfied responses) at 6 months after surgery, was 88.0% (22 of 25) in the intervention group and only 62.5% (15 of 24) in the control group (chi square = 4.306; p = 0.038; odds ratio [OR] = 4.40; 95% confidence interval [CI], 1.02 to 18.99; Table III). One female patient, who was the only "dissatisfied" patient in the intervention group, noted severe anterior knee pain with no evidence of infection or instability, and the problem was solved with a 2-stage patellar resurfacing. In the control group, 4 of the 9 patients who were not satisfied declared specific reasons. Two of the "very dissatisfied" patients returned with inadequate knee ROM (<90°) at 6 weeks postoperatively, and they received a manipulation under lumbar anesthesia. The other 2 "dissatisfied" patients had experienced a DVT during the inpatient period and were treated with anticoagulant therapy, with good results. The remaining 5 of the 9 patients declared that their expecta- tions had not been reached after surgery, but they offered no explanation such as pain or dysfunction. Patient satis- faction was altered slightly at the 2-year follow-up visit (as described below). The secondary outcomes, including the

	effective in improving patient reported joint outcomes ranged from 6 to 35 sessions [32, 36]. All interventions with less than six sessions were not effective in improv- ing patient reported outcomes [33–35, 38], and one intervention with more than 14 sessions was found to be ineffective [37]. However one intervention with 6 to 12 sessions [32] and another intervention with 35 self-directed sessions [36] were found to improve patient reported outcomes.	for 3 days post surgery to wearing headphones with no input found no differences in NRS or VRS pain scores between groups on postoperative days 1–3.42 A 2-arm RCT with 30 participants which compared patient- selected music played on headphones during surgery to white noise found the intervention group reported lower mean VAS pain scores at 3 hours (1.5 (SD 1.4) vs 3.9 (SD 3.4); p=0.01) and 24 hours (2.4 (SD 1.7) vs 4.1 (SD 2.9); p=0.04) post surgery.37 A 2-arm RCT with 32 patients compared music therapist-delivered live music during a 5 min physiotherapy pedalling exercise to no music found no mean difference in NRS pain scores between groups at the 2 min break timepoint and at the 4 min endpoint after the pedalling exercise. Guided imagery and music One single-centre RCT evaluated the effectiveness of guided imagery on outcomes post surgery.43 The study was at high or unclear risk of bias for three domains. The 2-arm RCT with 82 participants was multimodal and compared 19–21 min of audio-recorded guided imagery with the addition of soothing instrumental background music listened to	the secondary outcomes, including the WOMAC scores, the HSS scores, and maximal ROM, in the intervention group had improved significantly more compared with those in the control group (Table IV). In the intervention group, the WOMAC score had been reduced from 51.04 ± 5.4 to 13.40 ± 1.9 at 2 years after surgery; in the control group, the WOMAC score had been reduced from 49.20 ± 7.2 to 16.33 ± 2.1 ($p < 0.0001$). The HSS score had increased from 54.50 ± 7.6 to 87.44 ± 5.3 in the intervention group compared with 53.29 ± 6.8 to 80.71 ± 3.87 in the control group at 2 years postoperatively ($p < 0.0001$). No infection, implant failure, or hematoma had occurred in any of the patients during the study period. The reduction rate of the SDS score changed 51.97% in the intervention group compared with 17.35% in the control group ($p < 0.001$), and the SCL-90-R depression score changed 44.66% in the intervention group compared with 15.73% in the control group ($p < 0.001$), which suggested a significant psychological improvement in the intervention group (Table V). A significant difference ($p = 0.024$, Fisher exact test; Table VI) was demonstrated in the rate of patient satisfaction between those with effective psychological intervention and

			every day for 2 weeks before surgery and 3 weeks after surgery to a control group who received 17–21 min of commercially available spoken word audio recordings (eg, poetry, short stories, essays) at the same timepoints. Pain was assessed preoperatively, on the day of surgery, 3 weeks post surgery, and 6 months post surgery using the WOMAC pain score and VAS pain score. No comparisons were made between trial arms. Hypnosis One single-centre RCT evaluated the effectiveness of a prerecorded hypnotic audio recording on outcome post surgery.48 The study was high or unclear risk of bias for four domains. The 3-arm RCT with 24 patients compared 35 min prerecorded hypnosis audio listened to at least once presurgery and at least once 24 hours post surgery to minimal treatment effect (psychoeducation, diaphragmatic breathing, relaxing music), and treatment as usual. Pain was assessed using a pain NRS preoperatively, daily until discharge, and then at 1 month, 3 months, and 6 months. Differences in mean pain ratings between the groups were small at 72 hours (1.77 vs 2.23 vs 2.59) and 6 months (1.4 vs 1.73 s 2.23). Progressive muscle relaxation with biofeedback	those with ineffective intervention.

		biofeedback One single-centre RCT evaluated the effectiveness of progressive muscle relaxation with biofeedback on pain during continuous passive motion therapy.46 The study had unclear risk of bias for five domains and high risk of bias for blinding of outcome assessment. The 2-arm RCT with 66 participants was multimodal and compared 30 min of training on biofeedback-assisted progressive muscle relaxation skills on the day before surgery and during 30 min sessions of continuous passive motion therapy two times a day for 5 days post surgery to standard continuous passive motion therapy. Pain was assessed on days 1–5 after surgery before and after continuous passive motion therapy using an NRS pain score. The interventionshowed a significant between group effect ($p<0.001$) with the intervention group reporting lower NRS pain scores compared with the control group on all 5 days. Pain coping skills programme One 5-centre RCT evaluated the effectives of a pain coping skills training programme for patients who catastrophise about pain before TKR.49 The study was at high risk of bias for two domains, blinding participants and personnel and blinding of outcome assessment. The 3-arm RCT with 402 patients	

compared an eight-session pain coping skills programme to arthritis education and to usual care. The pain coping skills programme comprised eight 50 min sessions over a 2-month period beginning 2 weeks before surgery and ending 6 weeks after surgery. One session was in person with remaining sessions via tele- phone. The programme was a complex multimodal inter- vention and included sessions on cognitive restructuring, thought identification and challenging, self-calming and relaxation techniques, and activity management. Arthritis education follows the same schedule, although without the psychological components. Pain was assessed by the WOMAC Pain Scale at baseline and 2, 6, and 12 months post surgery. No differences were found in mean WOMAC pain treatment scores or group-by-time interaction.

Enhanced postoperative recovery using motivational interviewing
One single-centre RCT evaluated the effectiveness of an enhanced postoperative recovery programme to improve postoperative functional status.44 The study was at high risk of bias for blinding of participants and personnel, blinding of outcome assessment and selective reporting

			outcome assessment and selective reporting. In this 2-arm RCT with 308 participants, the intervention was an enhanced postoperative recovery programme comprising 10 telephone calls with a navigator over a 6-month postoperative period aimed at identifying post- surgical objectives and improving self-efficacy using moti- vational interviewing. The control group received usual care including inpatient physiotherapy and outpatient physiotherapy after discharge. Pain was assessed at base- line, 3 month post surgery, and 6 months post surgery using the WOMAC pain score. There were no differ-ences between groups in mean WOMAC pain scores at 6 months post operation. CBT programmes Two RCTs (one pilot and one feasibility) with 150 participants evaluated the effectiveness of CBT-based programmes.39 41 Both studies were at low risk of bias for four domains, with one having unclear risk of bias for selective outcome reporting and other bias,39 and one with high risk of bias for blinding of participants and personnel, blinding of outcome assessment, and incom-plete outcome data.41 One 2-arm pilot RCT with 100 participants evaluated use of CBT that aimed to reduce kinesiophobia (fear of movement) post surgery when compared		

		with standard care.39 Four tailored sessions of 30 min each were delivered individually. Between group difference was found with reduction in pain NRS scores of 5.63 (SD 0.73) in the intervention group compared with 6.27 (SD 0.86) in the standard care group demon- strated at 6-month follow-up (p=0.003). One 2-arm feasi- bility RCT with 50 participants compared the use of a CBT-based programme of up to 10 1 hour sessions for reducing anxiety and depression to standard care.41 No between group differences in pain measured using the WOMAC pain score were found at 4-month or 6-month follow-up, and no between group difference in mood was found at 4-month or 12-month follow-up measured using the Beck Anxiety Inventory and Depression Inventory.	

Key findings (use Results and Conclusion in Abstract)	Results: A total of 19,489 titles were screened. Seven studies met the inclusion criteria and were included. Five of seven studies did not show improvements in patient reported outcomes after surgery. Specifically, psycho-education alone was not effective at improving patient reported joint outcomes in two out of two studies. Conclusion: The current literature does not support routine psychological interventions for TKA and THA. However, it should be noted that the literature for psychological interventions in conjunction with TKA and THA is still in its infancy. This gap in the literature is surprising, considering the importance of the role of psychological factors in recovery. Further RCTs with long term follow ups, multidisciplinary involvement, and more comprehensive and focused interventions that go beyond educating patients are needed. Future studies should account for the demand effect, include measures of psychological variables to determine whether psychological interventions are more beneficial for some patients compared to others, and compare the different modes of delivery and timing of interventions to determine the optimal nature and duration of psychological interventions for TKA and THA.	Results: 12 RCTs were included, with a total of 1299 participants. Psychological interventions comprised music therapy (five studies), guided imagery and music (one study), hypnosis (one study), progressive muscle relaxation with biofeedback (one study), pain coping skills programme (one study), cognitive–behavioural therapy (two studies), and a postoperative management programme (one study). Due to the high heterogeneity of interventions and poor reporting of harms data, it was not possible to make any definitive statements about the overall effectiveness or safety of psychology interventions for pain outcomes after TKR. Conclusion: Further evidence about the effectiveness of psychological interventions for improving pain outcomes after TKR is needed. The reporting of harm outcomes and intervention fidelity is currently poor and could be improved. Future work exploring the impact of intervention timing on effectiveness and whether different psychological approaches are needed to address acute postoperative pain and chronic postoperative pain would be of benefit.	Results: Fifty-three patients with depression were identified. Fifty-one patients were enrolled in the randomized con- trolled trial. Two patients were lost to follow-up at 6 months after surgery. Therefore, 49 patients (25 in the intervention group and 24 in the control group) remained in the final analysis. At 6 months postoperatively, statistical differences in patient satisfaction were identified between the 2 groups (88.0% in the intervention group compared with 62.5% in the control group; odds ratio = 4.40; 95% confidence interval, 1.02 to 18.99). There was a significant improvement in the Self-Rating Depression Scale (SDS) score (the reduction rate was 51.97% in the intervention group compared with 17.35% in the control group) and the Symptom Checklist 90 Revised (SCL-90-R) subscore for depression (the reduction rate was 44.66% in the intervention group compared with 15.73% in the control group). The clinical outcomes, including the WOMAC scores, the HSS scores, and maximal range of motion, in the intervention group had improved significantly more compared with those in the control group. Conclusions: Psychological interventions during the perioperative period can improve patient satisfaction in patients with depression who undergo TKA. Therefore, psychological intervention and management may be beneficial for patients with depression who are planning to undergo TKA.
1) Type of study for which you are doing the quality assessment	Systematic review with or without meta-analysis (AMSTARII)	Systematic review with or without meta-analysis (AMSTARII)	Randomised controlled trial (ROBII

What is the lowest evidence study included in the SR?	RCT, Level 1	RCT, Level 1	
Assessment tool	AMSTAR	AMSTAR	ROBII
RoB/Level of confidence	Critically Low	Critically Low	High
Level Of Evidence (Oxford 2011)	2	2	2

55. Empfehlung	Neu 2024
Empfehlungsgrad ⇑⇑	Bei Patient*innen mit Gonarthrose, welche sich der Implantation einer Knieendoprothese unterziehen empfehlen wir als Narkoseverfahren • eine spinale Anästhesie (SA) **oder** • allgemeine Anästhesie (AA). Beide Narkoseverfahren sollen jeweils in Kombination mit einer Lokalanästhesie erfolgen.
	Wobei als Lokalanästhesie entweder eine • Lokale Infiltrationsanästhesie (LIA) stark empfohlen wird **oder** eine • Nervenblockade schwach empfohlen wird.
Level of Evidence (GRADE) Auszugsweise AA vs. SA: Mortalität (Follow up 2 Monate):⊕ Post OP Delirium (Follow up 1 Woche): ⊕ Thrombembolische Ereignisse bis Entlasstag: ⊕	Adoption einer evidenzbasierten Empfehlung aus NICE Guideline NG157 (Punkt 1.3.2) (1)
Konsensstärke	100% (starker Konsens)

56. Empfehlung	Neu 2024
Empfehlungsgrad ⇑⇑	Als kombinierbare Lokalanästhesie zum Narkoseverfahren empfehlen wir • eine Lokale Infiltrationsanästhesie (LIA) **oder**
⇑	• schlagen eine periphere Nervenblockade vor.
Level of Evidence (GRADE) Auszugsweise RA mit NB vs. RA: Postoperative pain VAS: ⊕⊕⊕⊕ AA mit NB vs. AA: Postoperative pain VAS: ⊕ SA mit LIA vs. RA: Postoperative pain VAS: ⊕⊕ Postoperative use of analgesia: ⊕ AA mit LIA vs. AA: Thromboembolic complications Pulmonary embolism: ⊕	Adoption einer evidenzbasierten Empfehlung aus NICE Guideline NG157 (Punkt 1.3.2) (1)
Konsensstärke	100 % (starker Konsens)

Schlüsselfrage und PICO Format sind dem Evidence Review E der Quellleitlinie zu entnehmen hier:

https://www.nice.org.uk/guidance/ng157/evidence/e-anaesthesia-for-knee-replacement-pdf-8771013042 (ab Seite 5)

Suchhistorie und Recherche Flowchart sind den Appendices B-C des Evidence Review E zu entnehmen hier:

https://www.nice.org.uk/guidance/ng157/evidence/e-anaesthesia-for-knee-replacement-pdf-8771013042 (ab Seite 82)

Evidenztabellen nach GRADE sind dem Appendix F des Evidence Review E der Quellleitlinie zu entnehmen hier:

https://www.nice.org.uk/guidance/ng157/evidence/e-anaesthesia-for-knee-replacement-pdf-8771013042 (ab Seite 186)

Empfehlung der zugrundeliegenden Quellleitlinie:

Leitlinie (Erscheinungsjahr)	NICE NG157 (2022) (1)
Empfehlung:	1.3.2 „Offer people having primary elective knee replacement a choice of: regional anaesthesia in combination with LIA **or** general anaesthesia in combination with LIA. Consider adding a nerve block that does not impair motor function to either of the options above, provided it does not delay surgery significantly.“
Empfehlungsgrad:	Erster Absatz „strong“ Zweiter Absatz „weak“
Evidenzgrad:	Kein Gesamtevidenzgrad angegeben. GRADE Profile siehe Appendices F des Evidence Review E ab Seite 186
Referenzen:	Siehe Evidence Review E Tabelle 2 ab Seite 7 https://www.nice.org.uk/guidance/ng157/evidence/e-anaesthesia-for-knee-replacement-pdf-8771013042

1. (NICE), National Institute for Health and Care Excellence. Joint replacement (primary): hip, knee and shoulder (NICE Guideline NG157). London: National Institute for Health and Care Excellence; 2020 June 04.https://www.nice.org.uk/guidance/ng157 [Date Accessed: 02.07.2024].

57. Empfehlung	Neu 2024
Empfehlungsgrad ⇓⇓ (hochgestuft)	Wir empfehlen, im Rahmen der Knieprothesenimplantation auf das Legen einer Drainage zu verzichten.
Level of Evidence „high“	Adaptation einer evidenzbasierten Empfehlung aus: AAOS Surgical Management of Osteoarthritis of the Knee (1)
Konsensstärke	100% (starker Konsens)

Die PICO-Frage sowie die Standard-Einschlusskriterien sind dem e-Appendix 1 der Quellleitlinie (S. 3) zu entnehmen:

https://www.aaos.org/globalassets/quality-and-practice-resources/surgical-management-knee/smoak-eappendix-1.pdf

Die Literatursuchhistorie und -strategie sind dem e-Appendix 1 der Quellleitlinie (S. 5 ff) zu entnehmen:

https://www.aaos.org/globalassets/quality-and-practice-resources/surgical-management-knee/smoak-eappendix-1.pdf

Evidenztabellen sind e-Appendix 2 der Quellleitlinie (S. 215f) zu entnehmen:

https://www.aaos.org/globalassets/quality-and-practice-resources/surgical-management-knee/smoak-eappendix-2.pdf

Empfehlung der zugrundeliegenden Quellleitlinie:

Leitlinie (Erscheinungsjahr)	Surgical Management of Osteoarthritis of the Knee - Evidence-Based Clinical Practice Guideline (Dec 2022) (1)
Empfehlung:	Drains should not be used with total knee arthroplasty because there is no significant difference in complications or outcomes..
Empfehlungsgrad:	„moderate“ (downgraded)
Evidenzgrad:	„High“ *Evidence from two or more “Moderate” quality studies with consistent findings, or evidence from a single “High” quality study for recommending for or against the intervention. Also, higher strength evidence can be downgraded to limited due to major concerns addressed in the EtD Framework.*
Referenzen:	• „Supplement to the Clinical Practice Guideline for the Surgical Management of Osteoarthritis of the Knee“- e-Appendix 1 • „Supplement to the Clinical Practice Guideline for the Surgical Management of Osteoarthritis of the Knee“- e-Appendix 2

1. (AAOS), American Academy of Orthopaedic Surgeons. Surgical Management of Osteoarthritis of the Knee Evidence-Based Clinical Practice Guideline. Rosemont, Illinois: American Academy of Orthopaedic Surgeons 2022 [First Edition].https://www.aaos.org/globalassets/quality-and-practice-resources/surgical-management-knee/smoak2cpg.pdf [Date Accessed: 02.07.2024].

58. Empfehlung	Neu 2024
Empfehlungsgrad ⇔	a) Bei erwachsenen Patient*innen mit Gonarthrose, welche eine Knieprothese erhalten und keine bekannte Kontraindikation haben, kann eine Blutsperre während der Operation benutzt werden.
⇑	b) Die Dauer der Nutzung sollte so kurz wie möglich gehalten werden.
Level of Evidence (Oxford 2011) 2 1 3	 Han et al. 2022 (64) Cao et al. 2021(65) Dragosloveanu et al. 2023(66)
Konsensstärke	100 % (starker Konsens)

1. Schlüsselfrage und PICO Format	
clinical key question	In adult patients with osteoarthritis undergoing KA and with no known contraindications, does using a tourniquet during surgery improve outcomes and/or decrease complications compared with not using a tourniquet?
population	Adults with: • symptomatic knee OA (clinically confirmed), AND • K/L stage 2/3/4 (radiographically confirmed), AND
intervention	• KA using tourniquet
comparison	• KA without using tourniquet
outcome	• Adverse events requiring readmission, reoperation • Clinical and functional scores (validated PROMS): o Pain o Physical function o Health related quality of life o Satisfaction

2. Recherche Zusammenfassung

Identifier	*ID Ordinal 45*
PICO(T) question	In adult patients with osteoarthritis undergoing KA and with no known contraindications, does using a tourniquet during surgery improve outcomes and/or decrease complications compared with not using a tourniquet?
Search characteristics	
Date of search	230530
Initials of primary reader	CA
Database(s)	*PubMed*
Keywords	*Knee* *osteoarthritis; arthritis; osteoarthros*; gonitis; gonarthritis; gonarthros** knee arthroplasty; knee replacement; tourniquet
Search strings	*#1 Animals[Title] OR Cadaver[Title] OR animal*[Title] OR dog[Title] OR dogs[Title] OR canine[Title] OR cats[Title] OR feline[Title] OR horse*[Title] OR equine[Title] OR mouse[Title] OR mice[Title] OR rat[Title] OR rats[Title] OR rabbit*[Title] OR sheep[Title] OR porcine[Title] OR pig[Title] OR pigs[Title] OR rodent*[Title] OR monkey*[Title] OR cadaver*[Title/Abstract] OR "in vitro"[Title/Abstract] OR comment[Publication Type] OR editorial[Publication Type] OR letter[Publication Type] OR "historical article"[Publication Type] OR address[Publication Type] OR news[Publication Type] OR "newspaper article" [Publication Type] OR "case reports"[Publication Type] OR case report*[Title] OR abstracts[Title] OR editorial[Title] OR reply[Title] OR comment*[Title] OR commentary[Title] OR letter[Title] OR biomechanic*[Title]* *#2 "randomized-controlled-trial" OR "Randomized-Controlled-Trials" OR "random-allocation" OR random*[Title] OR RCT* *#3 (systematic* AND review*) OR meta-analys*[Title/Abstract] OR meta-analysis OR systematic-review* *#4 (Knee)*

	#5 (Osteoarthritis OR arthritis OR osteoarthros OR gonitis OR gonarthritis OR gonarthros*)* #6 ("knee arthroplasty" OR "knee replacement" OR KA) AND (tourniquet) #7 (#4 AND #5 AND #6) NOT #1 #8 (#7 AND #2) #9 (#7 AND #3)
Number of hits	
RCTs (#8)	109
SR(+MA) (#9)	8
Studies published before 2003	4 RCTs + 0 SR/MAs
Articles to consider	
DOIs MAs	Han 2023: 10.3389/fsurg.2022.994795 Cao 2021: 10.1080/07853890.2021.1991588 Cai 2019: 10.1186/s13018-019-1422-4
DOIs SRs	
DOIs RCTs	Dragosloveanu 2023: 10.3390/medicina59050870 Lawrie 2023: 0.1016/j.arth.2023.03.081 Hung 2023: 10.1097/JCMA.0000000000000914 Lee 2023: 10.1007/s00167-022-07228-4 Sogbein 2022: 10.2147/ORR.S381894 Pavão 2023: 10.1016/j.arth.2022.10.026 Hamawandi 2023: 10.1055/s-0041-1731719 Yi 2021: 10.1186/s12891-021-03968-5 Ayik 2021: 10.1055/s-0040-1701454 Goel 2019: 10.2106/JBJS.19.00146 Jawhar 2020: 10.1007/s00167-019-05646-5 Kim 2019: .1186/s12891-019-2636-7 Alexandersson 2019: 10.1007/s00167-018-5196-8 Stetzelberger 2018: 10.1007/s00167-017-4760-y Liu 2017: 10.1111/os.12329 Mori 2016: 10.1016/j.knee.2016.02.007 Wand 2017: DOI: 10.1007/s00167-015-3964-2 Harsten 2015: 10.1016/j.knee.2014.12.010 Jensen 2014: 10.1186/1471-2474-15-110 Huang 2014: 10.1007/s00402-014-1948-1 Ledin 2012: 10.3109/17453674.2012.727078 Husted 2005: 10.1016/j.arth.2004.11.016

Include/Excluded after FT screening	
Include	Han 2023: 10.3389/fsurg.2022.994795
Include but Missing supplementary	Cao 2021: 10.1080/07853890.2021.1991588
Exclude, not specific enough	Cai 2019: 10.1186/s13018-019-1422-4
Include	Dragosloveanu 2023: 10.3390/medicina59050870
Include	Lawrie 2023: 0.1016/j.arth.2023.03.081
Exclude: hemodynamic	Hung 2023: 10.1097/JCMA.0000000000000914
Include	Lee 2023: 10.1007/s00167-022-07228-4
Exclude: Pilot RCT	Sogbein 2022: 10.2147/ORR.S381894
Include	Pavão 2023: 10.1016/j.arth.2022.10.026
Could not retrieve	Hamawandi 2023: 10.1055/s-0041-1731719
Included in study	Yi 2021: 10.1186/s12891-021-03968-5
Could not retrieve	Ayik 2021: 10.1055/s-0040-1701454
Included in study	Goel 2019: 10.2106/JBJS.19.00146
Include	Jawhar 2020: 10.1007/s00167-019-05646-5
Include	Kim 2019: .1186/s12891-019-2636-7
Include	Alexandersson 2019: 10.1007/s00167-018-5196-8
Excluded: implant position	Stetzelberger 2018: 10.1007/s00167-017-4760-y
Included in study	Liu 2017: 10.1111/os.12329
Included in study	Mori 2016: 10.1016/j.knee.2016.02.007
Include	Wang 2017: DOI: 10.1007/s00167-015-3964-2
Included in study	Harsten 2015: 10.1016/j.knee.2014.12.010
Exclude: protocol	Jensen 2014: 10.1186/1471-2474-15-110
Included in study	Huang 2014: 10.1007/s00402-014-1948-1
Included in study	Ledin 2012: 10.3109/17453674.2012.727078
Exclude: about patella tracking	Husted 2005: 10.1016/j.arth.2004.11.016

History and Search Details

Download Delete

Search	Actions	Details	Query	Results	Time
#9	•••	›	Search: **(#7 AND #3)**	8	03:22:19
#8	•••	›	Search: **(#7 AND #2)**	109	03:22:13
#7	•••	›	Search: **(#4 AND #5 AND #6) NOT #1**	285	03:22:06
#6	•••	›	Search: **("knee arthroplasty" OR "knee replacement" OR KA) AND (tourniquet)**	1,074	03:21:57
#5	•••	›	Search: **(Osteoarthritis OR arthritis OR osteoarthros* OR gonitis OR gonarthritis OR gonarthros*)**	418,512	03:21:48
#4	•••	›	Search: **knee**	207,278	03:21:39
#3	•••	›	Search: **(systematic* AND review*) OR meta-analys*[Title/Abstract] OR meta-analysis OR systematic-review**	535,201	03:21:36
#2	•••	›	Search: **"randomized-controlled-trial" OR "Randomized-Controlled-Trials" OR "random-allocation" OR random*[Title] OR RCT**	995,389	03:21:29
#1	•••	›	Search: **Animals[Title] OR Cadaver[Title] OR animal*[Title] OR dog[Title] OR dogs[Title] OR canine[Title] OR cats[Title] OR feline[Title] OR horse*[Title] OR equine[Title] OR mouse[Title] OR mice[Title] OR rat[Title] OR rats[Title] OR rabbit*[Title] OR sheep[Title] OR porcine[Title] OR pig[Title] OR pigs[Title] OR rodent*[Title] OR monkey*[Title] OR cadaver*[Title/Abstract] OR "in vitro"[Title/Abstract] OR comment[Publication Type] OR editorial[Publication Type] OR letter[Publication Type] OR "historical article"[Publication Type] OR address[Publication Type] OR news[Publication Type] OR "newspaper article" [Publication Type] OR "case reports"[Publication Type] OR case report*[Title] OR abstracts[Title] OR editorial[Title] OR reply[Title] OR comment*[Title] OR commentary[Title] OR letter[Title] OR biomechanic*[Title]**	8,488,905	03:20:39

Showing 1 to 9 of 9 entries

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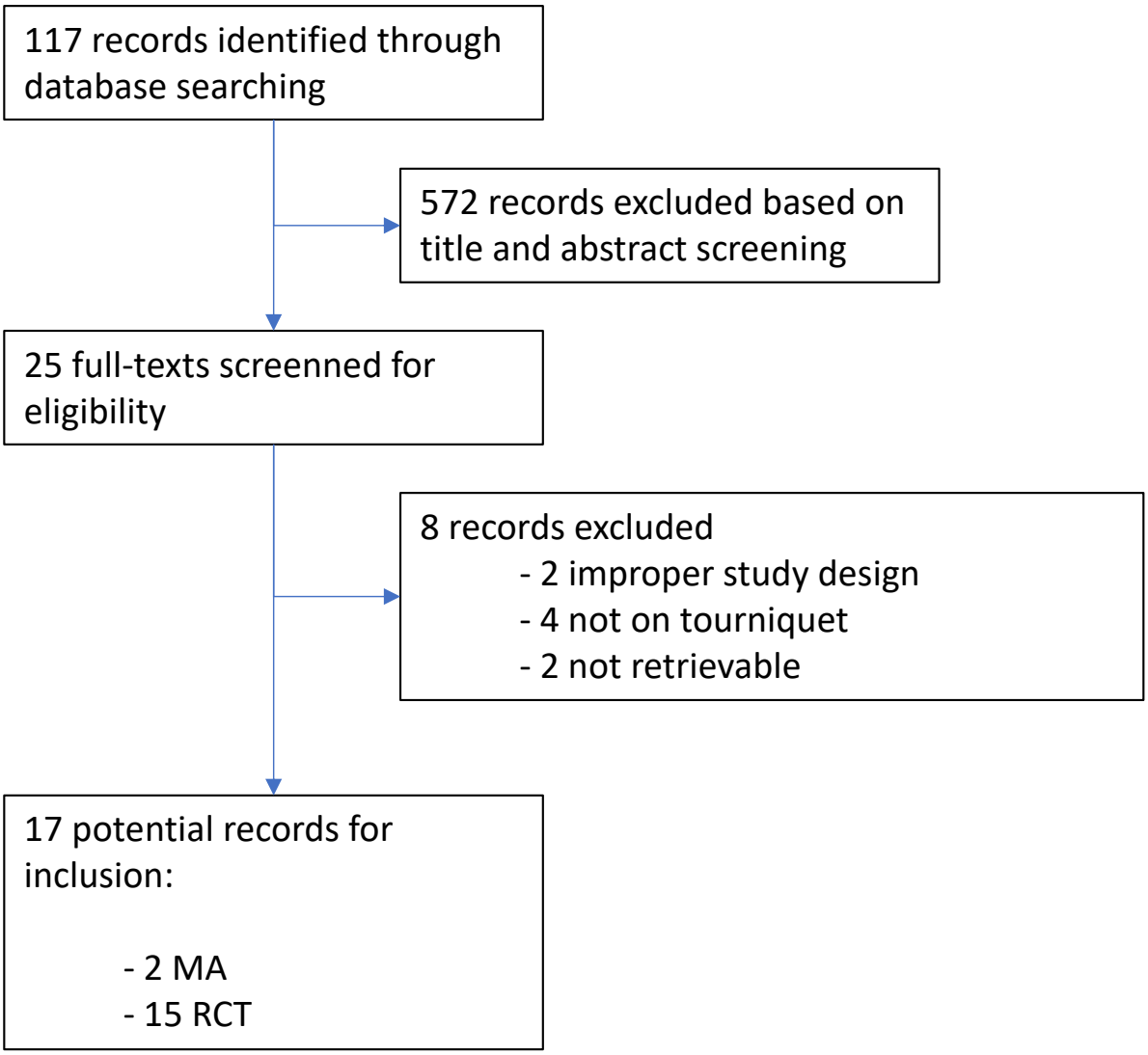
4. Studienselektion: Flowchart

PubMed Search: In adult patients with osteoarthritis undergoing KA and with no known contraindications, does using a tourniquet during surgery improve outcomes and/or decrease complications compared with not using a tourniquet?

(26/04/2023)



Included SRs and MAs

(1, 2)

1. Cao Z, Guo J, Li Q, Wu J, Li Y. Comparison of efficacy and safety of different tourniquet applications in total knee arthroplasty: a network meta-analysis of randomized controlled trials. Ann Med. 2021;53(1):1816-26. doi: 10.1080/07853890.2021.1991588
2. Han J, Zhang XY, Mu SY, Liu SL, Cui QT, Zhang C, et al. Tourniquet application in primary total knee arthroplasty for osteoarthritis: A systematic review and meta-analysis of randomized controlled trials. Front Surg. 2022;9:994795. doi: 10.3389/fsurg.2022.994795

Included RCTs

(1-15)

1. Pavão DM, Pires eAlbuquerque RS, de Faria JLR, Sampaio YD, de Sousa EB, Fogagnolo F. Optimized Tourniquet Use in Primary Total Knee Arthroplasty: A Comparative, Prospective, and Randomized Study. J Arthroplasty. 2023;38(4):685-90. doi: 10.1016/j.arth.2022.10.026
2. Lee NK, Lee SI, Chang CB. The limited use of a tourniquet during total knee arthroplasty under a contemporary enhanced recovery protocol has no meaningful benefit: a prospective randomized controlled trial. Knee Surg Sports Traumatol Arthrosc. 2023;31(3):1089-97. doi: 10.1007/s00167-022-07228-4
3. Lawrie CM, Hannon CP, Jo S, King J, Riegler V, Nunley RM, et al. Chitranjan S. Ranawat Award: Tourniquet Use Does Not Impact Trajectory of Total Knee Arthroplasty Early Recovery: A Prospective, Randomized Controlled Trial. J Arthroplasty. 2023;38(6s):S7-s13. doi: 10.1016/j.arth.2023.03.081
4. Dragosloveanu S, Dragosloveanu C, Petre M, Gherghe ME, Cotor DC. The Impact of Tourniquet Usage on TKA Outcome: A Single-Center Prospective Trial. Medicina (Kaunas). 2023;59(5). doi: 10.3390/medicina59050870
5. Yi Z, Yan L, Haibo S, Yuangang W, Mingyang L, Yuan L, et al. Effects of tourniquet use on clinical outcomes and cement penetration in TKA when tranexamic acid administrated: a randomized controlled trial. BMC Musculoskelet Disord. 2021;22(1):126. doi: 10.1186/s12891-021-03968-5
6. Jawhar A, Skeirek D, Stetzelberger V, Kollowa K, Obertacke U. No effect of tourniquet in primary total knee arthroplasty on muscle strength, functional outcome, patient satisfaction and health status: a randomized clinical trial. Knee Surg Sports Traumatol Arthrosc. 2020;28(4):1045-54. doi: 10.1007/s00167-019-05646-5
7. Kim TK, Bamne AB, Sim JA, Park JH, Na YG. Is lower tourniquet pressure during total knee arthroplasty effective? A prospective randomized controlled trial. BMC Musculoskelet Disord. 2019;20(1):275. doi: 10.1186/s12891-019-2636-7
8. Goel R, Rondon AJ, Sydnor K, Blevins K, O'Malley M, Purtill JJ, et al. Tourniquet Use Does Not Affect Functional Outcomes or Pain After Total Knee Arthroplasty: A Prospective, Double-Blinded, Randomized Controlled Trial. J Bone Joint Surg Am. 2019;101(20):1821-8. doi: 10.2106/jbjs.19.00146
9. Alexandersson M, Wang EY, Eriksson S. A small difference in recovery between total knee arthroplasty with and without tourniquet use the first 3 months after surgery: a randomized controlled study. Knee Surg Sports Traumatol Arthrosc. 2019;27(4):1035-42. doi: 10.1007/s00167-018-5196-8
10. Wang K, Ni S, Li Z, Zhong Q, Li R, Li H, et al. The effects of tourniquet use in total knee arthroplasty: a randomized, controlled trial. Knee Surg Sports Traumatol Arthrosc. 2017;25(9):2849-57. doi: 10.1007/s00167-015-3964-2
11. Liu PL, Li DQ, Zhang YK, Lu QS, Ma L, Bao XZ, et al. Effects of Unilateral Tourniquet Used in Patients Undergoing Simultaneous Bilateral Total Knee Arthroplasty. Orthop Surg. 2017;9(2):180-5. doi: 10.1111/os.12329
12. Mori N, Kimura S, Onodera T, Iwasaki N, Nakagawa I, Masuda T. Use of a pneumatic tourniquet in total knee arthroplasty increases the risk of distal deep vein thrombosis: A prospective, randomized study. Knee. 2016;23(5):887-9. doi: 10.1016/j.knee.2016.02.007

13. Harsten A, Bandholm T, Kehlet H, Toksvig-Larsen S. Tourniquet versus no tourniquet on knee-extension strength early after fast-track total knee arthroplasty; a randomized controlled trial. Knee. 2015;22(2):126-30. doi: 10.1016/j.knee.2014.12.010
14. Huang ZY, Pei FX, Ma J, Yang J, Zhou ZK, Kang PD, et al. Comparison of three different tourniquet application strategies for minimally invasive total knee arthroplasty: a prospective non-randomized clinical trial. Arch Orthop Trauma Surg. 2014;134(4):561-70. doi: 10.1007/s00402-014-1948-1
15. Ledin H, Aspenberg P, Good L. Tourniquet use in total knee replacement does not improve fixation, but appears to reduce final range of motion. Acta Orthop. 2012;83(5):499-503. doi: 10.3109/17453674.2012.727078

5. Charakteristika der eingeschlossenen Studien

PICO number:	45	45	45
PICO Question:	In adult patients with osteoarthritis undergoing KA and with no known contraindications, does using a tourniquet during surgery improve outcomes and/or decrease complications compared with not using a tourniquet?	In adult pa*ents with osteoarthri*s undergoing KA and with no known contraindica*ons, does using a tourniquet during surgery improve outcomes and/or decrease complica*ons compared with not using a tourniquet?	In adult patients with osteoarthritis undergoing KA and with no known contraindications, does using a tourniquet during surgery improve outcomes and/or decrease complications compared with not using a tourniquet?
Article name:	The Impact of Tourniquet Usage on TKA Outcome: A Single-Center Prospective Trial	Tourniquet application in primary total knee arthroplasty for osteoarthritis: A systematic review and meta-analysis of randomized controlled trials	Comparison of efficacy and safety of different tourniquet applications in total knee arthroplasty: a network meta-analysis of randomized controlled trials
Lead author	Dragosloveanu	Han	Cao
Year published	2023	2023	2021
Number of included studies (if SR with or without MA)	0	29	38

Description of intervention group (optional for SRs)	Patients included in our assessment were split into two groups, one which underwent a total knee replacement using a tourniquet (T)	With a tourniquet, 1,258 procedures were performed. The male percentages ranged from 14% to 70% in the tourniquet group. The mean age at operation was available in all studies, ranging from 58.0 to 73.0 both in tourniquet and non-tourniquet groups. The BMI was available in 21 studies, ranging from 26.1 to 33.0 in the tourniquet group. At the final follow-up, a total of 45 procedures were dropped out in the tourniquet group.	The mean age of the 3007 patients included in this study was 67.61 years (IQR 64.66 to 70.50 years) and the proportion of male patients was 31.79% (ranged from 10.91% to 53.23%) across studies. Most participants received primary TKA due to KOA or RA, except for five patients who underwent revision surgery. The medial parapatellar approach was the most common surgical approach (26 articles), followed by the mid-vastus approach (4 articles) and sub-vastus approach (1 article).
Description of control group (optional for SRs)	Patients included in our assessment were split into two groups, one which underwent a total knee replacement without a tourniquet (NT)	1,254 procedures were performed without a tourniquet. The male percentages ranged from 10.3% to 90% in the non-tourniquet group. The mean age at operation was available in all studies, ranging from 58.0 to 73.0 both in tourniquet and non-tourniquet groups. The BMI was available in 21 studies, ranging from 25.3 to 33.0 in the non-tourniquet group. At the final follow-up, a total of 49 procedures were dropped out in the non-tourniquet group.	0
Number of patients in intervention group	96	1,258 procedures	3007

Number of patients in control group	94	1,254 procedures	0
Mean age with range of intervention group	68.4 ± 7.8	58.0 to 73.0	7.61 years (IQR 64.66 to 70.50 years)
Mean age with range of control group	67.5 ± 8.1	58.0 to 73.0	0
Inclusion criteria (on patient-level if clinical study; on article-level if SR) **Examples:** **Clinical study: "The inclusion criteria were (i) primary ACLR in (ii) patients aged over 50 years. The exclusion criteria were (iii) severe concomitant ligament injury (grade 3), (iv) tibiofemoral osteoarthritis visible on weight-bearing anteroposterior and/or sagittal radiographs (> 50% joint space narrowing), and (v) history of intra- or extra-articular ligament surgery in either knee."** **SR: "Studies comparing the diagnostic accuracy of physical examination (clinical tests or ultrasound) versus arthroscopy for the assessment of LHBT pathologies"**	We excluded from our study patients with revisions and cases requiring a greater constraint than a posterior stabilized TKA (constrained or hinged knee). We also excluded patients with coronary diseases, neurological diseases, infectious conditions, coagulation disorders or a history of deep vein thrombosis or pulmonary embolism. Inclusion criteria consisted of patients aged between 50–80 years and with BMI < 45 kg/m2.	The records retrieved from the electronic databases were screened for eligibility when fulfilling the following criteria: 1) participants: undergone TKA for knee osteoarthritis; (2) intervention and comparison: the TKA was assisted with or without a tourniquet during operation; (3) outcome: studies reported outcome data about blood loss, transfusion requirement, swelling, pain, knee function, ROM, operation time, bone cement mantle thickness, complications, and so on; (4) study: only RCTs with high quality were included. Studies were excluded for the following reasons: (1) duplicated records; (2) studies published in non-English language; (3) studies for patients with diagnosis other than knee osteoarthritis; (4) non-RCTs, including cohort study, nonrandomized clinical trial, case–control study, case series	ny article which met the following inclusion criteria were included: 1. The patients included in the study underwent total knee replacement or arthroplasty; 2. The study included a comparison among two or more different tourniquet release strategies; 3. The study used a randomized clinical trial design, whether blinded or not; 4. The study reported at least one desirable outcome: operation time, blood loss, func- tional rehabilitation, pain relief, the incidence of DVT, or other complications. The exclusion criteria for this study were: 1. The study included another type of surgery, including uni-compartmental knee arthroplasty or osteotomy; 2. Low-quality studies according to the Cochrane Handbook; 3. All animal studies and cadaver studies; 4. All reviews, systematic reviews and meta-analyses, conference abstracts, letters, and those without ori- ginal

		case-control study, case series, literature review, and meta-analysis.	letters, and those without off-label study data.
Follow-up period	6m	1 day to 36 months	0
Main results	Regarding blood loss, the NT group demonstrated significantly lower levels: 245 ± 97.8 mL intraoperative and 324.8 ± 151.65 mL postoperative, compared to the T group, where we recorded 276 ± 109.2 mL during the surgical procedures and 353.44 ± 101.55 mL after the surgery, ($p < 0.05$). Regarding postoperative hemoglobin, the Tourniquet group demonstrated significantly lower values (11.23 ± 1.5) compared to the No Tourniquet group (11.5 ± 1.3), ($p < 0.05$). We also recorded significant differences in operative room time between the groups: 100.5 ± 42 for the T group and 92.2 ± 38 for the NT group, respectively. The average tourniquet usage was 69.4 ± 6 min, ($p < 0.05$). At the first follow-up, we recorded significantly lower WOMAC pain scores for the NT group (7.3 ± 1.8 compared to 8.2 ± 3.1, $p = 0.015$). No other differences between the groups	As a result, application of a tourniquet was significantly associated with higher VAS- pain score, at the 1st day, 2nd day, 3rd day, 4th day, 5th day, 1st week, and 3rd week, compared to that of the non-tourniquet group (Figure 3A). Concerning the postoperative ROM, the tourniquet group was associated with significantly decreased full ROM (at the 1st day, 3rd day, and 6th week, Figure 3B), flexion ROM (at the 3rd day, Figure 3C), and extension ROM (at the 6th week and 8th month, Figure 3D). The application of a tourniquet was also related with poorer knee outcome according to KSS at the 3rd week, 6th week, and 3rd month (Figure 3E). The percentage of HCT was significantly lower at the 3rd day postoperatively in the tourniquet group (Figure 3F). The Oxford knee score was higher in the tourniquet group only at the 6th month postoperatively (Figure 3G). Increased swelling was demonstrated	3.3. Operation time 3.3.1. Conventional pair-wise meta-analysis Significant heterogeneity of the included studies and interventions was reported (I2 1⁄4 79.9%), so the random-effects model was adopted. The use of a tour- niquet overall was associated with a significantly shorter operation time than non-use (WMD 4.00, 95% CI [–7.14 to 0.84]). 3.4. Blood loss 3.4.1. Conventional pair-wise meta-analysis Significant heterogeneity was found in intraoperative blood loss (I2 1⁄4 88.2%), postoperative blood loss (I2 1⁄4 59.2%) and total blood loss (I2 1⁄4 92.2%) so the ran- dom-effects model was adopted. The use of a tourniquet overall was associated with a significantly decreased intraoperative blood loss compared to non-use of a tourniquet

	other differences between the groups were seen at this follow-up. The VAS scale demonstrated a slight improvement for the NT group but was not significant from the statistical point of view. Both groups demonstrated improvements compared to preoperative results. Knee range of motion also showed significant improvements after the surgical procedure but with no significant differences between the groups. (Table 3) At the second follow-up, both groups showed significantly reduced knee pain and improved function.	increased swelling was demonstrated for application of tourniquet at the 3rd day and 6th month according to knee circumference (Figure 3H). The intraoperative blood loss was significantly decreased after tourniquet application (MD = −138.72 ml, 95% CI: −167.12 to −110.30, p < 0.001, Figure 4B). However, no significant difference was found between two groups for postoperative draining volume (MD = 18.30 ml, 95% CI: −46.48 to 83.08, p = 0.580, Figure 4C), total blood loss (MD = −21.27 ml, 95% CI: −140.73 to 98.18, p = 0.727, Figure 4D), rate of blood transfusion CI: 0.94–2.26, p = 0.095, Figure 4E), and change of the lowest level of Hb compared to baseline level (MD = −0.80 g/L, 95% CI: −6.13 to 4.53, p = 0.769, Figure 4F).	compared to non-use of a tourniquet (WMD 142.86, 95% CI [–175.05 to 110.67]), but also with increased postoperative blood loss (WMD 81.28, 95% CI [35.23 to 127.33]). No significant difference was found in total blood loss (WMD 79.28, 95% CI [–177.34 to 18.78]). 3.5. Pain 3.5.1. Conventional pair-wise meta-analysis Significant heterogeneity was found for both early (I2 1⁄4 97.3%) and late (I2 1⁄4 73.4%) postoperative pain so the random-effects model was adopted. No significant differences were found in early postoperative pain (SMD 0.23, 95% CI [–0.73 to 1.19]) or late postopera- tive pain (SMD 0.04, 95% CI [–0.34 to 0.27]). 3.6. Function 3.6.1. Conventional pair-wise meta-analysis Heterogeneity was found only in early

				postoperative function (I2 1⁄4 71.6%). The fixed-effects model was used for late postoperative function (I2 1⁄4 0.00%) and knee flexion range (I2 1⁄4 39.3%), and the random- effects model was adopted for early postoperative function. No significant difference was found in any functional outcome. The use or absence of tourniquets does not influence the patient's early postoperative functional status (SMD 0.30, 95%CI [–0.682 to 0.073]), early postoperative functional status (SMD 0.05, 95%CI [–0.186 to 0.277]) or knee flexion range (WMD 0.79, 95%CI [–2.598 to 1.028]). 3.7. Safety outcome 3.7.1. Conventional pair-wise meta-analysis No heterogeneity was reported in safety outcomes (I2 1⁄4 0.00%) so the fixed-effects model was used. No sig-nificant differences were found

			nificant differences were found between the use or absence of the tourniquet on the incidence of DVT (OR 1.39, 95%CI [0.879 to 2.209]), minor complications (OR 1.31, 95%CI [0.846 to 2.017]) or major complications (OR 0.95, 95%CI [0.251 to 3.555]).

Key findings (use Results and Conclusion in Abstract)	Results: We included 96 patients in the T group and 94 in the NT group, respectively, who remained until the last follow-up. Regarding blood loss, the NT group demonstrated significantly lower levels: 245 ± 97.8 mL intraoperative and 324.8 ± 151.65 mL postoperative, compared to the T group, where we recorded 276 ± 109.2 mL during the surgical procedures and 353.44 ± 101.55 mL after the surgery, ($p < 0.05$). We also recorded significantly shorter operative room time for the NT group, ($p < 0.05$). During the follow-up, we noticed postoperative improvements but without significant differences between the groups. Conclusions: We found a significant decrease in bleeding after no tourniquet usage during total knee replacements and shorter operative times. On the other hand, the knee function demonstrated no significant differences between the groups. Further studies may be required in	total of 29 RCTs, involving 2,512 operations (1,258 procedures with a tourniquet and 1,254 procedures without a tourniquet), were included, and 18 outcomes were compared. Tourniquet application could significantly decrease intraoperative blood loss (MD = −138.72 ml, $p < 0.001$), shorten operation duration (MD = −1.77 min, $p < 0.001$), and increase cement mantle thickness (MD = 0.17 mm, $p < 0.001$). However, it was significantly associated with increased postoperative pain intensity, decreased full ROM/flexion ROM/ extension ROM, poorer knee function, increased knee swelling, and increased length of hospital stay (LOS) at several follow-up points ($p<0.050$). No significant difference was found for postoperative draining volume, total blood loss, transfusion rate, change of Hb level, and risks of deep venous thrombosis and all complications. Conclusions: Tourniquet application	38 eligible studies that assessed 3007 participants who underwent TKA were included in this network meta-analysis. Tourniquet inflation before osteotomy then deflation after wound closure effectively reduce perioperative bleeding (WMD compared with control group 234.66, 95% CI [–409.19 to 60.13]), while shortening the operation time (WMD 8.98, 95%CI [–14.07 to 3.88]) and reducing postoperative complications, including DVT (OR 0.58, 95%CI [–1.19 to 0.03]) and minor wound complications (OR 1.38, 95%CI [–3.00 to 0.25]). No difference was found in the late postoperative knee pain and function outcomes. Conclusions: Using tourniquets during the entire operation can effectively reduce blood loss, but it also can cause many safety problems, including DVTs, wound oozing, delayed healing, and serious wound complications. Tourniquet inflation before osteotomy then deflation after

	Further studies may be required in order to assess complications.	Conclusions: Tourniquet application could only decrease the intraoperative blood loss but has no effectiveness on the total blood loss and transfusion requirement. On the contrary, it has a reverse effect on the pain score, knee function, ROM, swelling, and LOS.	before osteotomy then deflation after wound closure effectively can reduce perioperative bleeding while shortening the operation time and reducing postoperative complications, so it could be the ideal tourniquet application strategy in TKA.
Type of Study	Randomised controlled trial (ROBII	Systematic review with or without meta-analysis (AMSTARII)	Systematic review with or without meta-analysis (AMSTARII)
Assessment tool	ROBII	AMSTAR	AMSTAR
Overall Assessment	High (RoB)	Critically low (Quality assessment)	Low (Quality assessment)
What is the lowest evidence study included in the SR?		RCT, Level 1	RCT, Level 1
Level of evidence (Oxford 2011)	Level 3, downgraded due to high risk of bias	Level 2, downgraded due to critically low AMSTAR	Level 1

59. Empfehlung	Neu 2024
Empfehlungsgrad ⇔	Es können Navigationssysteme bei der Implantation einer Knieendoprothese nach vorheriger Aufklärung verwendet werden. Es zeigt sich kein Vorteil hinsichtlich des funktionellen Ergebnisses.
Level of Evidence „high“	Übernahme aufbereiteter Evidenz aus: AAOS Surgical Management of Osteoarthritis of the Knee (1)
Konsensstärke	100 % (starker Konsens)

Die PICO-Frage sowie die Standard-Einschlusskriterien sind dem e-Appendix 1 der Quellleitlinie (S. 3) zu entnehmen:

https://www.aaos.org/globalassets/quality-and-practice-resources/surgical-management-knee/smoak-eappendix-1.pdf

Die Literatursuchhistorie und -strategie sind dem e-Appendix 1 der Quellleitlinie (S. 5 ff) zu entnehmen:

https://www.aaos.org/globalassets/quality-and-practice-resources/surgical-management-knee/smoak-eappendix-1.pdf

Evidenztabellen sind e-Appendix 2 der Quellleitlinie (S. 193ff) zu entnehmen:

https://www.aaos.org/globalassets/quality-and-practice-resources/surgical-management-knee/smoak-eappendix-2.pdf

Empfehlung der zugrundeliegenden Quellleitlinie:

Leitlinie (Erscheinungsjahr)	Surgical Management of Osteoarthritis of the Knee - Evidence-Based Clinical Practice Guideline (Dec 2022) (1)
Empfehlung:	There is no difference in outcomes, function, or pain between navigation and conventional techniques.
Empfehlungsgrad:	„moderate“ (downgraded)
Evidenzgrad:	„high“ *Evidence from two or more “Moderate” quality studies with consistent findings, or evidence from a single “High” quality study for recommending for or against the intervention. Also, higher strength evidence can be downgraded to limited due to major concerns addressed in the EtD Framework..*
Referenzen:	• „Supplement to the Clinical Practice Guideline for the Surgical Management of Osteoarthritis of the Knee“- e-Appendix 1 • „Supplement to the Clinical Practice Guideline for the Surgical Management of Osteoarthritis of the Knee“- e-Appendix 2

1. (AAOS), American Academy of Orthopaedic Surgeons. Surgical Management of Osteoarthritis of the Knee Evidence-Based Clinical Practice Guideline. Rosemont, Illinois: American Academy of Orthopaedic Surgeons 2022 [First Edition].https://www.aaos.org/globalassets/quality-and-practice-resources/surgical-management-knee/smoak2cpg.pdf [Date Accessed: 02.07.2024].

60. Empfehlung	Neu 2024
Empfehlungsgrad ⇔	Bei Patient*innen mit Gonarthrose, welche sich der Implantation einer Knieendoprothese unterziehen, können Patient Specific Instruments (PSI) verwendet werden. Es gibt keine verbesserten funktionellen Ergebnisse oder verringerte Komplikationen.
Level of Evidence „high“	Übernahme aufbereiteter Evidenz aus AAOS Surgical Management of Osteoarthritis of the Knee (1)
Konsensstärke	92 % (Konsens)

Die PICO-Frage sowie die Standard-Einschlusskriterien sind dem e-Appendix 1 der Quellleitlinie (S. 3) zu entnehmen:

https://www.aaos.org/globalassets/quality-and-practice-resources/surgical-management-knee/smoak-eappendix-1.pdf

Die Literatursuchhistorie und -strategie sind dem e-Appendix 1 der Quellleitlinie (S. 5 ff) zu entnehmen:

https://www.aaos.org/globalassets/quality-and-practice-resources/surgical-management-knee/smoak-eappendix-1.pdf

Evidenztabellen sind e-Appendix 2 der Quellleitlinie (S. 387ff) zu entnehmen:

https://www.aaos.org/globalassets/quality-and-practice-resources/surgical-management-knee/smoak-eappendix-2.pdf

Empfehlung der zugrundeliegenden Quellleitlinie:

Leitlinie (Erscheinungsjahr)	Surgical Management of Osteoarthritis of the Knee - Evidence-Based Clinical Practice Guideline (Dec 2022) (1)
Empfehlung:	The practitioner should not use patient specific technology (e.g., guides, cutting blocks) because there is no significant difference in patient outcomes, function, or pain as compared to conventional total knee arthroplasty (TKA). Additionally, it does not reduce operating time, blood loss, length of stay, and/or complications.
Empfehlungsgrad:	„Strong“
Evidenzgrad:	„High“ *Evidence from two or more “High” quality studies with consistent findings for recommending for or against the intervention. to limited due to major concerns addressed in the EtD Framework..*
Referenzen:	• „Supplement to the Clinical Practice Guideline for the Surgical Management of Osteoarthritis of the Knee“- e-Appendix 1 • „Supplement to the Clinical Practice Guideline for the Surgical Management of Osteoarthritis of the Knee“- e-Appendix 2

1. (AAOS), American Academy of Orthopaedic Surgeons. Surgical Management of Osteoarthritis of the Knee Evidence-Based Clinical Practice Guideline. Rosemont, Illinois: American Academy of Orthopaedic Surgeons 2022 [First Edition].https://www.aaos.org/globalassets/quality-and-practice-resources/surgical-management-knee/smoak2cpg.pdf [Date Accessed: 02.07.2024].

61. Empfehlung	Neu 2024
Empfehlungsgrad **EK** ⇑⇑	Bei Patient*innen mit Indikation zur Knieendoprothese, welche eine bestätigte Metallallergie haben, empfehlen wir, im Rahmen des Aufklärungsgesprächs über das sehr geringe Risiko einer allergiebedingten Komplikation bei der Verwendung von Standardimplantaten und die höhere Revisionsrate der meisten Allergieimplantate zu informieren und die Risiken gegeneinander abzuwägen. Mit dem Einverständnis der Patient*innen ist die Verwendung eines Standardimplantates möglich.
Konsensstärke	100 % (starker Konsens)

1. Schlüsselfrage und PICO Format	
clinical key question	Should hypoallergenic implants be routinely used instead of steel or CoCr implants for knee arthroplasty in patients with metal allergies?
population	Adults with: • symptomatic knee OA (clinically confirmed), AND • K/L stage 2/3/4 (radiographically confirmed), AND • Patients with confirmed metal allergies
intervention	• KA with hypoallergenic implants
comparison	• KA with non-hypoallergenic implants

outcome	• Adverse events and complications
	• Clinical and functional scores (validated PROMS):
	  ○ Pain
	  ○ Physical function
	  ○ Health related quality of life
	  ○ Satisfaction

2. Recherche Zusammenfassung

Identifier	*14*
PICO(T) question	Should hypoallergenic implants be routinely used instead of steel or CoCr implants for knee arthroplasty in patients with metal allergies?
Search characteristics	
Date of search	28/04/2023
Initials of primary reader	CA
Database(s)	*PubMed*
Keywords	*Knee* *osteoarthritis; arthritis; osteoarthros*; gonitis; gonarthritis; gonarthros** hypoallergenic; allergy; metal allergies, metal sensitivity
Search strings	*#1 Animals[Title] OR Cadaver[Title] OR animal*[Title] OR dog[Title] OR dogs[Title] OR canine[Title] OR cats[Title] OR feline[Title] OR horse*[Title] OR equine[Title] OR mouse[Title] OR mice[Title] OR rat[Title] OR rats[Title] OR rabbit*[Title] OR sheep[Title] OR porcine[Title] OR pig[Title] OR pigs[Title] OR rodent*[Title] OR monkey*[Title] OR cadaver*[Title/Abstract] OR "in vitro"[Title/Abstract] OR comment[Publication Type] OR editorial[Publication Type] OR letter[Publication Type] OR "historical article"[Publication Type] OR address[Publication Type] OR news[Publication Type] OR "newspaper article" [Publication Type] OR "case reports"[Publication Type] OR case report*[Title] OR abstracts[Title] OR editorial[Title] OR reply[Title] OR comment*[Title] OR commentary[Title] OR letter[Title] OR biomechanic*[Title]* *#2 "randomized-controlled-trial" OR "Randomized-Controlled-Trials" OR "random-allocation" OR random*[Title] OR RCT* *#3 (systematic* AND review*) OR meta-analys*[Title/Abstract] OR meta-analysis OR systematic-review* *#4 (Knee)* *#5 (Osteoarthritis OR arthritis OR osteoarthros* OR gonitis OR gonarthritis OR gonarthros*)*

	#6 (hypoallergenic OR allergy OR "metal allergy" OR "metal allergies" OR "metal sensitive" OR "metal sensitivity") #7 (#4 AND #6) NOT(#1) #8 (#7 AND #2) #9 (#7 AND #3)
Number of hits	
RCTs (#8)	79
SR(+MA) (#9)	27
Studies published before 2003	3 RCTs
Articles to consider	
DOIs MAs	0
DOIs SRs	Mitchelson 2015: 10.1155/2015/137287 Outcomes of Revision Joint Arthroplasty Due to Metal Allergy and Hypersensitivity: A Systematic Review. No DOI available, cannot retrieve full text Peacock 2022: 10.1186/s42836-022-00144-5 + Matar 2021: 10.1302/2633-1462.210.BJO-2021-0098.R1 (from RCT search)
DOIs RCTs	Lutzner 2013 : 10.1007/s00264-013-2010-6 Lutzner 2023: 10.1007/s00167-021-06836-w Lutzner 2023: 10.1016/j.arth.2022.07.014
Include/Excluded after FT screening	
Exclude: Cannot obtain full text	Mitchelson 2015: 10.1155/2015/137287
Exclude: No protocol registered	Matar 2021: 10.1302/2633-1462.210.BJO-2021-0098.R1
Exclude: No protocol registered	Peacock 2022: 10.1186/s42836-022-00144-5
Exclude: Not right population	Lutzner 2013: 10.1007/s00264-013-2010-6
Exclude: Not right population	Lutzner 2023: 10.1007/s00167-021-06836-w
Exclude: Not right population	Lutzner 2023: 10.1016/j.arth.2022.07.014

Query box

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		Query	Results
#9	••• >	Search: **#7 AND #3** Sort by: **Most Recent**	27
#8	••• >	Search: **#7 AND #2** Sort by: **Most Recent**	79
#7	••• >	Search: **(#4 AND #6) NOT #1** Sort by: **Most Recent**	772
#6	••• >	Search: **(hypoallergenic OR al...** Sort by: **Most Recent**	572,914
#5	••• >	Search: **(Osteoarthritis OR ar...** Sort by: **Most Recent**	416,632
#4	••• >	Search: **(Knee)** Sort by: **Most Recent**	206,142
#3	••• >	Search: **(systematic* AND re...** Sort by: **Most Recent**	529,244
#2	••• >	Search: **"randomized-control...** Sort by: **Most Recent**	990,586
#1	••• >	Search: **1 Animals[Title] OR C...** Sort by: **Most Recent**	8,459,760

Showing 1 to 9 of 9 entries

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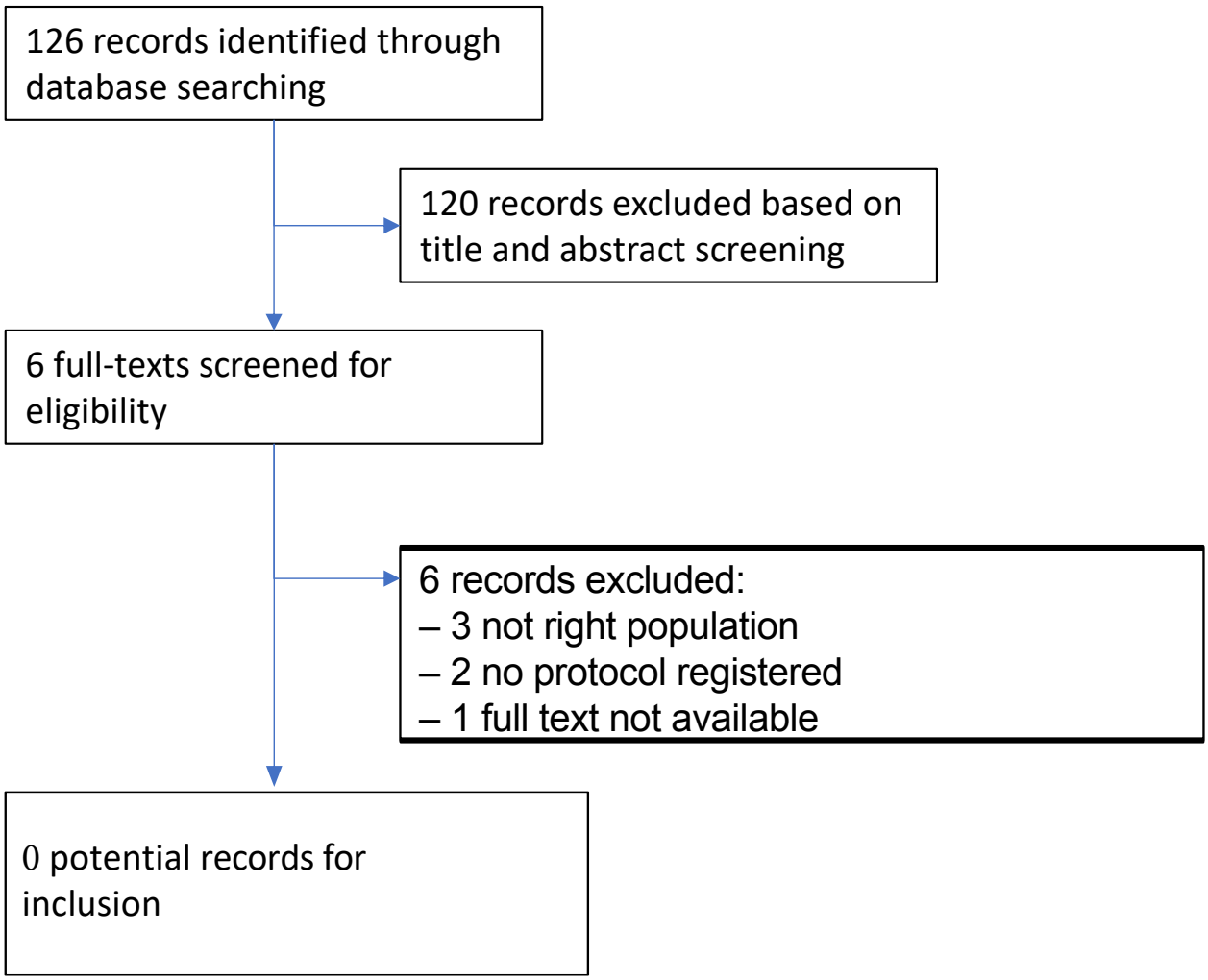
4. Studienselektion: Flowchart

PubMed Search: Should hypoallergenic implants be routinely used instead of steel or CoCr implants for knee arthroplasty in patients with metal allergies? (28/04/2023)



62. Statement	Geprüft 2024
Die verfügbare Evidenz belegt den Zusammenhang zwischen hoher Fallzahl pro Krankenhaus und besserem Ergebnis im Falle der primären Knieendoprothese.	
Level of Evidence (Oxford 2011) 3 3 1	 Kugler et al. 2022 (67) Lau et al. 2012 (68) Hoshijima et al. 2019 (69)
Konsensstärke	100% Konsens (16 FG)

1. Schlüsselfrage und PICO Format	
clinical key question	Is hospital volume and/or surgeon volume associated with better outcomes after TKA?
population	Adults with isolated medial or lateral: • symptomatic knee OA (clinically confirmed), and • K/L stage 2/3/4 (radiographically confirmed)
intervention	Knee arthroplasty
Comparison	• Surgical intervention o Corrective osteotomy (HTO, DFO, and DLO) o Total knee arthroplasty o Arthroscopic lavage and/or debridement • Conservative treatment (e.g. exercises) • Medical treatment (e.g. analgesics)
outcome	• Progression of OA (within same/other compartments) • Adverse events requiring readmission, reoperation, or arthroplasty • Clinical and functional scores (validated PROMS): o Pain o Physical function o Health related quality of life o Satisfaction

2. Recherche Zusammenfassung

Identifier	*ID Ordinal 20*
PICO(T) question	Is hospital volume and/or surgeon volume associated with better outcomes after TKA?
Search characteristics	
Date of search	28/04/23
Initials of primary reader	CA
Database(s)	*PubMed*
Keywords	*Knee* *osteoarthritis; arthritis; osteoarthros*; gonitis; gonarthritis; gonarthros** TKA; TKR; total knee arthroplasty; total knee replacement; hospital volume; surgeon volume
Search strings	*#1 Animals[Title] OR Cadaver[Title] OR animal*[Title] OR dog[Title] OR dogs[Title] OR canine[Title] OR cats[Title] OR feline[Title] OR horse*[Title] OR equine[Title] OR mouse[Title] OR mice[Title] OR rat[Title] OR rats[Title] OR rabbit*[Title] OR sheep[Title] OR porcine[Title] OR pig[Title] OR pigs[Title] OR rodent*[Title] OR monkey*[Title] OR cadaver*[Title/Abstract] OR "in vitro"[Title/Abstract] OR comment[Publication Type] OR editorial[Publication Type] OR letter[Publication Type] OR "historical article"[Publication Type] OR address[Publication Type] OR news[Publication Type] OR "newspaper article" [Publication Type] OR "case reports"[Publication Type] OR case report*[Title] OR abstracts[Title] OR editorial[Title] OR reply[Title] OR comment*[Title] OR commentary[Title] OR letter[Title] OR biomechanic*[Title]* *#2 "randomized-controlled-trial" OR "Randomized-Controlled-Trials" OR "random-allocation" OR random*[Title] OR RCT* *#3 (systematic* AND review*) OR meta-analys*[Title/Abstract] OR meta-analysis OR systematic-review* *#4 (Knee)* *#5 (Osteoarthritis OR arthritis OR osteoarthros* OR gonitis OR gonarthritis OR gonarthros*)*

	#6 (TKA OR TKR OR "total knee arthroplasty" OR "total knee replacement") AND ("hospital volume" OR "surgeon volume") #7 (#4 AND #6) NOT(#1) #8 (#7 AND #2) #9 (#7 AND #3)
Number of hits	
RCTs (#8)	3
SR(+MA) (#9)	8
Studies published before 2003	0
Articles to consider	
DOIs MAs	Hoshijima 2019: 10.1097/MD.0000000000017712 Rombey 2020: 10.1186/s13643-020-01295-9 Kugler 2022: 10.1007/s00167-021-06692-8
DOIs SRs	Lau 2012: 10.1186/1471-2474-13-250
DOIs RCTs	0
Include/Excluded after FT screening	
Included	Lau 2012: 10.1186/1471-2474-13-250
Includes a study on TKA	Hoshijima 2019: 10.1097/MD.0000000000017712
Exclude: protocol	Rombey 2020: 10.1186/s13643-020-01295-9
Included	Kugler 2022: 10.1007/s00167-021-06692-8

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		Query	Results
#8	••• >	Search: **#7 AND #2** Sort by: **Most Recent**	3
#9	••• >	Search: **(#7 AND #3)** Sort by: **Most Recent**	8
#7	••• >	Search: **(#4 AND #6) NOT #1** Sort by: **Most Recent**	93
#6	••• >	Search: **(TKA OR TKR OR "tot...** Sort by: **Most Recent**	96
#5	••• >	Search: **(Osteoarthritis OR ar...** Sort by: **Most Recent**	416,531
#4	••• >	Search: **Knee** Sort by: **Most Recent**	206,073
#3	••• >	Search: **(systematic* AND re...** Sort by: **Most Recent**	528,842
#2	••• >	Search: **"randomized-control...** Sort by: **Most Recent**	990,330
#1	••• >	Search: **Animals[Title] OR Ca...** Sort by: **Most Recent**	8,458,159
#0	••• >	Search: **Clipboard**	2

Showing 1 to 10 of 10 entries

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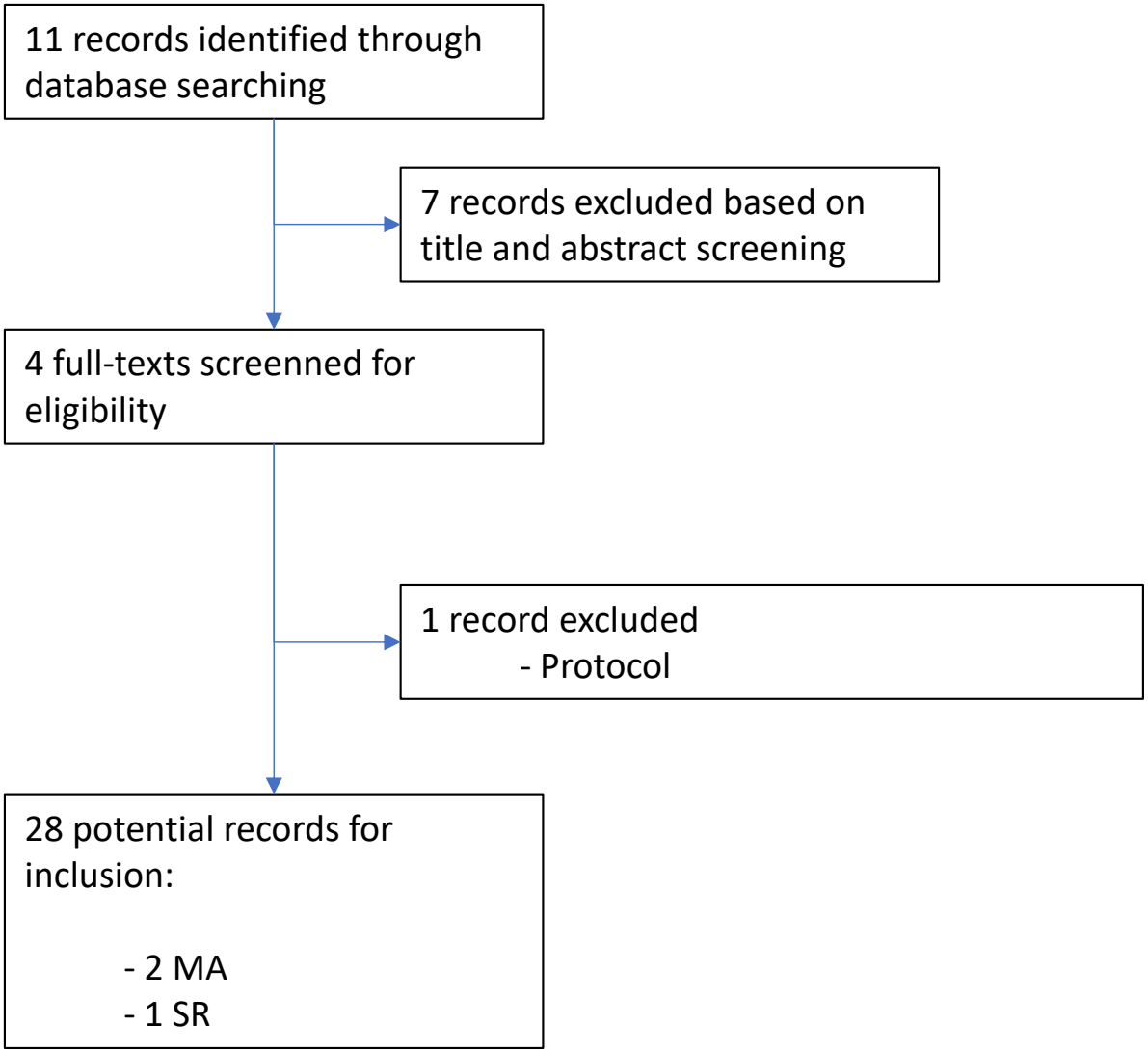
4. Studienselektion: Flowchart

PubMed Search: Is hospital volume and/or surgeon volume associated with better outcomes after TKA? (28/04/2023)



Included SRs and MAs

(1-3)

1. Hoshijima H, Wajima Z, Nagasaka H, Shiga T. Association of hospital and surgeon volume with mortality following major surgical procedures: Meta-analysis of meta-analyses of observational studies. Medicine (Baltimore). 2019;98(44):e17712. doi: 10.1097/md.0000000000017712
2. Kugler CM, Goossen K, Rombey T, De Santis KK, Mathes T, Breuing J, et al. Hospital volume-outcome relationship in total knee arthroplasty: a systematic review and dose-response meta-analysis. Knee Surg Sports Traumatol Arthrosc. 2022;30(8):2862-77. doi: 10.1007/s00167-021-06692-8
3. Lau RL, Perruccio AV, Gandhi R, Mahomed NN. The role of surgeon volume on patient outcome in total knee arthroplasty: a systematic review of the literature. BMC Musculoskelet Disord. 2012;13:250. doi: 10.1186/1471-2474-13-250

5. Charakteristika der eingeschlossenen Studien

PICO number:	20	20	20
PICO Question:	Is hospital volume and/or surgeon volume associated with better outcomes after TKA?	Is hospital volume and/or surgeon volume associated with better outcomes after TKA?	Is hospital volume and/or surgeon volume associated with be7er outcomes a8er TKA?
Article name:	Hospital volume-outcome relationship in total knee arthroplasty: a systematic review and dose-response meta-analysis	Association of hospital and surgeon volume with mortality following major surgical procedures. Meta-analysis of meta-analyses of observational studies	The role of surgeon volume on patient outcome in total knee arthroplasty: a systematic review of the literature
Lead author	Kugler	Hoshijima	Lau
Year published	2022	2019	2012
Number of included studies (if SR with or without MA)	68	20	
Description of intervention group (optional for SRs)	In 55 studies, the population was limited to primary TKA patients, 12 included primary and revision TKA patients, and one study did not specify the type of TKA. The study and patient characteristics of studies report- ing primary and main secondary outcomes are shown in Table 1, and the characteristics of all 68 included studies are shown in Supplementary Table 8.	MAs on TKA surgery	Patients undergoing primary TKA
Description of control group (optional for SRs)		Other surgeries	
Number of patients in intervention group	14713940	1240	286875
Number of patients in control group		4519480	

Mean age with range of intervention group	71 (22-101)	NA	NA
Mean age with range of control group		NA	
Inclusion criteria (on patient-level if clinical study; on article-level if SR) **Examples:** **Clinical study: "The inclusion criteria were (i) primary ACLR in (ii) patients aged over 50 years. The exclusion criteria were (iii) severe concomitant ligament injury (grade 3), (iv) tibiofemoral osteoarthritis visible on weight-bearing anteroposterior and/or sagittal radiographs (> 50% joint space narrowing), and (v) history of intra- or extra-articular ligament surgery in either knee."** **SR: "Studies comparing the diagnostic accuracy of physical examination (clinical tests or ultrasound) versus arthroscopy for the assessment of LHBT pathologies"**	Inclusion criteria: Primary studies 1.with the following PICO criteria: a)Population: Patients with primary and/or revision TKA b)Intervention/Control: TKA conducted at hospitals with at least two different hospital volumes (reported as volume categories or continuous values) c)Outcome: At least one patient-relevant outcome 2.that report results for TKA patients separately from other surgical procedures 3.published in peer-reviewed journals or conference abstracts or unpublished (registered trials) 4.with the following designs: (cluster-) RCTs and prospective or retrospective cohort studies 5.available as full-text Exclusion criteria: 1.Studies analysing data from one hospital only 2.Studies analysing only the	Our inclusion criteria were as follows: (1) the exposure is a high-volume hospital, and/or ,highvolume surgeon, (2) meta-analyses were conducted; (3) dichotomous outcome measures (from forest plots) were available or could be calculated from the original cohort studies; (4) effect sizes (e.g., odds ratio) with corresponding 95% CIs were available or could be derived from the original cohort studies; and (5) sample size restrictions were not applied.	To be included in the review, the study population had to include patients undergoing primary TKA. Eligible studies had to compare primary TKA outcomes between low volume surgeons and high volume surgeons. Primary TKA outcomes including perioperative mortality and morbidity, patient-reported outcomes, or TKA implant survivorship were examined.

	2.Studies analysing only the influence of surgeon volume but not hospital volume 3.Modelling studies 4.Additions to the protocol: a)Studies using volume categories from revision TKA instead of total TKA. This was done because the revision volumes were not comparable to overall hospital TKA volumes. b)Studies comparing less than two hospitals in the same country / healthcare system. This was done because differences in the healthcare systems may have a higher impact on outcomes than hospital volumes. c)Studies comparing hospital volume-outcome relationships within different time periods. This was done to avoid potential time-varying confounding.		
Follow-up period			NA

Main results	A higher hospital volume may be associated with a lower early revision rate (7 studies [5, 50, 54, 61, 65, 82, 83], narrative synthesis Table 2, low certainty evidence). Five studies with a high risk of bias, which accounted for 261,243 of 301,378 (87%) patients in total for this outcome [50, 54, 61, 65, 83], reported lower revision rates for higher volumes. In contrast, the only study with a moderate risk of bias [5] found that a higher hospital volume (> 125 TKAs/ year) was associated with a higher early revision rate. There was no evidence for a linear dose,Äìresponse relationship between hospital volume and revision rate within 1-5 years (OR = 0.96 per 50 TKAs/year increase, 95% CI [0.86-ì1.07]; 5 studies [5, 50, 51, 54, 73], I2 = 98%, very low certainty, Table 3). This finding was robust to sensitivity analyses (Supplementary Tables 13, 14, 16). The relationship between	For hospital volume and mortality associations, the summary random effects estimates were significant (P<.05) in 15 of 19 surgical procedures (79%), whereas the summary fixed effect estimates were significant in all surgical procedures (100%) (see Figs. 2 and 3). In 15 surgical procedures (84%), the effects of the largest study were significant. Regarding estimation of 95% prediction intervals, the null value was excluded in only 3 surgical procedures (repair of abdominal aortic aneurysm[32] [both elective and ruptured], and pancreaticoduodenectomy[30]). For surgeon volume and mortality associations, the summary random effects estimates were significant in 9 of 11 surgical procedures (82%), whereas the summary fixed effects estimates were significant in all surgical procedures (100%). The effects of the largest study were	None of the studies identified a statistically significant relationship between surgeon volume and MR. Among the 2 studies examining PE and/or DVT, neither reported a statistically significant association with surgeon volume. Three of the 5 studies found a statistically significant as- sociation (p < 0.05) between low surgeon volume and infection rates [8,26,30]. Wei et al found a higher in- hospital infection rate among low volume (LV) surgeons [0.99% (LV) vs. 0.54% high volume (HV) surgeon, adjusted OR: 2.31 (CI: 1.379 - 3.876)] [26] and Muilwijk et al found a lower infection rate 1 year post-TKA among HV surgeons [2.1% (HV) vs 4.9% (LV), adjusted OR: 0.43 (CI: 0.23-0.80)] [30].

	14, 15). The relationship between hospital volume and revision rate within 6-10 years was inconsistent (narrative synthesis, 5 studies [5, 9, 30, 81, 97], very low certainty). A higher hospital volume is likely associated with a lower mortality rate ≤ 3 months (OR = 0.91 per additional 50 TKAs/year, 95% CI [0.87-0.95]; 9 studies [45, 51, 52, 54, 60, 76, 83, 98, 104], I2 = 51%, moderate certainty, Table 3, Fig. 2a). The direction of this relationship was robust to sen- sitivity analyses (Supplementary Tables 13,16), although the pooled OR was no longer significant when the analysis included only data that were also adjusted for surgeon volume (Supplementary Table 15).	effects of the largest study were significant in 10 surgical procedures (91%). Regarding estimation of 95% prediction intervals, the null value was excluded in only three surgical procedures (repair of abdominal aortic aneurysm,[44] colorectal cancer,[25] and pancreaticoduodectomy[35]).	

Key findings (use Results and Conclusion in Abstract)	Results: A total of 68 cohort studies with data from 1985 to 2018 were included. The risk of bias for all outcomes ranged from moderate to critical. Higher hospital volume may be associated with a lower rate of early revision ≤12 months (narrative synthesis of k = 7 studies, n = 301,378 patients) and is likely associated with lower mortality ≤ 3 months (OR = 0.91 per additional 50 TKAs/year, 95% confidence interval [0.87-0.95], k = 9, n = 2,638,996, I2 = 51%) and readmissions ≤ 3 months (OR = 0.98 [0.97-0.99], k = 3, n = 830,381, I2 = 44%). Hospital volume may not be associated with the rates of deep infections within 1-4 years, late revision (1-10 years) or adverse events ≤ 3 months. The confidence in the cumulative evidence was moderate for mortality and readmission rates; low for early revision rates; and very low for deep infection, late revision and adverse event rates	Twenty meta-analyses including 4,520,720 patients were included, with 19 types of surgical procedures for hospital volume and 11 types of surgical procedures for surgeon volume. Nominally significant reductions were found in odds ratio in 82% to 84% of surgical procedures in both hospital and surgeon volume-mortality associations. To summarize the overall level of evidence, however, only one surgical procedure (pancreaticoduodenectomy) fulfilled the criteria of class I and II for both hospital and surgeon volume and mortality relationships, with a decrease in OR for hospital (0.42, 95% confidence interval[CI] [0.35-0.51]) and for surgeon (0.38, 95% CI [0.30-0.49]), respectively. In contrast, most of the procedures appeared to be weak or "nonsignificant" Only a very few surgical procedures such as pancreaticoduodenectomy appeared to have convincing	Results: Studies were variable in defining surgeon volume (low: <3 to <52 total knee arthroplasty per year; ,high: >5 to >70 total knee arthroplasty per year). Mortality rate, survivorship and thromboembolic events were not found to be associated with surgeon volume. We found a significant association between low surgeon volume and higher rate of infection (0.26% 2.8% higher), procedure time (165 min versus 135 min), longer length of stay (0.4 2.13 days longer), transfusion rate (13% versus 4%), and worse patient reported outcomes. Conclusions: Findings suggest a trend towards better outcomes for higher volume surgeons, but results must be interpreted with caution.

	event rates. Conclusion: An inverse volume-outcome relationship probably exists for some TKA outcomes, including mortality and readmissions, and may exist for early revisions. Small reductions in unfavourable outcomes may be clinically relevant at the population level, supporting centralisation of TKA to high-volume hospitals.	appeared to have convincing evidence on the inverse surgeon volume-mortality associations, and yet most surgical procedures resulted in having weak or "non-significant" evidence. Therefore, healthcare professionals and policy makers might be required to steer their centralization policy more carefully unless more robust, higher-quality evidence emerges, particularly for procedures considered as having a weak or non-significant evidence level including total knee replacement, thyroidectomy, bariatric surgery, radical cystectomy, and rectal and colorectal cancer resections.	
Type of Study	Systematic review with or without meta-analysis (AMSTARII)	Systematic review with or without meta-analysis (AMSTARII)	Systematic review with or without meta-analysis (AMSTARII)
Assessment tool	AMSTAR	AMSTAR	AMSTAR
Overall Assessment	Low (Quality assessment)	Moderate (Quality assessment)	Moderate (Quality assessment)
What is the lowest evidence study included in the SR?	Retrospective comparative study or case series, Level 3	RCT, Level 1	Retrospective comparative study or case series, Level 3
Level of evidence (Oxford 2011)	Level 3	Level 1	Level 3

64. Empfehlung	Modifiziert 2024
Empfehlungsgrad ⇑	Wir schlagen vor, die Implantation einer unikondylären Endoprothese von einer/einem erfahrenen Operateur/in durchführen zu lassen.
Level of Evidence (Oxford 2011) 5 5 4	 Mohammad et al. 2023 (71) Mohammad et al. 2022(72) Hamilton et al. 2017 (73)
Konsensstärke	100 % (starker Konsens)

1. Schlüsselfrage und PICO Format	
Clinical key question	Is hospital volume and/or surgeon volume associated with better outcomes after medial UKA?
Population	Adults with isolated medial or lateral: • symptomatic knee OA (clinically confirmed), and • K/L stage 2/3/4 (radiographically confirmed)
Intervention	Medial unicompartmental knee arthroplasty
Comparison	• Surgical intervention o Corrective osteotomy (HTO, DFO, and DLO) o Total knee arthroplasty o Arthroscopic lavage and/or debridement • Conservative treatment (e.g. exercises) • Medical treatment (e.g. analgesics)
Outcome	• Progression of OA (within same/other compartments) • Adverse events requiring readmission, reoperation, or arthroplasty • Clinical and functional scores (validated PROMS): o Pain o Physical function o Health related quality of life o Satisfaction

2. Recherche Zusammenfassung

Identifier	*ID Ordinal 21*
PICO(T) question	Is hospital volume and/or surgeon volume associated with better outcomes after medial UKA?
Search characteristics	
Date of search	02/05/23
Initials of primary reader	CA
Database(s)	*PubMed*
Keywords	*Knee* *osteoarthritis; arthritis; osteoarthros*; gonitis; gonarthritis; gonarthros** UKA; unilateral knee arthroplasty; unicompartental knee arthroplasty; medial knee arthroplasty; medial condyle replacement; hospital volume; surgeon volume
Search strings	*#1 Animals[Title] OR Cadaver[Title] OR animal*[Title] OR dog[Title] OR dogs[Title] OR canine[Title] OR cats[Title] OR feline[Title] OR horse*[Title] OR equine[Title] OR mouse[Title] OR mice[Title] OR rat[Title] OR rats[Title] OR rabbit*[Title] OR sheep[Title] OR porcine[Title] OR pig[Title] OR pigs[Title] OR rodent*[Title] OR monkey*[Title] OR cadaver*[Title/Abstract] OR "in vitro"[Title/Abstract] OR comment[Publication Type] OR editorial[Publication Type] OR letter[Publication Type] OR "historical article"[Publication Type] OR address[Publication Type] OR news[Publication Type] OR "newspaper article" [Publication Type] OR "case reports"[Publication Type] OR case report*[Title] OR abstracts[Title] OR editorial[Title] OR reply[Title] OR comment*[Title] OR commentary[Title] OR letter[Title] OR biomechanic*[Title]* *#2 "randomized-controlled-trial" OR "Randomized-Controlled-Trials" OR "random-allocation" OR random*[Title] OR RCT* *#3 (systematic* AND review*) OR meta-analys*[Title/Abstract] OR meta-analysis OR systematic-review* *#4 (Knee)*

	#5 (Osteoarthritis OR arthritis OR osteoarthros OR gonitis OR gonarthritis OR gonarthros*)* #6 (UKA OR "unilateral knee arthroplasty" OR "uni-lateral knee arthroplasty" OR "unicompartmental knee arthroplasty" OR "uni-compartmental knee arthroplasty" OR "medial knee arthroplasty " OR "medial knee replacement" OR "medial condyle replacement" OR "unicondylar knee replacement") AND ("hospital volume" OR "surgeon volume" OR caseload OR "surgical volume") #7 (#4 AND #6) NOT #1 #8 (#7 AND #2) #9 (#7 AND #3)
Number of hits	
RCTs (#8)	0
SR(+MA) (#9)	3
Studies published before 2003	0
Articles to consider	
DOIs MAs	Hamilton 2017: 10.1016/j.arth.2017.04.063 Klasan 2017: 10.1007/s00167-021-06437-7
DOIs SRs	
DOIs RCTs	
Include/Excluded after FT screening	
Included	Hamilton 2017: 10.1016/j.arth.2017.04.063
Excluded. Register study	Klasan 2017: 10.1007/s00167-021-06437-7
Included NRCS	Mohammad 2022: 10.2340/17453674.2022.2743
Included NRCS	Mohammad 2023: 10.1016/j.arth.2022.08.011

Query box

Enter / edit your search query here

Search

History and Search Details

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		Query	Results
#9	••• >	Search: **(#7 AND #3)** Sort by: **Most Recent**	3
#8	••• >	Search: **(#7 AND #2)** Sort by: **Most Recent**	0
#7	••• >	Search: **(#4 AND #6) NOT #1** Sort by: **Most Recent**	29
#6	••• >	Search: **(UKA OR "unilateral ...** Sort by: **Most Recent**	30
#5	••• >	Search: **(Osteoarthritis OR ar...** Sort by: **Most Recent**	416,531
#4	••• >	Search: **Knee** Sort by: **Most Recent**	206,073
#3	••• >	Search: **(systematic* AND re...** Sort by: **Most Recent**	528,842
#2	••• >	Search: **"randomized-control...** Sort by: **Most Recent**	990,330
#1	••• >	Search: **Animals[Title] OR Ca...** Sort by: **Most Recent**	8,458,159

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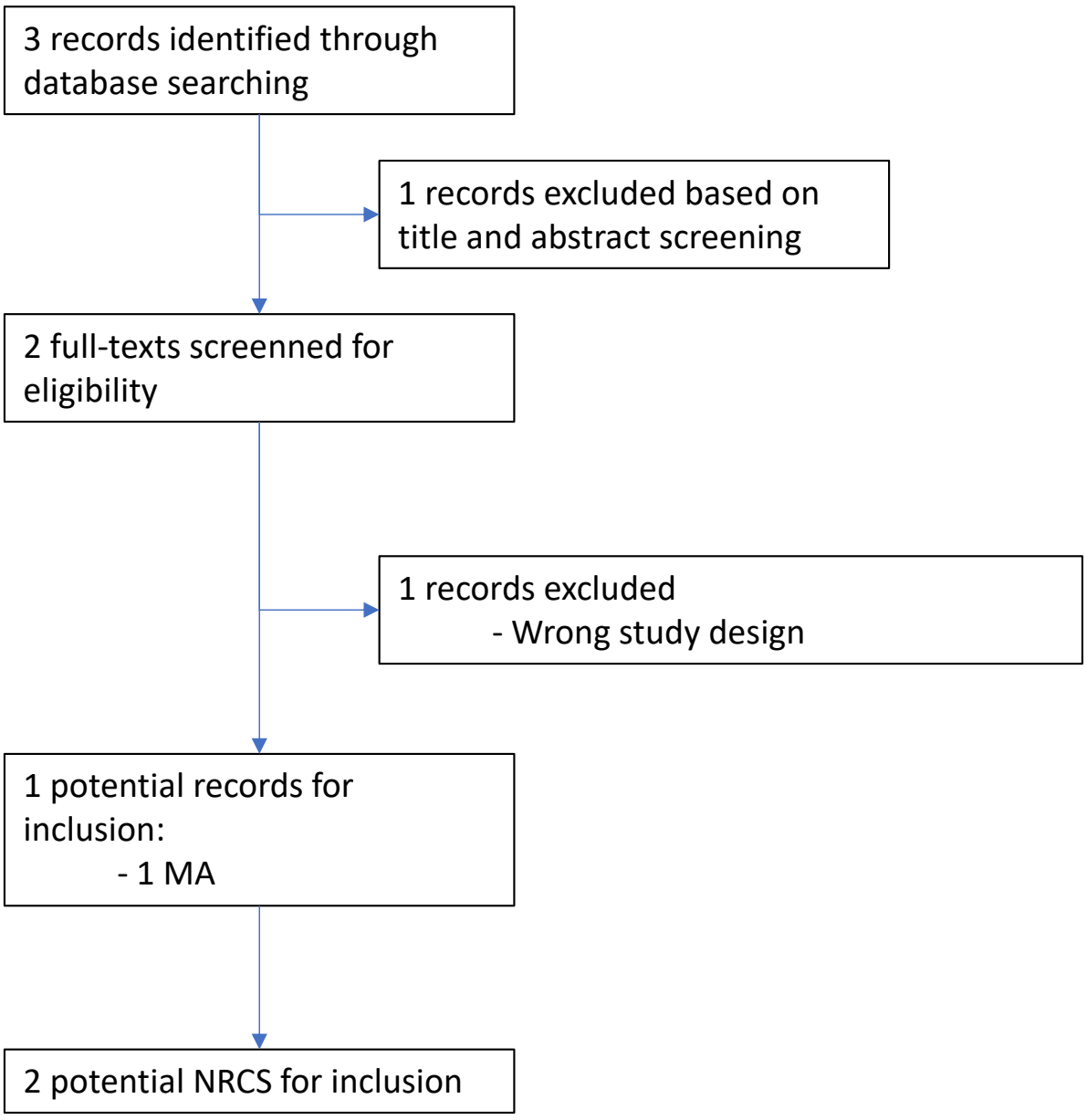
4. Studienselektion: Flowchart

PubMed Search: Is hospital volume and/or surgeon volume associated with better outcomes after medial UKA? (02/05/2023)



Included SRs and MAs

(1)

1. Hamilton TW, Rizkalla JM, Kontochristos L, Marks BE, Mellon SJ, Dodd CAF, et al. The Interaction of Caseload and Usage in Determining Outcomes of Unicompartmental Knee Arthroplasty: A Meta-Analysis. J Arthroplasty. 2017;32(10):3228-37.e2. doi: 10.1016/j.arth.2017.04.063

Included NRCS

(1, 2)

1. Mohammad HR, Judge A, Murray DW. A matched comparison of cementless unicompartmental and total knee replacement outcomes based on the National Joint Registry for England, Wales, Northern Ireland and the Isle of Man. Acta Orthop. 2022;93:478-87. doi: 10.2340/17453674.2022.2743
2. Mohammad HR, Judge A, Murray DW. The Influence of Surgeon Caseload and Usage on the Long-Term Outcomes of Mobile-Bearing Unicompartmental Knee Arthroplasty: An Analysis of Data From the National Joint Registry for England, Wales, Northern Ireland, and the Isle of Man. J Arthroplasty. 2023;38(2):245-51. doi: 10.1016/j.arth.2022.08.011

5. Charakteristika der eingeschlossenen Studien

PICO number:	21	21	21
PICO Question:	Is hospital volume and/or surgeon volume associated with better outcomes after medial UKA?	Is hospital volume and/or surgeon volume associated with better outcomes after medial UKA?	Is hospital volume and/or surgeon volume associated with better outcomes after medial UKA?

Article name:	A matched comparison of cementless unicompartmen- tal and total knee replacement outcomes based on the National Joint Registry for England, Wales, Northern Ireland and the Isle of Man	The Influence of Surgeon Caseload and Usage on the Long-Term Outcomes of Mobile-Bearing Unicompartmental Knee Arthroplasty: An Analysis of Data From the National Joint Registry for England, Wales, Northern Ireland, and the Isle of Man	The Interaction of Caseload and Usage in Determining Outcomes of Unicompartmental Knee Arthroplasty: A Meta-Analysis
Lead author	Mohammad	Mohammad	Hamilton
Year published	2022	2023	2017

Number of included studies (if SR with or without MA)	NA	NA	45
Description of intervention group (optional for SRs)	Cementless UKRs	Patients undergoing cemented or cementless medial UKAs	Studies reporting the outcomes of the cemented Phase 3 Oxford medial UKA implanted through a minimally invasive approach
Description of control group (optional for SRs)	Cementless TKRs		NA
Number of patients in intervention group	10552	34277	12,520 knees

Number of patients in control group	10552		NA
Mean age with range of intervention group	65.2 (9.5)	65 (31-97)	60.7 (57-77)
Mean age with range of control group	65.5 (9.3)		NA

Inclusion criteria (on patient-level if clinical study; on article-level if SR) **Examples:** **Clinical study: "The inclusion criteria were (i) primary ACLR in (ii) patients aged over 50 years. The exclusion criteria were (iii) severe concomitant ligament injury (grade 3), (iv) tibiofemoral osteoarthritis visible on weight-bearing anteroposterior and/or sagittal radiographs (> 50% joint space narrowing), and (v) history of intra- or extra-articular ligament surgery in either knee."** **SR: "Studies comparing the diagnostic accuracy of physical examination (clinical tests or ultrasound) versus arthroscopy for the assessment of LHBT pathologies"**	NJR records were linked to the Hospital Episodes Statistics Admitted Patient Records (HES-APC) and Patient Reported Outcome Measures (HES-PROMs) database. The NJR is the world,Äôs largest arthroplasty register (5). HES-APC is a database of all admission episodes for patients admitted to National Health Service (NHS) hospitals in England and contains information including comorbidities, medical complications, and reoperations (11). The HES-PROMs database was created from approximately 2009 onwards. All NHS-funded knee replacements have preoperative and 6-month postoperative PROMs recorded (12). These include the Oxford Knee Score (OKS) (13) and quality of life EuroQol 5 Domain index (EQ-5D) (14).	Between January 1, 2004 and December 31, 2018, 1,186,514 knee arthroplasties were recorded by the NJR. From these, 858,725 records were linked to HES-APC records. Oxford Phase 3 medial UKAs were identified. Analyses were restricted to patients older than 18 years. Bilateral and hybrid UKAs were excluded	Studies reporting the outcomes of the cemented Phase 3 Oxford medial UKA implanted through a minimally invasive approach between 1998, the year the Phase 3 was introduced, and March 17, 2016. Studies were excluded if they did not report the outcomes of a consecutive series of knees or did not present implant survival data. Registry studies were excluded due to the limitations in data reporting and obtaining volume and usage data for individual surgeons. There were no limits on language of publication, number of patients, duration of follow-up, or indication.
Follow-up period	8 years		1-11.5 years

Main results	In the cementless UKR and TKR groups there were 327 revisions and 210 revisions respectively. Overall, the rates of implant survival for cementless UKR and TKR at 10 years were 92% (CI 89-94) and 95% (CI 93-96), with HR of 1.5 (CI 1.3-1.8). Subgroup analyses of UKR caseloads low (n = 1,736), medium (n = 4,456), and high (n = 4,360) had 8-year implant survivals of 90% (CI 87-93), 93% (CI 91,Äì95), and 96% (CI 94-97) respectively. At 8 years TKR survival was 96% (CI 95-97) (Figure 2). The respective HRs for the different UKR caseload groups compared with their matched TKRs were 2.0 (CI 1.3-2.9), 2.0 (CI 1.6-2.7), and 1.0 (CI 0.8-1.3) (Table 2). There were no statistically significant differences between the TKR groups (p = 0.2). The rates of revision for osteoarthritis progression, dislocation/subluxation, component dissociation	The steepest decline in revision rates was from increasing caseloads to 10 UKAs/y. With increasing surgeon usage, revision rates fell for both cemented and cementless UKAs until usages of 50% were achieved (Fig. 3). The steepest decline in revision rates was from increasing usages up to 20%. The 10-year survival with revision as the end point was 87.7% (CI 87.1-88.2). For low-caseload surgeons, it was 83.6% (CI 82.7-84.6) and for high-caseload surgeons, it was 89.7% (CI 89.1-90.3). For low- usage surgeons, 10-year survival was 84.7% (CI 83.9-85.5) and for high-usage surgeons, it was 89.9% (CI 89.2-90.5). The 10-year survival was 83.2% (CI 82.1-84.2) for low-caseload/ low-usage surgeons, 87.3% (CI 86.0-88.5) for high-caseload/low-usage surgeons, 85.4% (CI 83.3-87.2) for low-caseload/high-usage surgeons, and 90.5% (CI 89.8%-91.1%) for high	No difference in mean age (P = .69), gender (P = .71), or body mass index (BMI; P= .38) was seen between groups based on caseload. The revision rate decreased as the caseload increased (P = .02; Fig. 2). The revision rate where surgeons performed <6 UKA/y was 1.87% pa (95% CI, 1.14-2.76), >6 but ≤12 UKA/y was 1.25% pa (95% CI, 0.77-1.83), >12 but under 24 UKA/y was 1.37% pa (95% CI, 0.93- 1.89), and >24 UKA/y was 0.88% pa (95% CI, 0.63-1.61). The revision rate for lateral compartment disease progression (P = .005), unexplained pain (P = .02), and aseptic loosening (P = .003) decreased as caseload increased. No difference in annual revision rate (P = .58) or absolute revision rate (P = .17) for bearing dislocation was detected (Table 3).

	component dissociation, malalignment, peri- prosthetic fracture, and other were statistically significantly higher following cementless UKR, but the rates of revision for infection and stiffness were statistically significantly lower. In the UKR group and TKR group there were 1,022 and 1,195 reoperations respectively. The 10-year reoperation survival was 77% (CI 73-81) for cementless UKR and 78% (CI 76-81) for TKR. The HR for reoperation was 0.8 (CI 0.7-0.9) and varied with time. From 0 to 5 years cementless UKR was superior, with an HR of 0.8 (CI 0.7-0.9). From 5 to 10 years there were no significant differences between groups with an HR of 1.1 (CI 0.8-ì1.6). Subgroup analyses of UKR caseloads low (n = 1,736), medium (n = 4,456), and high (n = 4,360) had 8-year reopera- tion survivals of 76% (CI 71-	and 90.5% (CI 89.8%-91.1%) for high-caseload/high- usage surgeons (Fig. 4). Compared to the low-caseload/low-usage surgeons, the revision rate was no different (HR 0.87, CI 0.75-1.01, P = .06) for low-caseload/high-usage surgeons, lower (HR 0.75, CI 0.67-0.84, P < .001) for high-caseload/low-usage surgeons, and much lower (HR 0.55, CI 0.50-0.60, P < .001) for high-caseload/high-usage surgeons.	

	80), 81% (CI 78-85), and 84% (CI 82-86) respectively (Figure 2). At 8 years, TKR survival was 81% (CI 80-83). The respective HRs for the different caseload groups compared with their matched TKR were 1.2 (CI 1.0-1.4), 0.9 (CI 0.8-1.0), and 0.6 (CI 0.5-0.7) (Table 2). No differences were found between the reoperation survival in the TKR groups (p = 0.4).		

Key findings (use Results and Conclusion in Abstract)	Results: 8-year cementless UKR revision survival for the 3 respective caseloads were 90% (95% CI 87-93), 93% (CI 91-95), and 96% (CI 94-97). 8-year reoperation survivals were 76% (CI 71-80), 81% (CI 78-85), and 84% (CI 82-86) respectively. For TKR the 8-year implant survivals for revision and reoperation were 96% (CI 95-97) and 81% (CI 80-83). The HRs for the 3 caseload groups compared with TKR for revision were 2.0 (CI 1.3-2.9), 2.0 (CI 1.6-2.7), and 1.0 (CI 0.8-1.3) and for reoperation were 1.2 (CI 1.0-1.4), 0.9 (CI 0.8-1.0), and 0.6 (CI 0.5-0.7). 6-month Oxford Knee Score (OKS) (39 vs. 37) and EQ-5D (0.80 vs. 0.77) were higher ($p < 0.001$) for the cementless UKR Interpretation : Cementless UKRs have higher revision and reoperation rates than TKR for low-volume UKR surgeons, similar reoperation but higher revision rates for midvolume surgeons, and lower reoperation and	Results: The 10-year survival of the low-caseload/low-usage cemented and cementless UKA was 82.8% (CI 81.6-83.9) and 86.2% (CI 72.1-93.4), respectively. The 10-year survival of the high-caseload/high-usage cemented and cementless UKA was 90.0% (CI 89.2-90.6) and 93.3% (CI 91.3-94.8), respectively. For cemented UKA, the high-caseload/high-usage group had lower revision rates (hazard ratio [HR] 0.57, CI 0.52-0.63, $P < .001$) compared to the low-caseload/low-usage group. The high-caseload/low-usage (HR 0.74, CI 0.66-0.83, $P < .001$) and the low-caseload/high-usage (HR 0.86, CI 0.74-0.99, $P = .04$) groups also had lower revision rates than the low-caseload/low-usage group. Conclusion: Mobile-bearing UKA revision rates improve with both increasing surgeon UKA caseload and usage. Surgeons using cemented UKA who have usage ,â•20% and caseload â•10/year had a 10-year survival of	Forty-six studies (12,520 knees) with an annual revision-rate ranging from 0% to 4.35% pa, mean 1.21% pa (95% confidence interval [CI], 0.97-1.47), were identified. In series with mean follow-up of 10-years, the revision-rate was 0.63% pa (95% CI, 0.46-0.83), equating to a 94% (95% CI, 92%-95%) 10-year survival. Aseptic loosening, lateral arthritis, bearing dislocation, and unexplained pain were the predominant failure mechanisms with revision for patellofemoral problems and polyethylene wear exceedingly rare. The lowest revision-rates were achieved with caseload >24 UKA/y (0.88% pa; 95% CI, 0.63-1.61) and usage >30% (0.69% pa; 95% CI, 0.50-0.90). Usage was more important than caseload; with high usage (!20%), the revision-rate was low, whether the caseload was high (>12 UKA/y) or low (12 UKA/y; (0.94% pa; 95% CI, 0.69-1.23 and 0.85% pa; 95% CI, 0.65-1.08), respectively); with low

	surgeons, and lower reoperation and similar revision rates for high-volume surgeons. Cementless UKR also had better PROMs.	,a 10/year had a 10-year survival of 90%. Higher survivorship was associated with higher caseload, higher usage, and cementless fixation.	CI, 0.03-1.03), respectively), with low usage (<20%), the revision-rate was high, whether the caseload was high or low (1.58% pa; 95% CI, 0.57-3.05 and 1.76% pa; 95% CI, 1.21-2.41, respectively). To achieve optimum results, surgeons, whether high or low caseload, should adhere to the recommended indications such that !20%, or ideally >30% of their knee arthroplasties are UKA. If they do this, then they can expect to achieve results similar to those of the long-term series, which all had high usage (>20%) and an average 10-year survival of 94%.
Type of Study	Retrospective non-randomised study (ROBINS I)	Retrospective non-randomised study (ROBINS I)	Systematic review with or without meta-analysis (AMSTARII)
Assessment tool	ROBINS I	ROBINS I	AMSTAR
Overall Assessment	High (Serious RoB)	High (Serious RoB)	Critically low (Quality assessment)

What is the lowest evidence study included in the SR?			Retrospective comparative study or case series, Level 3
Level of evidence (Oxford 2011)	Level 5, downgraded due to high risk of bias	Level 5, downgraded due to high risk of bias	Level 4, downgraded due to critically low AMSTAR

65. Empfehlung	Neu 2024
Empfehlungsgrad ⇑⇑	Übergewichtige Patient*innen mit Gonarthrose, welche sich der Implantation einer unikondylären Knieendoprothese unterziehen, haben ein erhöhtes Revisionsrisiko. Der Gewinn an Funktion und Lebensqualität ist jedoch mit nicht übergewichtigen Patient*innen vergleichbar. Wir empfehlen, übergewichtigen Patient*innen auf dieses erhöhte Risiko hinzuweisen und die Indikation bei BMI >40 kg/m^2 in Zusammenschau mit weiteren Risikofaktoren besonders kritisch zu prüfen. Ein generelles Vorenthalten einer unikondylären Knieendoprothese ist nicht gerechtfertigt.
Level of Evidence (Oxford 2011) 4 4 4	 Lua et al. 2022 Vasso et al. 2022 Ng et al. 2021
Konsensstärke	100 % (starker Konsens)

1. Schlüsselfrage und PICO Format	**(Medial UKA)**
clinical key question	In obese (BMI ≥ 30) adult patients with osteoarthritis undergoing medial UKA, are outcomes diminished and/or complications increased compared with non-obese patients (BMI < 30) undergoing medial UKA?
population	patients (> 18) Symptomatic knee oa X ray verified K/L stage 3/4 indication for partial or total knee arthroplasty
intervention	Medial UKA in patients with BMI>30
comparison	Medial UKA in patients with BMI<30
outcome	Primary outcomes (critical): • survival of implant • Serious adverse events • Pain (validated PROMS) • Physical function (validated PROMS) • Health related quality of life (validated PROMS)

2. Recherche Zusammenfassung

Identifier	*ID Ordinal 39*
PICO(T) question	In obese (BMI ≥ 30) adult patients with osteoarthritis undergoing medial UKA, are outcomes diminished and/or complications increased compared with non-obese patients (BMI < 30) undergoing medial UKA?
Search characteristics	
Date of search	02/05/23
Initials of primary reader	CA
Database(s)	*PubMed*
Keywords	*Knee* *osteoarthritis; arthritis; osteoarthros*; gonitis; gonarthritis; gonarthros** knee arthroplasty; knee replacement; obese; obesity; weight-loss; diet; bariatric; overweight
Search strings	*#1 Animals[Title] OR Cadaver[Title] OR animal*[Title] OR dog[Title] OR dogs[Title] OR canine[Title] OR cats[Title] OR feline[Title] OR horse*[Title] OR equine[Title] OR mouse[Title] OR mice[Title] OR rat[Title] OR rats[Title] OR rabbit*[Title] OR sheep[Title] OR porcine[Title] OR pig[Title] OR pigs[Title] OR rodent*[Title] OR monkey*[Title] OR cadaver*[Title/Abstract] OR "in vitro"[Title/Abstract] OR comment[Publication Type] OR editorial[Publication Type] OR letter[Publication Type] OR "historical article"[Publication Type] OR address[Publication Type] OR news[Publication Type] OR "newspaper article" [Publication Type] OR "case reports"[Publication Type] OR case report*[Title] OR abstracts[Title] OR editorial[Title] OR reply[Title] OR comment*[Title] OR commentary[Title] OR letter[Title] OR biomechanic*[Title]* *#2 "randomized-controlled-trial" OR "Randomized-Controlled-Trials" OR "random-allocation" OR random*[Title] OR RCT* *#3 (systematic* AND review*) OR meta-analys*[Title/Abstract] OR meta-analysis OR systematic-review* *#4 (Knee)*

	#5 (Osteoarthritis OR arthritis OR osteoarthros OR gonitis OR gonarthritis OR gonarthros*)* #6 ("knee arthroplasty" OR "knee replacement" OR KA) AND (obese OR obesity OR "weight loss" OR "weight-loss" OR diet OR bariatric OR overweight) #7 (#4 AND #6) NOT #1 #8 (#7 AND #2) #9 (#7 AND #3)
Number of hits	
RCTs (#8)	80
SR(+MA) (#9)	91
Studies published before 2003	6 RCTs
Articles to consider	
DOIs MAs	Lua 2022: 10.1016/j.jos.2022.09.011 Hui Ng 2021: 10.22038/ABJS.2021.57357.2842 Vasso 2022: 10.1007/s00167-021-06780-9 Campi 2021: 10.3390/jcm10163594 Agarwal 2021: 10.1038/s41366-020-00718-w Musbahi 2021: 10.1007/s00167-020-06297-7
DOIs SRs	
DOIs RCTs	
Include/Excluded after FT screening	
Included	Lua 2022: 10.1016/j.jos.2022.09.011
Included	Hui Ng 2021: 10.22038/ABJS.2021.57357.2842
Included	Vasso 2022: 10.1007/s00167-021-06780-9
Included	Campi 2021: 10.3390/jcm10163594
Included	Agarwal 2021: 10.1038/s41366-020-00718-w
Included	Musbahi 2021: 10.1007/s00167-020-06297-7

Query box

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		Query	Results
#9	••• >	Search: **#7 AND #3** Sort by: **Most Recent**	91
#8	••• >	Search: **#7 AND #2** Sort by: **Most Recent**	80
#7	••• >	Search: **(#4 AND #6) NOT #1** Sort by: **Most Recent**	1,392
#6	••• >	Search: **("knee arthroplasty" ...** Sort by: **Most Recent**	3,579
#5	••• >	Search: **(Osteoarthritis OR ar...** Sort by: **Most Recent**	416,531
#4	••• >	Search: **Knee** Sort by: **Most Recent**	206,073
#3	••• >	Search: **(systematic* AND re...** Sort by: **Most Recent**	528,842
#2	••• >	Search: **"randomized-control...** Sort by: **Most Recent**	990,330
#1	••• >	Search: **Animals[Title] OR Ca...** Sort by: **Most Recent**	8,458,159
#0	••• >	Search: **Clipboard**	2

Showing 1 to 10 of 10 entries

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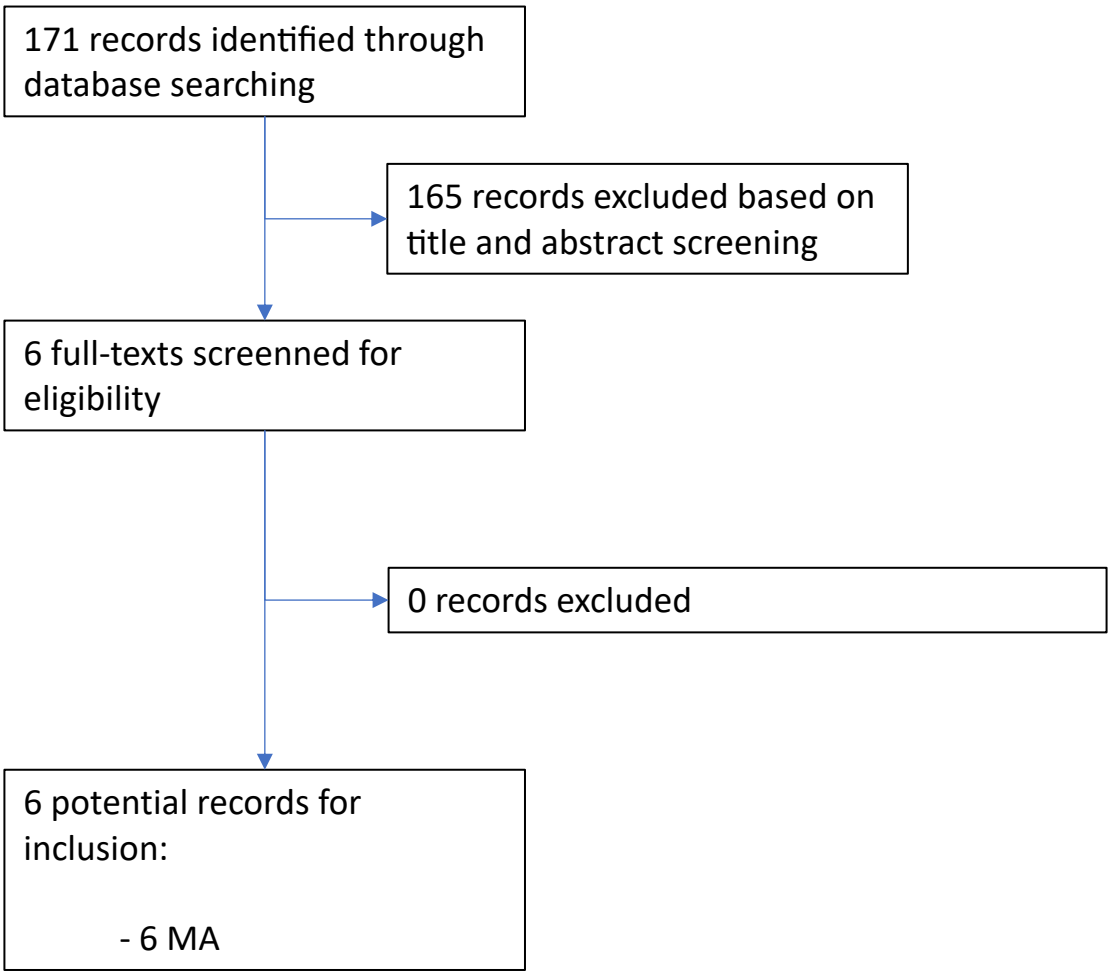
4. Studienselektion: Flowchart

PubMed Search: In obese (BMI ≥ 30) adult patients with osteoarthritis undergoing medial UKA, are outcomes diminished and/or complications increased compared with non-obese patients (BMI < 30) undergoing medial UKA? (02/05/2023)



Included SRs and MAs

(1-6)

1. Agarwal N, To K, Zhang B, Khan W. Obesity does not adversely impact the outcome of unicompartmental knee arthroplasty for osteoarthritis: a meta-analysis of 80,798 subjects. Int J Obes (Lond). 2021;45(4):715-24. doi: 10.1038/s41366-020-00718-w
2. Campi S, Papalia GF, Esposito C, Albo E, Cannata F, Zampogna B, et al. Unicompartmental Knee Replacement in Obese Patients: A Systematic Review and Meta-Analysis. J Clin Med. 2021;10(16). doi: 10.3390/jcm10163594
3. Lua J, Kripesh A, Kunnasegaran R. Is unicompartmental knee arthroplasty truly contraindicated in an obese patient? A meta-analysis. J Orthop Sci. 2022. doi: 10.1016/j.jos.2022.09.011
4. Musbahi O, Hamilton TW, Crellin AJ, Mellon SJ, Kendrick B, Murray DW. The effect of obesity on revision rate in unicompartmental knee arthroplasty: a systematic review and meta-analysis. Knee Surg Sports Traumatol Arthrosc. 2021;29(10):3467-77. doi: 10.1007/s00167-020-06297-7
5. Ng HJH, Loke WJ, James WLH. The Influence of Obesity on Unicompartmental Knee Arthroplasty Outcomes: A Systematic Review And Meta-Analysis. Arch Bone Jt Surg. 2021;9(6):618-32. doi: 10.22038/abjs.2021.57357.2842
6. Vasso M, Corona K, Gomberg B, Marullo M. Obesity increases the risk of conversion to total knee arthroplasty after unicompartimental knee arthroplasty: a meta-analysis. Knee Surg Sports Traumatol Arthrosc. 2022;30(12):3945-57. doi: 10.1007/s00167-021-06780-9

5. Charakteristika der eingeschlossenen Studien

PICO number:	39	39	39
PICO Question:	In obese (BMI ≥ 30) adult patients with osteoarthritis undergoing medial UKA, are outcomes diminished and/or complications increased compared with non-obese patients (BMI < 30) undergoing medial UKA?	In obese (BMI ≥ 30) adult patients with osteoarthritis undergoing medial UKA, are outcomes diminished and/or complications increased compared with non-obese patients (BMI < 30) undergoing medial UKA?	In obese (BMI ≥ 30) adult patients with osteoarthritis undergoing medial UKA, are outcomes diminished and/or complications increased compared with non-obese patients (BMI < 30) undergoing medial UKA?
Article name:	The Influence of Obesity on Unicompartmental Knee Arthroplasty Outcomes: A Systematic Review And Meta-Analysis	Obesity increases the risk of conversion to total knee arthroplasty after unicompartimental knee arthroplasty: a meta-analysis	Is unicompartmental knee arthroplasty truly contraindicated in an obese patient? A meta-analysis
Lead author	Ng	Vasso	Lua
Year published	2021	2022	2022
Number of included studies (if SR with or without MA)	12	17	25
Description of intervention group (optional for SRs)	obese patients (defined as BMI >30kg/m2	obese (BMI 30<35) and severely obese (BMI >35)	BMI > 35
Description of control group (optional for SRs)	non-obese population (BMI <30kg/m2	non obese (BMI<30)	BMI < 35
Number of patients in intervention group	9849	13,148 obese + 2998 severely obese	1163
Number of patients in control group	19609	27699	5758
Mean age with range of intervention group	56.5-80+	Obese: 56.2 ± 12.5 years, range, 33.1–68, Severely obese 58 ± 5.3 years, range, 45.8–65	NA
Mean age with range of control group	60-80+	61.5±12.4 (26.9-70.3)	

Inclusion criteria (on patient-level if clinical study; on article-level if SR) Examples: Clinical study: "The inclusion criteria were (i) primary ACLR in (ii) patients aged over 50 years. The exclusion criteria were (iii) severe concomitant ligament injury (grade 3), (iv) tibiofemoral osteoarthritis visible on weight-bearing anteroposterior and/or sagittal radiographs (> 50% joint space narrowing), and (v) history of intra- or extra-articular ligament surgery in either knee." SR: "Studies comparing the diagnostic accuracy of physical examination (clinical tests or ultrasound) versus arthroscopy for the assessment of LHBT pathologies"	Selection criteria The inclusion criteria were: Population: adult patients ≥ 18 years old; obese (BMI >30kg/m2) Intervention: UKA Comparison: non-obese (BMI <30kg/m2) Outcomes: Clinical outcomes: overall complications, all infections, revisions (all-cause, septic, and aseptic), aseptic loosening, bearing dislocations, venous thromboembolism (VTE), peri-prosthetic fractures, post-operative stiffness, persistent pain, readmissions, re-operations, mortality, overall implant survivorship, post-operative pain scores reported using the Visual Analogue Scale (VAS) Functional outcomes: Knee Society Score (KSS), Oxford Knee Scores (OKS), and range of movement (ROM). Study design: randomized controlled trials, quasi- randomized trials, and cohort studies The exclusion criteria was if studies were i) not in English; ii) did not directly compare obese and non- obese UKA outcomes of interest; iii) did not use clearly defined World Health Organization groupings.	Inclusion criteria were: (1) patients undergoing primary UKA; (2) WHO-defined subgroup stratification at the time of surgery (< 30 kg/m2 (non-obese), 30 to < 35 kg/ m2 (obese), and > 35 kg/m2 (severely obese)) [41, 42]; (3) outcomes of interest: clinical and functional scores, compli- cations, revision, and implant survival rates; and (4) study designed as retrospective (RE) or prospective (PRO) rand- omized controlled trial (RCT) [24]. Studies were excluded if they were: (1) case series in which outcomes were not reported according to BMI; (2) not published in English; (3) review articles; and (4) expert opinions.	Studies were included if they were English-language studies that involved adults undergoing a unicompartmental knee arthroplasty due for primary osteoarthritis, and were comparative studies that stratified patient groups based on BMI. Studies pub-lished between 2000 and 2020 were included. Implant survival as well as functional outcome comparisons between both groups were required for inclusion, as well as a minimum follow-up of 2 years. Systematic reviews were retrieved and their citations searched, however pooled data from the reviews were not included as they would lead to duplication of data. Exclusion criteria con- sisted of studies which included total knee replacements (TKRs), UKAs performed for indications other than OA, or not reporting outcomes based on BMI.
Follow-up period	30 days to 12.2 years	Non obese: 6.9 ± 3.8 years, range, 2–12; Obese: 6.3 ± 3.6 years, range, 2–11.4; Severely obese: 6 ± 3.5 years, range, 2–10	2 years min

Main results	Outcomes of interest - Clinical outcomes Overall complication rate Five articles reported overall complications(33,34,39– 41). This included all complications reported in the articles (major and minor complications). Obese patients had a statistically significant higher risk of complications (RR 2.12, 95% CI 1.17 to 3.85, p=0.01) [Figure 2]. Overall infection rate Eight studies reported infection rates (33–35,37–41), including three studies which did not differentiate between deep or superficial infection rates(37,38,41). Obese and non-obese patients had statistically similar risks of infection (RR 1.23, 95% CI 0.72 to 2.08, p=0.50) [Figure 3]. Revision outcomes Nine studies reported on all-cause revision rates(32– 39,41). Obese patients had a statistically higher risk of revisions (RR 1.49, 95% CI 1.04 to 2.13, p = 0.03) [Figure 4]. Kandil did not report on the different causes of revision, hence this study was excluded from further analysis(41). While obese patients had statistically similar risk of septic revisions (RR 0.97, 95% CI 0.25 to 3.80, p=0.97) [Figure 5], they had a higher risk of aseptic revisions (RR 1.36, 95% CI 1.01 to	Clinical and functional outcomes by BMI group Table 2 shows the post-operative outcomes and the survival rates in each of the studies examined. The data from six of the 17 studies (2476 patients) were used in the meta-analysis [23, 25, 32, 40, 43, 44]. Our analysis revealed no significant differences between the obese and the non- obese patient group for post-operative KSS pain score (MD – 1.19; 95% CI – 3.40 to 1.02; P = 0.29) [Fig. 2(a)] and KSS function score (MD -2.74; 95% CI – 5.65 to 0.16; P = 0.06) [Fig. 2(b)]. Analysis of the post-operative OKS scores reported in five studies [22, 23, 32, 43, 44] (2884 patients) disclosed a significant difference between the groups in favor of the non-obese group (MD – 2.06; 95% CI – 3.65 to – 0.46; P = 0.01) [Fig. 2(c)]. Only three [25, 32, 40] studies (311 patients) reported post-operative ROM scores and found no significant differences between the two patient groups (MD – 1.66; 95% CI – 3.95 to 0.63; P = 0.16) [Fig. 2(d)]. Analysis of three studies [23, 32, 43] (1525 patients) showed no significant differences in KSS pain scores between the severely obese and the non-obese group (MD – 7.50; 95% CI – 17.92 to 2.92; P = 0.16) [Fig. 3(a)], while KSS function scores were significantly higher for the non-obese than the severely obese	3.3. Obesity effects on revision rates A total of 19 articles analysed the significance of BMI >30 kg/m2 on UKA revision rates (Fig. 2). A total of 21,139 UKAs were analysed, with 11,462 performed on patients with BMI <30 kg/m2, and 9677 on patients with BMI>30 kg/m2. No significant differences in the revision rates were found between both groups, although there was a trend of increased likelihood of revision in patients with BMI >30 (OR 0.91 [0.79e1.05]). In analysis of patients with BMI higher and lower than 35, 12 articles were assessed (Fig. 3). A total of 6921 UKAs were per- formed, with 5758 on patients with BMI <35 kg/m2 and 1163 on patients >35 kg/m2. Again, no significant differences were found between both groups, although there was again a trend of increased likelihood of revision in patients with BMI >35 kg/m2 (OR 0.70 [0.48, 1.01]). Eight studies were assessed when comparing revision rates in patients with BMI higher and lower than 40 kg/m2 (Fig. 4). 1 article was excluded after assessing for publication bias. 32,360 UKAs were performed, with 30,085 on patients with BMI <40 kg/m2 and 2275 on patients >40 kg/m2. There was no significant difference between both groups, although the trend was to an increased likelihood of revision in patients with BMI >40 kg/m2 (OR

aseptic revisions (RR 1.36, 95% CI 1.01 to 1.82, p=0.04) [Figure 6].

Other complications

Five studies reported on rates of persistent pain (32,34,35,37,38) and aseptic loosening (33–35,37,38), three studies reported rates of VTE (34,40,41) and peri-prosthetic fracture (33,34,38), two studies reported rates of bearing dislocation (37,38), post-operative stiffness (34,41) and re- operation (33,40), while only one study reported on rates of readmission and mortality (40). Four studies reported on overall implant survivorship, summarized in [Appendix 4] (32,33,37,38). A combined Kaplan-Meier survival analysis was not performed due to the inability to extract raw data.

There was low heterogeneity for the other complications that occurred, which allowed pooling of the results. There were no significant differences between obese and non-
obese patients for risk of persistent pain, aseptic loosening, peri-prosthetic fractures, bearing dislocation, post- operative stiffness, re-operation, 30-day readmission, mortality and pain scores [Table 2; Appendix 5, Figures 1 – 7]. The lack of difference may be the result of the small number of events in these studies [Table 2].

for the non-obese than the severely obese group (MD – 9.51; 95% CI, – 14.50 to – 4.53; P = 0.0002) [Fig. 3(b)]. Analysis of post-operative OKS scores in four studies [22, 23, 32, 43] (2054 patients) showed no statistically significant difference between the two groups (MD – 2.08; 95% CI – 4.81 to 0.65; P = 0.13) [Fig. 3(c)].

Conversion to TKA and implant survival

Pooled data of the BMI groups showed significantly higher conversion to TKA for the obese (OR 1.34; 95% CI, 1.17–1.53; P < 0.0001) and the severely obese patient group (OR 1.68; 95% CI 1.36–2.08; P < 0.0001) than for the non- obese group [Figs. 4, 5]. Table 3 presents the main etiologies for conversion of UKA to TKA. Aseptic implant loosen- ing, persistent pain, infection, and progression of arthritis were the most likely indications for revision. One study reported implant survival rate stratified by BMI group (non- obese, obese, and severely obese) at a follow-up of 3 years (94.3%, 93.9%, and 97.2%, respectively) and 5 years (92.6%, 91.4%, and 95.5%, respectively) (Table 4) [2]. Seven studies reported implant survival rate at 10 years: 83.6–98.6% in non-obese, 82.5–95.3% in obese, and 87.5–93.8% in severely obese patients [2, 7, 22, 23, 34, 40,

revision in patients with BMI >40 kg/m2 (OR 0.66 [0.41, 1.07]).

3.4. Obesity effects on functional outcomes

Seven articles assessed Knee Society Score (KSS) knee score improvements after a UKA in patients with BMI higher and lower than 30 kg/m2 (Fig. 5). 2842 UKAs were assessed, with 2106 in patients with BMI <30 kg/m2 and 736 in patients >30 kg/m2. There was no significant difference between both groups, although there was a trend towards an improved knee society score post- operatively in patients with BMI >30 kg/m2 (OR 0.94 [0.32, 2.19]).

Similarly, for the 7 articles assessing improvements in KSS functional scores in patients with BMI higher and lower than 30 kg/m2, a total of 2020 UKAs were assessed (Fig. 6). 1467 were per- formed for patients with BMI <30 kg/m2, while 553 were per- formed for those with BMI >30 kg/m2. There was no significant different between both groups, although the trend was towards a bigger improvement in KSS functional scores in patients with BMI >30 kg/m2 (OR 2.34 [1.52, 6.20]).

Four articles assessed the effect of UKAs on improvements in Oxford Knee Scores (OKS) post-operatively in patients with BMI higher and lower than 30 kg/m2 (Fig. 7). A total of

	Obese patients had a significantly higher risk of venous thromboembolism, including deep venous thromboembolism and/or pulmonary embolism (RR 2.46, 95% CI 1.73 to 3.50, p<0.01) [Table 2; Appendix 5, Figure 8]. Functional outcomes For functional outcomes, the most common outcome measure used was the KSS and OKS scores. Range of movement was reported in three studies(33,39,43). Knee pain was reported using the VAS in three studies(32,39,43). Six studies reported KSS scores (33–35,38,39,43) and OKS scores(33,34,37–39,42). No significant difference was found for KSS clinical scores (MD -1.96, 95% CI -4.74 to 0.82, p=0.17) [Figure 7]. However, obese patients had statistically significant lower KSS function scores (MD -4.45, 95% CI - 7.93 to -0.97, p <0.01) [Figure 7], overall KSS scores (MD -3.21, 95% CI -5.52 to -0.89, p<0.01), OKS scores (MD -2.21, 95% CI -3.94 to -0.48, p=0.01) [Figure 8], and reduced ROM (MD -7.17, 95% CI -12.3 to -2.03, p<0.01) [Figure 9].	44].	2066 UKAs were performed, with 1447 on patients with BMI <30 kg/m2 and a further 619 on patients >30 kg/m2. There was a statistically significant increase in improvement of OKS scores in obese patients as compared to non-obese patients (OR 2.68 [1.79, 3.57]). Three studies analysed improvements in Visual Analogue Scale (VAS) pain scores in patients with BMI higher and lower than 30 kg/m2 after a UKA. 138 UKAs were performed, with 106 for patients with BMI <30 kg/m2, and a further 32 for patients with BMI >30 kg/m2 (Fig. 8). No significant difference in both groups was found (OR 0.15 [0.24, 0.53]).

Key findings (use Results and Conclusion in Abstract)	Twelve of 715 studies were eligible. Compared with non-obese patients, obese patients had a higher risk ratio for all- cause revision (RR 1.49; 95% CI 1.04 to 2.13; p = 0.03); aseptic revision (RR 1.36; 95% CI 1.01 to 1.81; p=0.04) and complications (RR 2.12; 95% CI 1.17 to 3.85; p=0.01). No significant differences were found in risk of septic revision and overall infection. Obese patients also had lower KSS scores (MD -3.21; 95% CI -5.52 to -0.89; p<0.01), OKS scores (MD -2.21; 95% CI -3.94 to -0.48; p=0.01), and ROM (MD -7.17; 95% CI -12.31 to -2.03; p<0.01). The average MINORS score was 14.2, indicating a moderate quality of evidence. In conclusion, the risk of revision, aseptic revision, and complications are higher in obese patients. The clinical significance of a lower functional score in obese may not be appreciable. Despite the greater risks, there is no conclusive evidence that obesity should be a contraindication to UKA. Further studies are required to corroborate the current conclusions with higher-quality study designs.	Results A total of 17 studies were included; 43,845 primary UKA patients were classified by their BMI: on-obese (BMI 25 to < 30 kg/m2); obese (BMI 30 to < 35 kg/m2); severely obese (BMI > 35 kg/m2). Pooled analysis showed no statistically significant difference in Knee Society Score (KSS) pain in the obese (n.s.) and the severely obese (n.s.) group compared to the non-obese group, while the KSS function score was lower in the severely obese (P = 0.0002) compared to the obese (P = 0.06) and the non-obese group. Postoperative Oxford Knee Score (OKS) was lower in the obese group (P = 0.01) but not in the severely obese group (P = 0.16). Postoperative Range of Motion (ROM) was comparable in the obese and non-obese group (P = 0.16). Implant survival at 10 years follow-up was significantly lower in the obese (82.5–95.3%; P < 0.0001) and the severely obese group (87.5–93.8%; P < 0.0001) thanthe non-obese group (83.6–98.6%). Conclusion Obesity and severe obesity were associated with significantly higher revision and lower implant survival rates. Obesity did not influence clinical and most functional outcomes after UKA, whereas KSS function score was significantly lower only for the severely obese patient group.	Results: Twenty-five articles reported revision rates or functional outcomes in 42,434 UKA surgeries. There was a trend to higher revision rates in patients with BMI > 30 kg/m2 (odds ratio [OR] 0.91 [0.79 e1.05]), BMI >35 kg/m2 (OR 0.70 [0.48, 1.01]) or BMI >40 kg/m2 (OR 0.66 [0.41, 1.07]), although the difference was not significant. There was a significant larger improvement in Oxford Knee Scores in obese patients after a UKA (OR 2.68 [1.79, 3.57], p < 0.00001), but no difference in Knee Society Scores or Visual Analogue Scale scores. Conclusion: With no significant increase in revision rates after a UKA, a significantly greater improve- ment in Oxford Knee Scores and no differences Knee Society Scores or Visual Analogue Scales, obesity should no longer be viewed as a relative contraindication when performing unicompartmental knee replacements.
AMSTAR Assessment	Critically low (Quality assessment)	Critically low (Quality assessment)	Critically low (Quality assessment)
Level of evidence (Oxford 2011)	Level 4, downgraded due to critically low AMSTAR	Level 4, downgraded due to critically low AMSTAR	Level 4, downgraded due to critically low AMSTAR

1. Schlüsselfrage und PICO Format	(Lateral UKA)
clinical key question	In obese (BMI ≥ 30) adult patients with osteoarthritis undergoing **lateral UKA**, are outcomes diminished and/or complications increased compared with non-obese patients (BMI < 30) undergoing lateral UKA?
population	patients (> 18) Symptomatic knee oa X ray verified K/L stage 3/4 indication for partial or total knee arthroplasty
intervention	Lateral UKA in patients with BMI>30
comparison	Lateral UKA in patients with BMI<30
outcome	Primary outcomes (critical): • survival of implant • Serious adverse events • Pain (validated PROMS) • Physical function (validated PROMS) • Health related quality of life (validated PROMS)

2. Recherche Zusammenfassung

Identifier	*ID Ordinal 40*
PICO(T) question	In obese (BMI ≥ 30) adult patients with osteoarthritis undergoing lateral UKA, are outcomes diminished and/or complications increased compared with non-obese patients (BMI < 30) undergoing lateral UKA?
Search characteristics	
Date of search	02/05/23
Initials of primary reader	CA
Database(s)	*PubMed*
Keywords	*Knee* *osteoarthritis; arthritis; osteoarthros*; gonitis; gonarthritis; gonarthros** knee arthroplasty; knee replacement; obese; obesity; weight-loss; diet; bariatric; overweight
Search strings	*#1 Animals[Title] OR Cadaver[Title] OR animal*[Title] OR dog[Title] OR dogs[Title] OR canine[Title] OR cats[Title] OR feline[Title] OR horse*[Title] OR equine[Title] OR mouse[Title] OR mice[Title] OR rat[Title] OR rats[Title] OR rabbit*[Title] OR sheep[Title] OR porcine[Title] OR pig[Title] OR pigs[Title] OR rodent*[Title] OR monkey*[Title] OR cadaver*[Title/Abstract] OR "in vitro"[Title/Abstract] OR comment[Publication Type] OR editorial[Publication Type] OR letter[Publication Type] OR "historical article"[Publication Type] OR address[Publication Type] OR news[Publication Type] OR "newspaper article" [Publication Type] OR "case reports"[Publication Type] OR case report*[Title] OR abstracts[Title] OR editorial[Title] OR reply[Title] OR comment*[Title] OR commentary[Title] OR letter[Title] OR biomechanic*[Title]* *#2 "randomized-controlled-trial" OR "Randomized-Controlled-Trials" OR "random-allocation" OR random*[Title] OR RCT* *#3 (systematic* AND review*) OR meta-analys*[Title/Abstract] OR meta-analysis OR systematic-review* *#4 (Knee)*

	#5 (Osteoarthritis OR arthritis OR osteoarthros OR gonitis OR gonarthritis OR gonarthros*)* #6 ("knee arthroplasty" OR "knee replacement" OR KA) AND (obese OR obesity OR "weight loss" OR "weight-loss" OR diet OR bariatric OR overweight) #7 (#4 AND #6) NOT #1 #8 (#7 AND #2) #9 (#7 AND #3)
Number of hits	
RCTs (#8)	80
SR(+MA) (#9)	91
Studies published before 2003	6 RCTs
Articles to consider	
DOIs MAs	Lua 2022: 10.1016/j.jos.2022.09.011 Hui Ng 2021: 10.22038/ABJS.2021.57357.2842 Vasso 2022: 10.1007/s00167-021-06780-9 Campi 2021: 10.3390/jcm10163594 Agarwal 2021: 10.1038/s41366-020-00718-w Musbahi 2021: 10.1007/s00167-020-06297-7
DOIs SRs	
DOIs RCTs	
Include/Excluded after FT screening	
Included	Lua 2022: 10.1016/j.jos.2022.09.011
Included	Hui Ng 2021: 10.22038/ABJS.2021.57357.2842
Included	Vasso 2022: 10.1007/s00167-021-06780-9
Included	Campi 2021: 10.3390/jcm10163594
Included	Agarwal 2021: 10.1038/s41366-020-00718-w
Included	Musbahi 2021: 10.1007/s00167-020-06297-7

Query box

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		Query	Results
#9	••• >	Search: **#7 AND #3** Sort by: **Most Recent**	91
#8	••• >	Search: **#7 AND #2** Sort by: **Most Recent**	80
#7	••• >	Search: **(#4 AND #6) NOT #1** Sort by: **Most Recent**	1,392
#6	••• >	Search: **("knee arthroplasty" ...** Sort by: **Most Recent**	3,579
#5	••• >	Search: **(Osteoarthritis OR ar...** Sort by: **Most Recent**	416,531
#4	••• >	Search: **Knee** Sort by: **Most Recent**	206,073
#3	••• >	Search: **(systematic* AND re...** Sort by: **Most Recent**	528,842
#2	••• >	Search: **"randomized-control...** Sort by: **Most Recent**	990,330
#1	••• >	Search: **Animals[Title] OR Ca...** Sort by: **Most Recent**	8,458,159
#0	••• >	Search: **Clipboard**	2

Showing 1 to 10 of 10 entries

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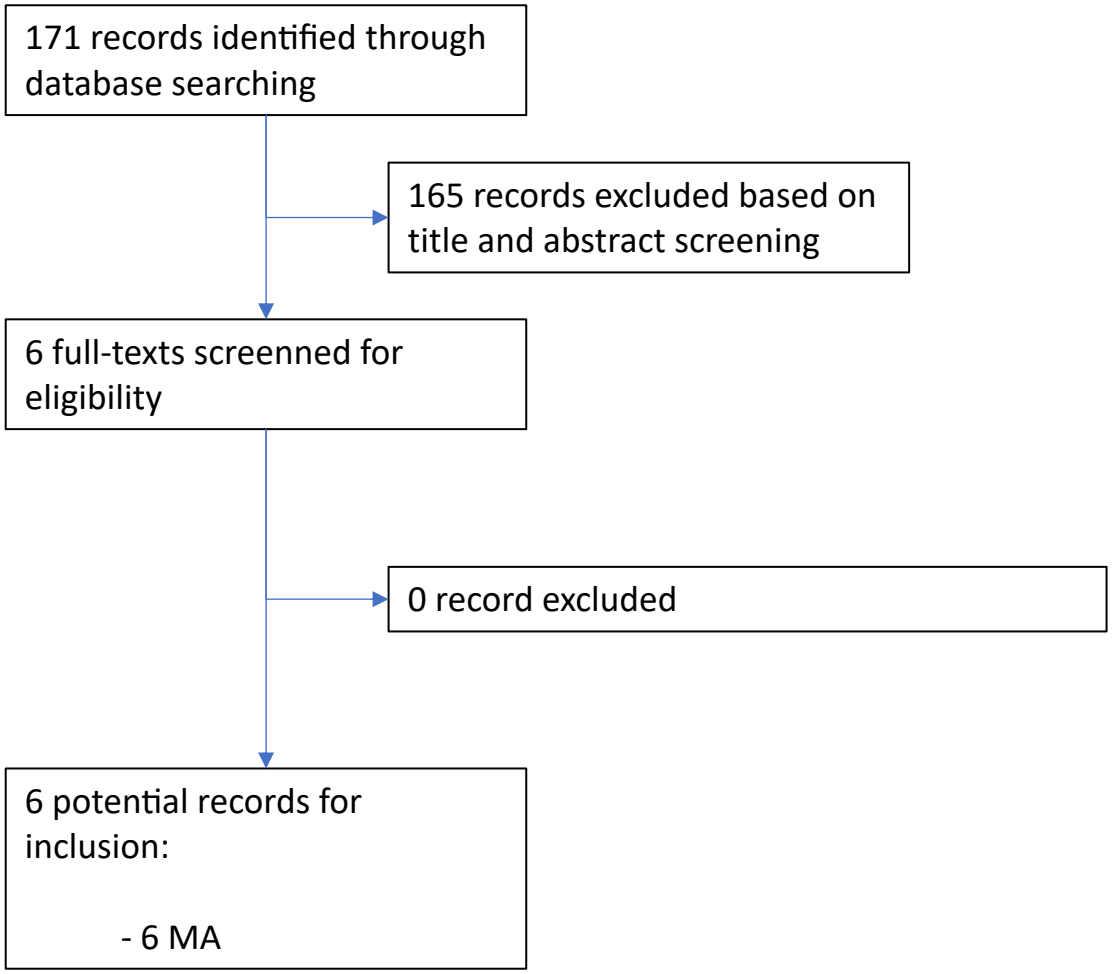
4. Studienselektion: Flowchart

PubMed Search: In obese (BMI ≥ 30) adult patients with osteoarthritis undergoing lateral UKA, are outcomes diminished and/or complications increased compared with non-obese patients (BMI < 30) undergoing lateral UKA? (02/05/2023)



Included SRs and MAs

(1-6)

1. Agarwal N, To K, Zhang B, Khan W. Obesity does not adversely impact the outcome of unicompartmental knee arthroplasty for osteoarthritis: a meta-analysis of 80,798 subjects. Int J Obes (Lond). 2021;45(4):715-24. doi: 10.1038/s41366-020-00718-w
2. Campi S, Papalia GF, Esposito C, Albo E, Cannata F, Zampogna B, et al. Unicompartmental Knee Replacement in Obese Patients: A Systematic Review and Meta-Analysis. J Clin Med. 2021;10(16). doi: 10.3390/jcm10163594
3. Lua J, Kripesh A, Kunnasegaran R. Is unicompartmental knee arthroplasty truly contraindicated in an obese patient? A meta-analysis. J Orthop Sci. 2022. doi: 10.1016/j.jos.2022.09.011
4. Musbahi O, Hamilton TW, Crellin AJ, Mellon SJ, Kendrick B, Murray DW. The effect of obesity on revision rate in unicompartmental knee arthroplasty: a systematic review and meta-analysis. Knee Surg Sports Traumatol Arthrosc. 2021;29(10):3467-77. doi: 10.1007/s00167-020-06297-7
5. Ng HJH, Loke WJ, James WLH. The Influence of Obesity on Unicompartmental Knee Arthroplasty Outcomes: A Systematic Review And Meta-Analysis. Arch Bone Jt Surg. 2021;9(6):618-32. doi: 10.22038/abjs.2021.57357.2842
6. Vasso M, Corona K, Gomberg B, Marullo M. Obesity increases the risk of conversion to total knee arthroplasty after unicompartimental knee arthroplasty: a meta-analysis. Knee Surg Sports Traumatol Arthrosc. 2022;30(12):3945-57. doi: 10.1007/s00167-021-06780-9

5. Charakteristika der eingeschlossenen Studien

PICO number:	40	40	40
PICO Question:	In obese (BMI ≥ 30) adult patients with osteoarthritis undergoing lateral UKA, are outcomes diminished and/or complications increased compared with non-obese patients (BMI < 30) undergoing lateral UKA?	In obese (BMI ≥ 30) adult patients with osteoarthritis undergoing lateral UKA, are outcomes diminished and/or complications increased compared with non-obese patients (BMI < 30) undergoing lateral UKA?	In obese (BMI ≥ 30) adult patients with osteoarthritis undergoing lateral UKA, are outcomes diminished and/or complications increased compared with non-obese patients (BMI < 30) undergoing lateral UKA?
Article name:	Is unicompartmental knee arthroplasty truly contraindicated in an obese patient? A meta-analysis	The Influence of Obesity on Unicompartmental Knee Arthroplasty Outcomes: A Systematic Review And Meta-Analysis	Obesity increases the risk of conversion to total knee arthroplasty after unicompartimental knee arthroplasty: a meta-analysis
Lead author	Jameson Lua	Hannah Jia Hui Ng	Michele Vasso
Year published	2022	2021	2021
Number of included studies (if SR with or without MA)	25	12	17
Description of intervention group (optional for SRs)			
Description of control group (optional for SRs)			
Number of patients in intervention group	42,434 UKA surgeries (number of patients not specified)	29484 patients	43,845 primary UKA patients
Number of patients in control group			
Mean age with range of intervention group	Not specified	64 years	10 studies reported the mean age at surgery (61.5 ± 12.4 years, range, 26.9–70.3);
Mean age with range of control group			

Inclusion criteria (on patient-level if clinical study; on article-level if SR) Examples: Clinical study: "The inclusion criteria were (i) primary ACLR in (ii) patients aged over 50 years. The exclusion criteria were (iii) severe concomitant ligament injury (grade 3), (iv) tibiofemoral osteoarthritis visible on weight-bearing anteroposterior and/or sagittal radiographs (> 50% joint space narrowing), and (v) history of intra- or extra-articular ligament surgery in either knee." SR: "Studies comparing the diagnostic accuracy of physical examination (clinical tests or ultrasound) versus arthroscopy for the assessment of LHBT pathologies"	Studies were included if they were English-language studies that involved adults undergoing a unicompartmental knee arthroplasty due for primary osteoarthritis, and were comparative studies that stratified patient groups based on BMI. Studies pub-lished between 2000 and 2020 were included. Implant survival as well as functional outcome comparisons between both groups were required for inclusion, as well as a minimum follow-up of 2 years. Systematic reviews were retrieved and their citations searched, however pooled data from the reviews were not included as they would lead to duplication of data. Exclusion criteria con- sisted of studies which included total knee replacements (TKRs), UKAs performed for indications other than OA, or not reporting outcomes based on BMI.	The inclusion criteria were: Population: adult patients ≥ 18 years old; obese (BMI >30kg/m2) Intervention: UKA Comparison: non-obese (BMI <30kg/m2) Outcomes: Clinical outcomes: overall complications, all infections, revisions (all-cause, septic, and aseptic), aseptic loosening, bearing dislocations, venous thromboembolism (VTE), peri-prosthetic fractures, post-operative stiffness, persistent pain, readmissions, re-operations, mortality, overall implant survivorship, post-operative pain scores reported using the Visual Analogue Scale (VAS) Functional outcomes: Knee Society Score (KSS), Oxford Knee Scores (OKS), and range of movement (ROM). Study design: randomized controlled trials, quasi-randomized trials, and cohort studies The exclusion criteria was if studies were i) not in English; ii) did not directly compare obese and non- obese UKA outcomes of interest; iii) did not use clearly defined World Health Organization groupings.	Inclusion criteria were: (1) patients undergoing primary UKA; (2) WHO-defined subgroup stratification at the time of surgery (< 30 kg/m2 (non-obese), 30 to < 35 kg/ m2 (obese), and > 35 kg/m2 (severely obese)) [41, 42]; (3) outcomes of interest: clinical and functional scores, compli- cations, revision, and implant survival rates; and (4) study designed as retrospective (RE) or prospective (PRO) rand- omized controlled trial (RCT) [24]. Studies were excluded if they were: (1) case series in which outcomes were not reported according to BMI; (2) not published in English; (3) review articles; and (4) expert opinions.
Follow-up period	Minimum follow-up of 2 years	minimum of 30 days to 12.2 years. Eleven studies had follow-up data of >1 year, where the remaining study reported on early 30-day complications(40)	

Main results	3.3. Obesity effects on revision rates A total of 19 articles analysed the significance of BMI >30 kg/m2 on UKA revision rates (Fig. 2). A total of 21,139 UKAs were analysed, with 11,462 performed on patients with BMI <30 kg/m2, and 9677 on patients with BMI>30 kg/m2. No significant differences in the revision rates were found between both groups, although there was a trend of increased likelihood of revision in patients with BMI >30 (OR 0.91 [0.79e1.05]). In analysis of patients with BMI higher and lower than 35, 12 articles were assessed (Fig. 3). A total of 6921 UKAs were per- formed, with 5758 on patients with BMI <35 kg/m2 and 1163 on patients >35 kg/m2. Again, no significant differences were found between both groups, although there was again a trend of increased likelihood of revision in patients with BMI >35 kg/m2 (OR 0.70 [0.48, 1.01]). Eight studies were assessed when comparing revision rates in patients with BMI higher and lower than 40 kg/m2 (Fig. 4). 1 article was excluded after assessing for publication bias. 32,360 UKAs were performed, with 30,085 on patients with BMI <40 kg/m2 and 2275 on patients >40 kg/m2. There was no significant difference between both groups, although the trend was to an increased likelihood of revision in patients with BMI >40 kg/m2 (OR	Overall complication rate Five articles reported overall complications(33,34,39– 41). This included all complications reported in the articles (major and minor complications). Obese patients had a statistically significant higher risk of complications (RR 2.12, 95% CI 1.17 to 3.85, p=0.01) [Figure 2]. Overall infection rate Eight studies reported infection rates (33–35,37–41), including three studies which did not differentiate between deep or superficial infection rates(37,38,41). Obese and non-obese patients had statistically similar risks of infection (RR 1.23, 95% CI 0.72 to 2.08, p=0.50) [Figure 3]. Revision outcomes Nine studies reported on all-cause revision rates(32– 39,41). Obese patients had a statistically higher risk of revisions (RR 1.49, 95% CI 1.04 to 2.13, p = 0.03) [Figure 4]. Kandil did not report on the different causes of revision, hence this study was excluded from further analysis(41). While obese patients had statistically similar risk of septic revisions (RR 0.97, 95% CI 0.25 to 3.80, p=0.97) [Figure 5], they had a higher risk of aseptic revisions (RR 1.36, 95% CI 1.01 to 1.82, p=0.04) [Figure 6]. Other complications	Clinical and functional outcomes by BMI group Table 2 shows the post-operative outcomes and the survival rates in each of the studies examined. The data from six of the 17 studies (2476 patients) were used in the meta-analysis [23, 25, 32, 40, 43, 44]. Our analysis revealed no significant differences between the obese and the non- obese patient group for post-operative KSS pain score (MD – 1.19; 95% CI – 3.40 to 1.02; P = 0.29) [Fig. 2(a)] and KSS function score (MD -2.74; 95% CI – 5.65 to 0.16; P = 0.06) [Fig. 2(b)]. Analysis of the post-operative OKS scores reported in five studies [22, 23, 32, 43, 44] (2884 patients) disclosed a significant difference between the groups in favor of the non-obese group (MD – 2.06; 95% CI – 3.65 to – 0.46; P = 0.01) [Fig. 2(c)]. Only three [25, 32, 40] studies (311 patients) reported post-operative ROM scores and found no significant differences between the two patient groups (MD – 1.66; 95% CI – 3.95 to 0.63; P = 0.16) [Fig. 2(d)]. Analysis of three studies [23, 32, 43] (1525 patients) showed no significant differences in KSS pain scores between the severely obese and the non-obese group (MD – 7.50; 95% CI – 17.92 to 2.92; P = 0.16) [Fig. 3(a)], while KSS function scores were significantly higher for the non-obese than the severely obese

revision in patients with BMI >40 kg/m2 (OR 0.66 [0.41, 1.07]).

3.4. Obesity effects on functional outcomes

Seven articles assessed Knee Society Score (KSS) knee score improvements after a UKA in patients with BMI higher and lower than 30 kg/m2 (Fig. 5). 2842 UKAs were assessed, with 2106 in patients with BMI <30 kg/m2 and 736 in patients >30 kg/m2. There was no significant difference between both groups, although there was a trend towards an improved knee society score post- operatively in patients with BMI >30 kg/m2 (OR 0.94 [0.32, 2.19]).

Similarly, for the 7 articles assessing improvements in KSS functional scores in patients with BMI higher and lower than 30 kg/m2, a total of 2020 UKAs were assessed (Fig. 6). 1467 were per- formed for patients with BMI <30 kg/m2, while 553 were per- formed for those with BMI >30 kg/m2. There was no significant different between both groups, although the trend was towards a bigger improvement in KSS functional scores in patients with BMI >30 kg/m2 (OR 2.34 [1.52, 6.20]).

Four articles assessed the effect of UKAs on improvements in Oxford Knee Scores (OKS) post-operatively in patients with BMI higher and lower than 30 kg/m2 (Fig. 7). A total of

Other complications

Five studies reported on rates of persistent pain (32,34,35,37,38) and aseptic loosening (33–35,37,38), three studies reported rates of VTE (34,40,41) and peri-prosthetic fracture (33,34,38), two studies reported rates of bearing dislocation (37,38), post-operative stiffness (34,41) and re- operation (33,40), while only one study reported on rates of readmission and mortality (40). Four studies reported on overall implant survivorship, summarized in [Appendix 4] (32,33,37,38). A combined Kaplan-Meier survival analysis was not performed due to the inability to extract raw data.

There was low heterogeneity for the other complications that occurred, which allowed pooling of the results. There were no significant differences between obese and non-obese patients for risk of persistent pain, aseptic loosening, peri-prosthetic fractures, bearing dislocation, post- operative stiffness, re-operation, 30-day readmission, mortality and pain scores [Table 2; Appendix 5, Figures 1 – 7]. The lack of difference may be the result of the small number of events in these studies [Table 2].

Obese patients had a significantly higher risk of venous thromboembolism, including deep venous thromboembolism and/or pulmonary

for the non-obese than the severely obese group (MD – 9.51; 95% CI, – 14.50 to – 4.53; P = 0.0002) [Fig. 3(b)]. Analysis of post-operative OKS scores in four studies [22, 23, 32, 43] (2054 patients) showed no statistically significant difference between the two groups (MD – 2.08; 95% CI – 4.81 to 0.65; P = 0.13) [Fig. 3(c)].

Conversion to TKA and implant survival

Pooled data of the BMI groups showed significantly higher conversion to TKA for the obese (OR 1.34; 95% CI, 1.17–1.53; P < 0.0001) and the severely obese patient group (OR 1.68; 95% CI 1.36–2.08; P < 0.0001) than for the non- obese group [Figs. 4, 5].

Table 3 presents the main etiologies for conversion of UKA to TKA. Aseptic implant loosen- ing, persistent pain, infection, and progression of arthritis were the most likely indications for revision. One study reported implant survival rate stratified by BMI group (non- obese, obese, and severely obese) at a follow-up of 3 years (94.3%, 93.9%, and 97.2%, respectively) and 5 years (92.6%, 91.4%, and 95.5%, respectively) (Table 4) [2]. Seven studies reported implant survival rate at 10 years: 83.6–98.6% in non-obese, 82.5–95.3% in obese, and 87.5–93.8% in severely obese patients [2, 7, 22, 23, 34, 40,

	2066 UKAs were performed, with 1447 on patients with BMI <30 kg/m2 and a further 619 on patients >30 kg/m2. There was a statistically significant increase in improvement of OKS scores in obese patients as compared to non-obese patients (OR 2.68 [1.79, 3.57]). Three studies analysed improvements in Visual Analogue Scale (VAS) pain scores in patients with BMI higher and lower than 30 kg/m2 after a UKA. 138 UKAs were performed, with 106 for patients with BMI <30 kg/m2, and a further 32 for patients with BMI >30 kg/m2 (Fig. 8). No significant difference in both groups was found (OR 0.15 [0.24, 0.53]).	embolism (RR 2.46, 95% CI 1.73 to 3.50, p<0.01) [Table 2; Appendix 5, Figure 8]. Functional outcomes For functional outcomes, the most common outcome measure used was the KSS and OKS scores. Range of movement was reported in three studies(33,39,43). Knee pain was reported using the VAS in three studies(32,39,43). Six studies reported KSS scores (33–35,38,39,43) and OKS scores(33,34,37–39,42). No significant difference was found for KSS clinical scores (MD -1.96, 95% CI -4.74 to 0.82, p=0.17) [Figure 7]. However, obese patients had statistically significant lower KSS function scores (MD -4.45, 95% CI - 7.93 to -0.97, p <0.01) [Figure 7], overall KSS scores (MD -3.21, 95% CI -5.52 to -0.89, p<0.01), OKS scores (MD -2.21, 95% CI -3.94 to -0.48, p=0.01) [Figure 8], and reduced ROM (MD -7.17, 95% CI -12.3 to -2.03, p<0.01) [Figure 9].	44].

Key findings (use Results and Conclusion in Abstract)	Results: Twenty-five articles reported revision rates or functional outcomes in 42,434 UKA surgeries. There was a trend to higher revision rates in patients with BMI > 30 kg/m2 (odds ratio [OR] 0.91 [0.79 e1.05]), BMI >35 kg/m2 (OR 0.70 [0.48, 1.01]) or BMI >40 kg/m2 (OR 0.66 [0.41, 1.07]), although the difference was not significant. There was a significant larger improvement in Oxford Knee Scores in obese patients after a UKA (OR 2.68 [1.79, 3.57], p < 0.00001), but no difference in Knee Society Scores or Visual Analogue Scale scores. Conclusion: With no significant increase in revision rates after a UKA, a significantly greater improve- ment in Oxford Knee Scores and no differences Knee Society Scores or Visual Analogue Scales, obesity should no longer be viewed as a relative contraindication when performing unicompartmental knee replacements.	Twelve of 715 studies were eligible. Compared with non-obese patients, obese patients had a higher risk ratio for all- cause revision (RR 1.49; 95% CI 1.04 to 2.13; p = 0.03); aseptic revision (RR 1.36; 95% CI 1.01 to 1.81; p=0.04) and complications (RR 2.12; 95% CI 1.17 to 3.85; p=0.01). No significant differences were found in risk of septic revision and overall infection. Obese patients also had lower KSS scores (MD -3.21; 95% CI -5.52 to -0.89; p<0.01), OKS scores (MD -2.21; 95% CI -3.94 to -0.48; p=0.01), and ROM (MD -7.17; 95% CI -12.31 to -2.03; p<0.01). The average MINORS score was 14.2, indicating a moderate quality of evidence. In conclusion, the risk of revision, aseptic revision, and complications are higher in obese patients. The clinical significance of a lower functional score in obese may not be appreciable. Despite the greater risks, there is no conclusive evidence that obesity should be a contraindication to UKA. Further studies are required to corroborate the current conclusions with higher-quality study designs.	Results A total of 17 studies were included; 43,845 primary UKA patients were classified by their BMI: on-obese (BMI 25 to < 30 kg/m2); obese (BMI 30 to < 35 kg/m2); severely obese (BMI > 35 kg/m2). Pooled analysis showed no statistically significant difference in Knee Society Score (KSS) pain in the obese (n.s.) and the severely obese (n.s.) group compared to the non-obese group, while the KSS function score was lower in the severely obese (P = 0.0002) compared to the obese (P = 0.06) and the non-obese group. Postoperative Oxford Knee Score (OKS) was lower in the obese group (P = 0.01) but not in the severely obese group (P = 0.16). Postoperative Range of Motion (ROM) was comparable in the obese and non-obese group (P = 0.16). Implant survival at 10 years follow-up was significantly lower in the obese (82.5–95.3%; P < 0.0001) and the severely obese group (87.5–93.8%; P < 0.0001) thanthe non-obese group (83.6–98.6%). Conclusion Obesity and severe obesity were associated with significantly higher revision and lower implant survival rates. Obesity did not influence clinical and most functional outcomes after UKA, whereas KSS function score was significantly lower only for the severely obese patient group.
AMSTAR Assessment	Critically low (Quality assessment)	Low (Quality assessment)	Critically low (Quality assessment)
Level of Evidence (Oxford 2011)	Level 3, downgraded due to critically low AMSTAR	Level 2	Level 4, downgraded due to critically low AMSTAR

66. Empfehlung	Modifiziert 2024
Empfehlungsgrad ⇑⇑	Bei Patient*innen mit klinisch und radiologisch bestätigter isolierter hochgradiger medialer Gonarthrose empfehlen wir die Implantation einer medialen Schlittenprothese.
Level of Evidence (Oxford 2011) 2 4 2	 Bin et al. 2023 (77) Huang et al. 2022 (78) Ping et al. 2022 (79)
Konsensstärke	100 % (starker Konsens)

1. Schlüsselfrage und PICO Format	
clinical key question	Does medial UKA reduce pain and improve function in knees with clinically and radiographically confirmed isolated medial OA, compared to other surgical treatments?
population	Adults with isolated medial or lateral: • symptomatic knee OA (clinically confirmed), and • K/L stage 2/3/4 (radiographically confirmed)
intervention	Unicompartmental knee arthroplasty

Comparison	• Surgical intervention
	  ○ Corrective osteotomy (HTO, DFO, and DLO)
	  ○ Total knee arthroplasty
	  ○ Arthroscopic lavage and/or debridement
	• Conservative treatment (e.g. exercises)
	• Medical treatment (e.g. analgesics)

outcome	• Progression of OA (within same/other compartments)
	• Adverse events requiring readmission, reoperation, or arthroplasty
	• Clinical and functional scores (validated PROMS):
	  ○ Pain
	  ○ Physical function
	  ○ Health related quality of life
	  ○ Satisfaction

2. Recherche Zusammenfassung

Identifier	*ID Ordinal 16*
PICO(T) question	Does medial UKA reduce pain and improve function in knees with clinically and radiographically confirmed isolated medial OA, compared to other surgical treatments?
Search characteristics	
Date of search	26/04/2023
Initials of primary reader	JHM
Database(s)	*PubMed*
Keywords	*Knee* *osteoarthritis; arthritis; osteoarthros*; gonitis; gonarthritis; gonarthros** UKA
Search strings	*#1 Animals[Title] OR Cadaver[Title] OR animal*[Title] OR dog[Title] OR dogs[Title] OR canine[Title] OR cats[Title] OR feline[Title] OR horse*[Title] OR equine[Title] OR mouse[Title] OR mice[Title] OR rat[Title] OR rats[Title] OR rabbit*[Title] OR sheep[Title] OR porcine[Title] OR pig[Title] OR pigs[Title] OR rodent*[Title] OR monkey*[Title] OR cadaver*[Title/Abstract] OR "in vitro"[Title/Abstract] OR comment[Publication Type] OR editorial[Publication Type] OR letter[Publication Type] OR "historical article"[Publication Type] OR address[Publication Type] OR news[Publication Type] OR "newspaper article" [Publication Type] OR "case reports"[Publication Type] OR case report*[Title] OR abstracts[Title] OR editorial[Title] OR reply[Title] OR comment*[Title] OR commentary[Title] OR letter[Title] OR biomechanic*[Title]* *#2 "randomized-controlled-trial" OR "Randomized-Controlled-Trials" OR "random-allocation" OR random*[Title] OR RCT* *#3 (systematic* AND review*) OR meta-analys*[Title/Abstract] OR meta-analysis OR systematic-review* *#4 (Knee)*

	~~*#5 (Osteoarthritis OR arthritis OR osteoarthros* OR gonitis OR gonarthritis OR gonarthros*)*~~ #6 UKA OR "unilateral knee arthroplasty" OR "uni-lateral knee arthroplasty" OR "unicompartmental knee arthroplasty" OR "uni-compartmental knee arthroplasty" OR "medial knee arthroplasty " OR "medial knee replacement" OR "medial condyle replacement" OR "unicondylar knee replacement" #7 (#4 AND ~~#5 AND~~ #6) NOT(#1) #8 (#7 AND #2) #9 (#7 AND #3)
Number of hits	
RCTs (#8)	349
SR(+MA) (#9)	288
Studies published before 2003	349-329 + 288-286 = 22
Articles to consider	
DOIs MAs	10.1016/j.knee.2020.09.004 10.1007/s00590-015-1610-9 10.1016/j.knee.2021.04.005 10.1186/s12891-023-06403-z 10.1016/j.arth.2017.10.025 10.1016/j.arth.2016.08.019 10.1016/j.knee.2016.11.006 10.1055/s-0038-1677506 10.1007/s00402-021-03790-7 10.1016/s0140-6736(18)32531-5 10.1016/j.arth.2013.02.010 10.1097/md.0000000000009268 10.1016/j.jisako.2021.12.002 10.1016/j.arth.2019.02.061 10.1097/md.0000000000029576 10.1097/md.0000000000010828 10.1007/s00590-018-2358-9 10.1186/s13018-022-03319-7 10.1186/s13018-017-0552-9 10.1007/s43465-022-00620-9 PMCID: PMC6383371 10.1007/s40279-015-0421-9 10.1097/cm9.0000000000002099 10.1177/10225536231162829

DOIs SRs	10.1177/0363546520948861 10.1111/j.1445-2197.2007.04021.x 10.1007/s00402-020-03336-3 10.1007/s00167-017-4817-y 10.1007/s00167-022-07029-9 10.1093/bmb/ldv009 PMCID: PMC5100444 10.2174/1874325001206010268 10.1007/s00402-021-03827-x 10.1016/j.arth.2015.11.030 10.1111/ans.18244
DOIs RCTs	10.1016/s0140-6736(19)31281-4 10.3310/hta24200 10.1055/s-0031-1280970 10.1136/bmjopen-2020-046731 10.1016/j.arth.2016.12.014 10.2106/jbjs.21.00950 10.1016/j.arth.2022.02.076 10.1111/os.13111
Include/Excluded after FT screening	
10.1016/j.knee.2020.09.004	Not a relevant comparator.
10.1007/s00590-015-1610-9	Relevant
10.1016/j.knee.2021.04.005	Not a relevant comparator.
10.1186/s12891-023-06403-z	Relevant
10.1016/j.arth.2017.10.025	Relevant
10.1016/j.arth.2016.08.019	Relevant
10.1016/j.knee.2016.11.006	Relevant
10.1055/s-0038-1677506	Not a relevant comparator
10.1007/s00402-021-03790-7	Relevant
10.1016/s0140-6736(18)32531-5	Relevant
10.1016/j.arth.2013.02.010	Relevant
10.1097/md.0000000000009268	Relevant
10.1016/j.jisako.2021.12.002	Relevant
10.1016/j.arth.2019.02.061	Relevant
10.1097/md.0000000000029576	Relevant
10.1097/md.0000000000010828	Relevant
10.1007/s00590-018-2358-9	Relevant
10.1186/s13018-022-03319-7	Relevant
10.1186/s13018-017-0552-9	Relevant
10.1007/s43465-022-00620-9	Relevant
PMCID: PMC6383371	Relevant
10.1007/s40279-015-0421-9	Interesting
10.1097/cm9.0000000000002099	Not a relevant comparator
10.1177/10225536231162829	Relevant

10.1177/0363546520948861	Relevant
10.1111/j.1445-2197.2007.04021.x	Relevant
10.1007/s00402-020-03336-3	Interesting
10.1007/s00167-017-4817-y	Relevant
10.1007/s00167-022-07029-9	Interesting
10.1093/bmb/ldv009	Relevant
PMCID: PMC5100444	Not systematic
10.2174/1874325001206010268	Interesting
10.1007/s00402-021-03827-x	Interesting
10.1016/j.arth.2015.11.030	Interesting
10.1111/ans.18244	Not relevant. Lateral UKA
10.1016/s0140-6736(19)31281-4	Relevant
10.3310/hta24200	Relevant
10.1055/s-0031-1280970	Relevant
10.1136/bmjopen-2020-046731	Relevant
10.1016/j.arth.2016.12.014	Relevant
10.2106/jbjs.21.00950	Not retrieved
10.1016/j.arth.2022.02.076	Relevant
10.1111/os.13111	Relevant

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PubMed Advanced Search Builder

Add terms to the query box

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Query box

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Add to History

Quoted phrases not found in phrase index: "uni-lateral knee arthroplasty", "medial knee arthroplasty", "medial condyle replacement"

History and Search Details

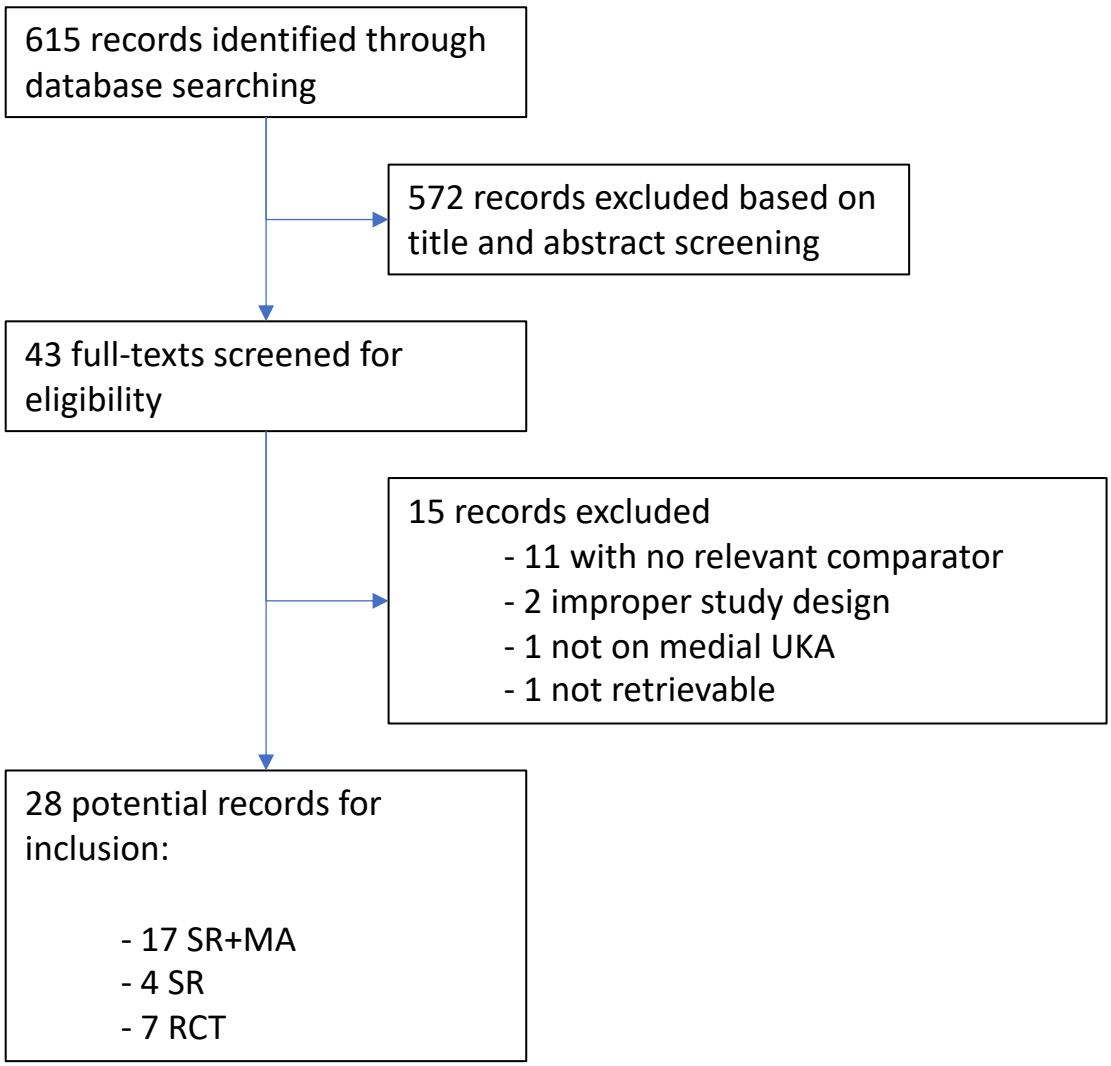
Search	Actions	Details	Query	Results	Time
#9	•••		Search: **#7 AND #3** Sort by: **Most Recent**	288	10:31:10
#8	•••		Search: **#7 AND #2** Sort by: **Most Recent**	349	10:31:02
#7	•••		Search: **(#4 AND #6) NOT #1** Sort by: **Most Recent**	5,589	10:30:43
#6	•••		Search: **UKA OR "unilateral knee arthroplasty" OR "uni-lateral knee arthroplasty" OR "unicompartmental knee arthroplasty" OR "uni-compartmental knee arthroplasty" OR "medial knee arthroplasty " OR "medial knee replacement" OR "medial condyle replacement" OR "unicondylar knee replacement"** Sort by: **Most Recent**	8,510	10:26:36
#5	•••		Search: **(Osteoarthritis OR arthritis OR osteoarthros* OR gonitis OR gonarthritis OR gonarthros*)** Sort by: **Most Recent**	416,224	10:26:10
#4	•••		Search: **Knee** Sort by: **Most Recent**	205,863	10:26:01
#3	•••		Search: **(systematic* AND review*) OR meta-analys* [Title/Abstract] OR meta-analysis OR systematic-review** Sort by: **Most Recent**	527,748	10:25:55
#2	•••		Search: **"randomized-controlled-trial" OR "Randomized-Controlled-Trials" OR "random-allocation" OR random*[Title] OR RCT** Sort by: **Most Recent**	989,547	10:25:47
#1	•••		Search: **Animals[Title] OR Cadaver[Title] OR animal*[Title] OR dog[Title] OR dogs[Title] OR canine[Title] OR cats[Title] OR feline[Title] OR horse*[Title] OR equine[Title] OR mouse[Title] OR mice[Title] OR rat[Title] OR rats[Title] OR rabbit*[Title] OR sheep[Title] OR porcine[Title] OR pig[Title] OR pigs[Title] OR rodent*[Title] OR monkey*[Title] OR cadaver*[Title/Abstract] OR "in vitro"[Title/Abstract] OR comment[Publication Type] OR editorial[Publication Type] OR letter[Publication Type] OR "historical article"[Publication Type] OR address[Publication Type] OR news[Publication Type] OR "newspaper article" [Publication Type] OR "case reports"[Publication Type] OR case report*[Title] OR abstracts[Title] OR editorial[Title] OR reply[Title] OR comment*[Title] OR commentary[Title] OR letter[Title] OR biomechanic*[Title]** Sort by: **Most Recent**	8,452,606	10:25:38

Showing 1 to 9 of 9 entries

FOLLOW NCBI

4. Studienselektion: Flowchart

Does medial UKA reduce pain and improve function in knees with clinically and radiographically confirmed isolated medial OA, compared to other surgical treatments? (26/04/2023)



Included SRs and MAs

(1-21)

1. Arirachakaran A, Choowit P, Putananon C, Muangsiri S, Kongtharvonskul J. Is unicompartmental knee arthroplasty (UKA) superior to total knee arthroplasty (TKA)? A systematic review and meta-analysis of randomized controlled trial. Eur J Orthop Surg Traumatol. 2015;25(5):799-806. doi: 10.1007/s00590-015-1610-9
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total knee arthroplasty in patients under 65: a systematic review. Knee Surg Sports Traumatol Arthrosc. 2018;26(6):1811-22. doi: 10.1007/s00167-017-4817-y
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Included RCTs

(1-7)

1. Kulshrestha V, Datta B, Kumar S, Mittal G. Outcome of Unicondylar Knee Arthroplasty vs Total Knee Arthroplasty for Early Medial Compartment Arthritis: A Randomized Study. J Arthroplasty. 2017;32(5):1460-9. doi: 10.1016/j.arth.2016.12.014
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5. Charakteristika der eingeschlossenen Studien

PICO number:	16	16	16
PICO Question:	Does medial UKA reduce pain and improve function in knees with clinically and radiographically confirmed isolated medial OA, compared to other surgical treatments?	Does medial UKA reduce pain and improve function in knees with clinically and radiographically confirmed isolated medial OA, compared to other surgical treatments?	Does medial UKA reduce pain and improve function in knees with clinically and radiographically confirmed isolated medial OA, compared to other surgical treatments?
Article name:	Surgical interventions for symptomatic knee osteoarthritis: a network meta-analysis of randomized control trials	Unicompartmental knee arthroplasty is superior to high tibial osteotomy for the treatment of medial unicompartmental osteoarthritis A systematic review and meta-analysis	Unicompartmental knee arthroplasty is associated with lower pain levels but inferior range of motion, compared with high tibial osteotomy: a systematic overview of meta-analyses
Lead author	Bin	Huang	Ping
Year published	2023	2022	2022
Number of included studies (if SR with or without MA)	21	29	10
Description of intervention group (optional for SRs)	Medial UKA	Medial UKA	UKA
Description of control group (optional for SRs)	TKA, HTO, bicompartmental knee arthroplasty (BCA), bi-unicompartmental knee arthroplasty (BIU), knee joint distraction (KJD)	OWHTO; CWHTO	HTO
Number of patients in intervention group	711 received UKA	1599	22557
Number of patients in control group	TKA, 709; HTO, 153; BCA, 91; BIU, 42; KJD, 43	1485 knees	8801
Mean age with range of intervention group	49.3-70.4	50-80	Not reported
Mean age with range of control group	49.3-70.4	40-67	Not reported

Inclusion criteria (on patient-level if clinical study; on article-level if SR) **Examples:** **Clinical study: "The inclusion criteria were (i) primary ACLR in (ii) patients aged over 50 years. The exclusion criteria were (iii) severe concomitant ligament injury (grade 3), (iv) tibiofemoral osteoarthritis visible on weight-bearing anteroposterior and/or sagittal radiographs (> 50% joint space narrowing), and (v) history of intra- or extra-articular ligament surgery in either knee."** **SR: "Studies comparing the diagnostic accuracy of physical examination (clinical tests or ultrasound) versus arthroscopy for the assessment of LHBT pathologies"**	We included all multiarm RCTs of human subjects that compared complications, revisions, reoperations, and functional outcomes among TKA, UKA, HTO, BCA, BIU, or KJD with a minimum 1-year follow-up. The exclusion criteria were as follows: (1) nonrandomized and nonclinical studies, (2) single-arm clinical trials, (3) case reports and series, (4) conference abstracts, and (5) non-English language publications.	The inclusion criteria were as follows: (1) the study was a retrospective or prospective controlled trial; (2) the subjects were patients with medial unicompartmental OA; (3) the study directly compared HTO with UKA; and (4) the study included at least one outcome, such as pain, complications, functions, and revision to total knee arthroplasty. The exclusion criteria were as follows: (1) case series; (2) registration study; (3) cost-effectiveness study; (4) study indirectly comparing HTO with UKA; (5) no valid data could be extracted from a published study; (6) cadaver or animal studies; (7) studies that included patients with traumatic arthritis or rheumatoid arthritis.	The criteria for article inclusion were as follows: Original meta-analyses. Analyses of studies comparing UKA and HTO for medial knee OA. Studies with the following outcomes were included: a. Functional scores, such as the Lysholm Knee Score (Lysholm), Knee Society Score (KSS), range of motion (ROM), and proportion of patients with excellent/good functional results. b.Complication rates (e.g., for infection or thrombosis). c. Implant survival and revision rates, such as Kaplan‚ÄìMeier analysis of revision rates and implant survival time to total knee arthroplasty (TKA). Studies that met the following criteria were excluded: Data were reported only for the UKA or HTO group, and no comparisons were made between the two groups. Duplicate reports.
Follow-up period	12 to 180 months	12 to 96 months	0 to 204 months

Main results	Complications Complications were reported in 14 studies. The network meta-analysis (NMA) revealed that the likelihood of complications for each method was as follows: KJD (99.8%), BCA (68.0%), BIU (47.7%), TKA (41.6%), HTO (40.0%), and UKA (3.0%). These findings indicate KJD had the greatest probability of postoperative complications, followed by BCA, while UKA had the lowest probability of postoperative complications. There were statistically significant differences in the incidence of complications when performing the following comparisons: KJD vs. TKA, UKA, HTO, BCA, and BIU, UKA vs. TKA, and BCA vs. UKA. Revisions and reoperations Revisions were reported in 13 studies. The NMA SUCRA rankings indicating the likelihood of revisions were as follows: KJD (73.5%), BCA (71.3%), HTO (55.8%), BIU (41.7%), UKA (33.9%), and TKA (23.8%), but there was no difference among all treatments. No differences in the risk of revision among different treatments were observed with direct-comparison meta-analysis and NMA. Reoperations were also reported in 13 studies. The NMA SUCRA rankings indicating the likelihood of reoperations were as follows:	Complications. Complications included hematoma, vessel and nerve injury, infection, deep venous thrombosis or pulmonary embolism, nonunion, dislocation, failure of fixation, and bedsores. Nineteen studies reported procedure-related complications. Complications occurred at a significantly higher rate in the HTO group than in the UKA group (OR, 4.88, 95% CI: 2.92-6.86, I2 = 20%, P < .00001). Revision to TKA. Fourteen studies with 1965 patients reported 176 subjects who underwent revision to TKA. The pooled data showed that the OR for the revision rate was 1.70 (95% CI: 0.74-3.91, I2 = 73%, P = .21), and there was no significant difference between the 2 groups. Sensitivity analysis was performed to explore potential sources of heterogeneity. After excluding the study of Rodkey 2021, the OR for the revision rate was 2.35 (95% CI: 1.16-4.77, I2 = 56%, P = 0.02). HTO had a greater revision rate than UKA. Range of motion. Ten studies compared ROM between HTO and UKA. The pooled data suggested that the difference in ROM between the HTO and UKA groups was not statistically significant (MD, 3.17, 95% CI: 1.63 to 7.98, I2 = 98%, P = .20). In subgroup	Functional results Seven studies reported the proportions of subjects with excellent or good functional results (E/G results). Five of these studies reported that the rate of E/G results was higher for patients undergoing UKA than HTO, while the other two studies reported no difference between the two patient groups. Seven studies used various scoring systems to compare knee scores between UKA and HTO. The Lysholm Knee Score is commonly reported as a subjective measure of patients' day-to-day knee function and general condition. Of the four studies that reported Lysholm scores, two reported better scores for UKA than for HTO (MD = 3.07, 95% confidence interval [CI] = 1.19-4.95; MD = 0.84, 95% CI = 0.29-1.39), while the remaining two studies found no difference between the two methods. Three studies used the SMD as the effect size to allow a meta-analysis of different scoring systems, and one study reported that the normalized knee score was significantly better after UKA than after HTO over a 5-12-year follow-up period (P < 0.001); however, the scores of the two groups were comparable after more than 12 years (P = 0.331). There were no significant differences in the other two studies, although scores tended to be

	the likelihood of reoperations were as follows: KJD (94.8%), BCA (69.9%), HTO (52.0%), BIU (37.8%), TKA (24.3%), and UKA (21.2%). There were statistically significant differences in the incidence of reoperations when comparing KJD with TKA, UKA, and HTO. The above NMA results are consistent with the direct comparison among the different interventions. Functional outcomes Functional outcomes were reported in all studies. The follow-up durations of these RCTs ranged from was 1 to 15 years. The majority of comparisons among various treatments showed no difference for functional outcomes. Compared with TKA, only one RCT (1/8) definitely showed that UKA had a better functional enhancement after 3 years of follow-up and three RCTs (3/8) revealed that UKA had a superior ROM (range of motion). For UKA vs. HTO, the functional outcomes were not different in all 3 RCTs. During a follow-up period of 1 to 10 years, BCA and BIU resulted in similar clinical and functional scores as TKA in 5 studies. KJD was noninferior to TKA and HTO in the primary functional outcomes in 3 studies, but a high incidence of pin track infection associated with KJD was found.	1.83 to 7.58, I2 = 98%, P = .20). In subgroup analysis, the HTO group showed a greater motion range than the fixed-bearing UKA group (MD, 9.13, 95% CI: 4.00-14.27, I2 = 68%, P = .0005). However, no significant difference was observed in ROM between HTO and mobile-bearing UKA groups (MD -3.78, 95% CI: -15.78 to 8.22, I2 = 99%, P = .54) and unknown type UKA groups (MD, -0.63, 95% CI: -5.67 to 4.41, I2 = 83%, P = .81). Postoperative pain. Thirteen studies reported postoperative pain. Different assessment systems have been used to assess pain. Based on the available data, 7 studies included information on postoperative pain, which was assessed by the visual analogue scale (VAS). The present analysis showed no statistically significant difference between the 2 groups (MD, 0.39, 95% CI: -0.01 to 0.79, I2 = 91%, P = .06). Walking speed. No significant differences were found in walking speed between the HTO and UKA groups (MD,-0.02, 95% CI: -0.07 to 0.04, I2 = 0%, P = .56), as reported in 4 studies involving 148 knees. Function score. There are several different	two studies, although scores tended to be higher for UKA than for HTO. Range of motion Six studies included an analysis of ROM, and all found that HTO was better than UKA for this parameter (SMD = 0.78-1.36, WMD = 5.47-10.18). Velocity Of the five studies that assessed postoperative velocity, four showed no significant differences between groups. The remaining study indicated that the UKA group tended to reach a faster velocity (WMD = ,-0.05, 95% CI ,à0.11 to ,àí 0.00). Pain assessment All three studies that included postoperative pain assessments reported lower postoperative pain in the UKA group. Revision surgery All 10 studies compared revision rates between UKA and HTO. Seven of the studies reported similar revision rates between UKA and HTO, while the other three found that the revision rates were lower and the implant survival time was longer in UKA than HTO. One study

			scoring systems to compare the postoperative functional outcomes between the 2 groups. However, only a few studies provided the mean and standard deviation (SD) of the same scoring system used in our meta-analysis. Seven studies involving 644 patients reported a lower Lysholm score in the HTO group than in the UKA group (MD -2.78, 95% CI: -5.37 to -0.18, I2 = 78%, P =.04). The Hospital for Special Surgery (HSS) score was estimated in 6 studies. The HTO group had worse HSS than the UKA group (MD, -2.80, 95% CI: -5.39 to -0.20, I2 = 75%, P = .03). Five studies used the Knee Society Score (KSS) to assess postoperative knee function. The results showed no significant difference between the HTO and UKA groups (MD,-0.26, 95% CI: -1.94 to 1.41, I2 = 33%, P = .76). Four studies used the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC). The meta-analysis of WOMAC results showed no differences between the 2 groups (MD, 4.33, 95% CI: -1.91 to 10.56, I2 = 86%, P = 0.17). The Tegner score was also similar between the 2 groups (MD, ,-0.35, 95% CI: -0.90 to 0.20, I2 = 89%, P = .21).	found no difference in revision rate between UKA and HTO (OR = 1.56, P = 0.35). After performing a subgroup analysis of patients treated with HTO, the revision rate of the opening-wedge HTO (OW-HTO) subgroup was similar to that of the UKA group (P = 0.19), while the closing-wedge (CW-HTO) subgroups had a significantly higher revision rate than the UKA group (OR = 2.38, P = 0.04). One study analyzed the implant survival time to TKA and the revision rates for UKA and HTO. The mean implant survival time (according to the Kaplan‚ÄìMeier method) to revision was 8.2 years in the UKA group and 9.7 years in the HTO group. The difference in revision rate between UKA and HTO after more than 12 years of follow-up was not significant. Complications Eight studies compared total complication rates between UKA and HTO. Four studies reported no difference in complication rate between UKA and HTO, while the remaining four studies indicated that the complication rates were lower in UKA (Table 2). Quantitative analysis To gain insight into the complication and revision rates of UKA and HTO, we extracted

			revision rates of UKA and HTO, we extracted and quantitatively synthesized the data from primary clinical studies included in all meta-analyses. A total of 20 studies were extracted. The revision and complication rates were quantitatively synthesized based on the methodological quality assessment. The subgroup analyses were performed by types of HTO (OW-HTO or CW-HTO). In subgroup analyses, compared with CW-HTO, OW-HTO showed a lowerrevision rate (OW-HTO: OR = 0.71, 95% CI [0.27,Äì1.85]; CW-HTO: OR = 0.31, 95%CI [0.14,Äì0.66]) and a lower complication rate (OW-HTO: OR = 0.96, 95% CI [0.41,Äì2.24]; CW-HTO: OR = 0.19, 95%CI [0.08,Äì0.42]). Subsequently, a meta-regression analysis was performed based on HTO types (OW-HTO or CW-HTO), study types (prospective or retrospective study), and publication years, and HTO types were not found to be the source of heterogeneity in revision rate (P = 0.491) and complication rate (P = 0.845). However, a metaregression analysis of OW-HTO group based on the publication year revealed that the postoperative revision rate of UKA decreased gradually with increase in year, and the predicted revision rate of UKA was lower than that of OW-HTO after 2014.

Key findings (use Results and Conclusion in Abstract)	Results This NMA and systematic review included 21 studies (17 RCTs), with a total of 1749 patients. The overall risk-of-bias assessment of the RCTs revealed that 7 studies had low risk, 5 had some concerns, and 9 had high risk. SUCRA (the surface under the cumulative ranking curve) rankings revealed that KJD had the greatest risk of appearing postoperative complications, revisions, and reoperations, and UKA or TKA had the lowest risk. The majority of comparisons among various treatments showed no difference for functional outcomes. Conclusion Each surgical intervention is noninferior to other treatments in functional outcomes, but UKA and TKA are better options to treat OA according to SUCRA rankings by comparing complications, revisions, and reoperations. KJD is an imperfect option for treating OA. Other treatments should be carefully considered for each patient in accordance with their actual conditions. However, this conclusion is limited by the selection of reviewed publications and individual variation of surgical indications for patients.	Results: Twenty-three retrospective and 6 prospective studies were included. A total of 3004 patients (3084 knees) were evaluated for comparison. Complications (OR, 4.88, 95% CI: 2.92-6.86) were significantly greater in the HTO group than in the UKA group. Postoperative function scores including Lysholm score (MD -2.78, 95% CI: -5.37 to -0.18) and Hospital for Special Surgery (HSS) score (MD -2.80, 95% CI: -5.39 to -0.20) were significantly lower in the HTO group than the UKA group. The postoperative ROM was similar between HTO and mobile-bearing UKA (MD -3.78, 95% CI: -15.78 to 8.22). However, no significant differences were observed between the HTO and UKA group in terms of postoperative pain, walking speed, and revision to TKA. Conclusions: UKA is superior to HTO in minimizing complications and enhancing postoperative function scores. Mobilebearing UKA has a similar ROM compared with HTO. Both HTO and UKA provide satisfactory clinical outcomes in terms of walking speed, relieving pain, and revision to TKA. UKA appears to be more suitable for the elderly, and both mobile-bearing UKA and HTO are viable surgical options for younger active individuals.	Results: A total of 10 meta-analyses were identified, and different studies reported different results. Five of the seven meta-analyses showed that the proportion of subjects with excellent or good functional results was higher for UKA than for HTO. All three meta-analyses showed that UKA was associated with lower pain levels, and all six of the studies that included an analysis of range of motion (ROM) reported that UKA was inferior to HTO. Four of the eight metaanalyses found that total complication rates were lower for UKA. Only 3 of the 10 meta-analyses found that UKA had lower revision rates. Moreover, in the subgroup analysis, the revision and complication rates of UKA were similar to those of opening-wedge HTO but much lower than those of closing-wedge HTO. Conclusions: Compared to HTO, UKA was associated with lower pain levels but inferior postoperative ROM. The results were inconclusive regarding whether UKA yielded better knee function scores and lower revision or complication rates than HTO. Accurate identification of indications and appropriate patient selection are essential for treating individuals with OA.
Overall AMSTAR assessment	critically low	critically low	low
Level of evidence (Oxford 2011)	Level 2, downgraded due to critically low AMSTAR	Level 4, downgraded due to critically low AMSTAR	Level 2

67. Empfehlung	Neu 2024
Empfehlungsgrad ⇔	Es können Roboterassistenzsysteme bei der Implantation einer medialen Knieteilendoprothese nach vorheriger Aufklärung verwendet werden. Es zeigt sich kein Vorteil hinsichtlich des funktionellen Ergebnisses
Level of Evidence (Oxford 2011) 2 4 2	 Bouché et al. 2023 (80) Zhang et al. 2022 (81) Kort et al. 2022 (82)
Konsensstärke	100% (starker Konsens)

1. Schlüsselfrage und PICO Format	
clinical key question	In adult patients with osteoarthritis undergoing medial UKA, does robotic assistance technology improve outcomes and/or decrease complications when compared to other techniques?
Population	patients (> 18) Symptomatic knee oa X ray verified K/L stage 2/3/4 indication UKA
intervention	UKA with robotic-assistance technology
comparison	standard care UKA
outcome	Primary outcomes (critical): • survival of implant • Serious adverse events • Pain (validated PROMS) • Physical function (validated PROMS) • Health related quality of life (validated PROMS)

2. Recherche Zusammenfassung

Identifier	*ID Ordinal 52*
PICO(T) question	In adult patients with osteoarthritis undergoing medial UKA, does robotic assistance technology improve outcomes and/or decrease complications when compared to other techniques?
Search characteristics	
Date of search	18/05/2023
Initials of primary reader	JHM
Database(s)	*PubMed*
Keywords	*Knee* *osteoarthritis; arthritis; osteoarthros*; gonitis; gonarthritis; gonarthros** Robot; medial UKA
Search strings	*#1 Animals[Title] OR Cadaver[Title] OR animal*[Title] OR dog[Title] OR dogs[Title] OR canine[Title] OR cats[Title] OR feline[Title] OR horse*[Title] OR equine[Title] OR mouse[Title] OR mice[Title] OR rat[Title] OR rats[Title] OR rabbit*[Title] OR sheep[Title] OR porcine[Title] OR pig[Title] OR pigs[Title] OR rodent*[Title] OR monkey*[Title] OR cadaver*[Title/Abstract] OR "in vitro"[Title/Abstract] OR comment[Publication Type] OR editorial[Publication Type] OR letter[Publication Type] OR "historical article"[Publication Type] OR address[Publication Type] OR news[Publication Type] OR "newspaper article" [Publication Type] OR "case reports"[Publication Type] OR case report*[Title] OR abstracts[Title] OR editorial[Title] OR reply[Title] OR comment*[Title] OR commentary[Title] OR letter[Title] OR biomechanic*[Title]* *#2 "randomized-controlled-trial" OR "Randomized-Controlled-Trials" OR "random-allocation" OR random*[Title] OR RCT* *#3 (systematic* AND review*) OR meta-analys*[Title/Abstract] OR meta-analysis OR systematic-review* *#4 (Knee)*

	~~*#5 (Osteoarthritis OR arthritis OR osteoarthros* OR gonitis OR gonarthritis OR gonarthros*)*~~ #6 ("knee arthroplasty" OR "knee replacement" OR KA) AND (robot OR robotic OR robot*) #7 (#4 AND ~~#5 AND~~ #6) NOT(#1) #8 (#7 AND #2) #9 (#7 AND #3)
Number of hits	
RCTs (#8)	69
SR(+MA) (#9)	73
Studies published before 2003	(69-68) + (73-73) = 1
Articles to consider	
DOIs MAs	10.1016/j.knee.2023.01.003 10.1055/s-0040-1701440 10.1007/s00132-018-3604-x 10.1055/s-0040-1701455 10.1016/j.jor.2021.05.012 10.1016/j.jor.2023.04.007 10.1136/bmjopen-2020-044778 10.1007/s00167-016-4305-9 10.1097/md.0000000000016968 10.1302/0301-620x.104b5.Bjj-2021-1506.R1 10.1002/rcs.2170
DOIs SRs	10.26355/eurrev_202303_31799 10.1007/s00402-021-04066-w 10.1007/s00264-018-4175-5 10.1302/2058-5241.5.190065 10.1016/j.arth.2020.10.033 32580234 10.1007/s00167-021-06472-4 10.1002/rcs.2124 10.1002/rcs.2302 29611157 10.1007/s11701-020-01162-8 10.2106/jbjs.Rvw.20.00091 10.1016/j.arth.2022.05.012 10.1302/0301-620x.102b4.Bjj-2019-1210.R1
DOIs RCTs	10.1302/0301-620x.103b6.Bjj-2020-1355.R2 10.1007/s00167-021-06560-5 10.2106/jbjs.15.00664

	10.1302/2046-3758.611.Bjr-2017-0060.R1 10.1302/0301-620x.88b2.17220 10.1016/j.arth.2018.02.050 10.1186/s13063-020-04631-5 10.1016/j.gaitpost.2018.02.029 10.1007/s11999-015-4259-0
Include/Excluded after FT screening	
10.1016/j.knee.2023.01.003	Include
10.1055/s-0040-1701440	Include
10.1007/s00132-018-3604-x	Include
10.1055/s-0040-1701455	Include
10.1016/j.jor.2021.05.012	Include
10.1016/j.jor.2023.04.007	Include
10.1136/bmjopen-2020-044778	Include
10.1007/s00167-016-4305-9	Include
10.1097/md.0000000000016968	Include
10.1302/0301-620x.104b5.Bjj-2021-1506.R1	Include
10.1002/rcs.2170	Include
10.26355/eurrev_202303_31799	Include
10.1007/s00402-021-04066-w	Include
10.1007/s00264-018-4175-5	Include
10.1302/2058-5241.5.190065	Include
10.1016/j.arth.2020.10.033	Include
32580234	Not retrieved
10.1007/s00167-021-06472-4	Include
10.1002/rcs.2124	Include
10.1002/rcs.2302	Include
29611157	Not retrieved
10.1007/s11701-020-01162-8	Include
10.2106/jbjs.Rvw.20.00091	Not retrieved
10.1016/j.arth.2022.05.012	Include
10.1302/0301-620x.102b4.Bjj-2019-1210.R	Include
10.1302/0301-620x.103b6.Bjj-2020-1355.R2	Include
10.1007/s00167-021-06560-5	Include
10.2106/jbjs.15.00664	Include
10.1302/2046-3758.611.Bjr-2017-0060.R1	Include
10.1302/0301-620x.88b2.17220	Include
10.1016/j.arth.2018.02.050	Include
10.1186/s13063-020-04631-5	Exclude – Protocol

10.1016/j.gaitpost.2018.02.029	Include
10.1007/s11999-015-4259-0	Include

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#8	•••		Search: **#7 AND #2**	69	06:12:30
#7	•••		Search: **(#4 AND #6) NOT #1**	778	06:12:21
#6	•••		Search: **("knee arthroplasty" OR "knee replacement" OR KA) AND (robot OR robotic OR robot*)**	1,037	06:11:58
#5	•••		Search: **(Osteoarthritis OR arthritis OR osteoarthros* OR gonitis OR gonarthritis OR gonarthros*)**	417,332	06:11:50
#4	•••		Search: **Knee**	206,608	06:11:43
#3	•••		Search: **(systematic* AND review*) OR meta-analys* [Title/Abstract] OR meta-analysis OR systematic-review**	531,599	06:11:37
#2	•••		Search: **"randomized-controlled-trial" OR "Randomized-Controlled-Trials" OR "random-allocation" OR random*[Title] OR RCT**	992,466	06:11:30
#1	•••		Search: **Animals[Title] OR Cadaver[Title] OR animal*[Title] OR dog[Title] OR dogs[Title] OR canine[Title] OR cats[Title] OR feline[Title] OR horse*[Title] OR equine[Title] OR mouse[Title] OR mice[Title] OR rat[Title] OR rats[Title] OR rabbit*[Title] OR sheep[Title] OR porcine[Title] OR pig[Title] OR pigs[Title] OR rodent*[Title] OR monkey*[Title] OR cadaver*[Title/Abstract] OR "in vitro"[Title/Abstract] OR comment[Publication Type] OR editorial[Publication Type] OR letter[Publication Type] OR "historical article"[Publication Type] OR address[Publication Type] OR news[Publication Type] OR "newspaper article"[Publication Type] OR "case reports"[Publication Type] OR case report*[Title] OR abstracts[Title] OR editorial[Title] OR reply[Title] OR comment*[Title] OR commentary[Title] OR letter[Title] OR biomechanic*[Title]**	8,471,453	06:11:23

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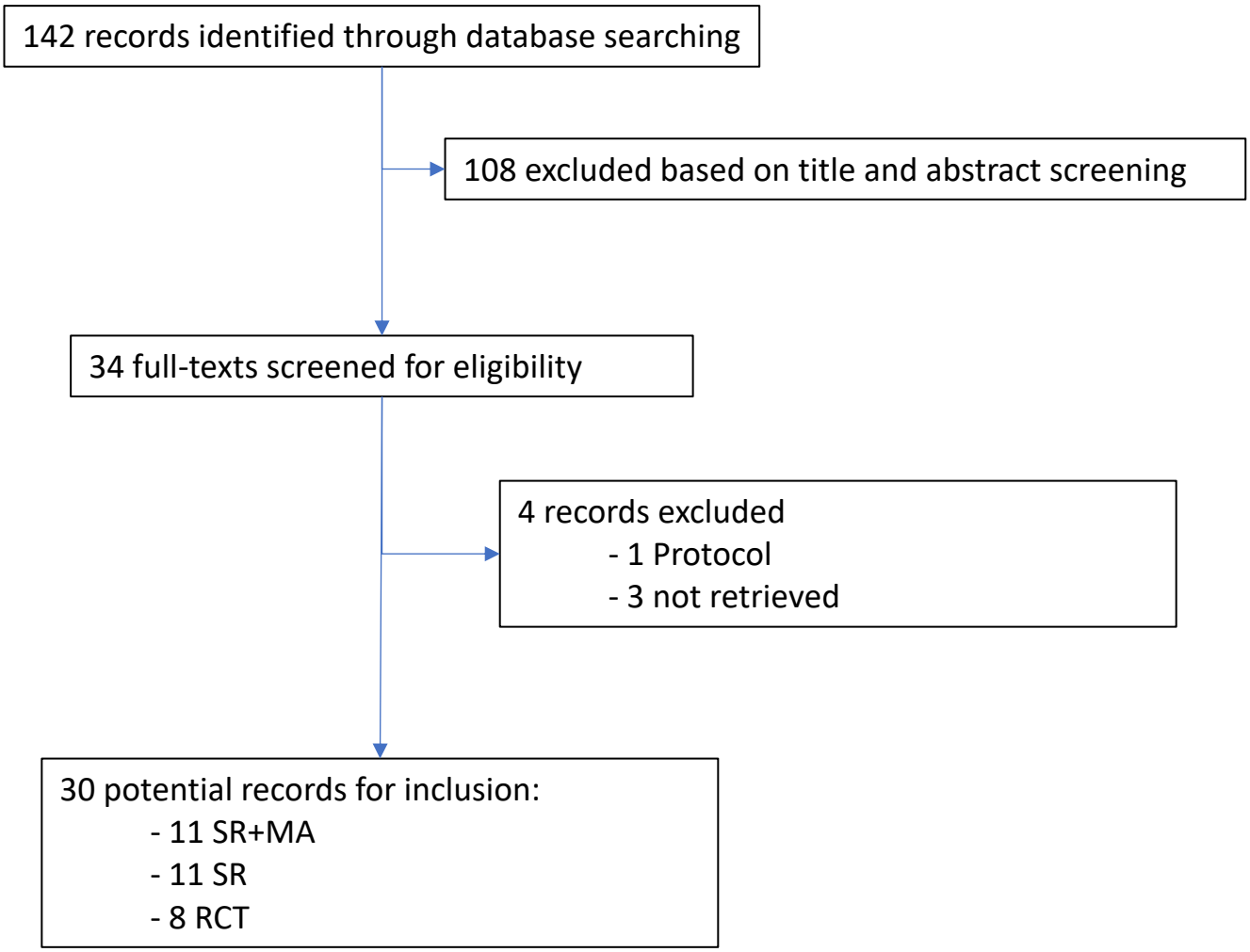
4. Studienselektion: Flowchart

PubMed Search: In adult patients with osteoarthritis undergoing medial UKA, does robotic assistance technology improve outcomes and/or decrease complications when compared to other techniques? 18/05/2023



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(1-22)

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(1-8)

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PICO number:	52	52	52
PICO Question:	In adult patients with osteoarthritis undergoing medial UKA, does robotic assistance technology improve outcomes and/or decrease complications when compared to other techniques?	In adult patients with osteoarthritis undergoing medial UKA, does robotic assistance technology improve outcomes and/or decrease complications when compared to other techniques?	In adult patients with osteoarthritis undergoing medial UKA, does robotic assistance technology improve outcomes and/or decrease complications when compared to other techniques?
Article name:	Comparative efficacy of the different cutting guides in unicompartmental knee arthroplasty: A systematic-review and network meta-analysis	Robotic arm-assisted versus manual unicompartmental knee arthroplasty A SYSTEMATIC REVIEW AND META-ANALYSIS OF THE MAKO ROBOTIC SYSTEM	Robot-assisted knee arthroplasty improves component positioning and alignment, but results are inconclusive on whether it improves clinical scores or reduces complications and revisions: a systematic overview of meta-analyses
Lead author	Bouché	Zhang	Kort
Year published	2023	2022	2022
Number of included studies (if SR with or without MA)	18	14	4 MAs on UKA
Description of intervention group (optional for SRs)	Robotic UKA	MAKO UKA	RA UKA
Description of control group (optional for SRs)	PSI UKA and CAS UKA	Conventional UKA	Conventional UKA
Number of patients in intervention group	480	3749	1880
Number of patients in control group	340 PSI and 506 CAS	10650	2352
Mean age with range of intervention group	62 to 66	65	Not reported
Mean age with range of control group	PSI, 58 to 68; CAS, 60 to 69	65	Not repoeted

Inclusion criteria (on patient-level if clinical study; on article-level if SR) **Examples:** **Clinical study: "The inclusion criteria were (i) primary ACLR in (ii) patients aged over 50 years. The exclusion criteria were (iii) severe concomitant ligament injury (grade 3), (iv) tibiofemoral osteoarthritis visible on weight-bearing anteroposterior and/or sagittal radiographs (> 50% joint space narrowing), and (v) history of intra- or extra-articular ligament surgery in either knee."** **SR: "Studies comparing the diagnostic accuracy of physical examination (clinical tests or ultrasound) versus arthroscopy for the assessment of LHBT pathologies"**	All RCTs that compared at least two different cutting guides and reported at least one of our mentioned outcomes were included. No restriction on language or date of publication was applied. Exclusion criteria were UKA for another indication than osteoarthritis or femoro-patellar prostheses.	Clinical trials were included if they involved patients undergoing UKA; compared RAUKA and mUKA (randomized and non-randomized); included outcome variables related to the proposed research questions; and had been published between January 2000 and November 2021. Studies were excluded if they were conference abstracts; animal studies; in vitro studies or articles published in a form other than clinical trials; or studies without quantitative data. For the purposes of this review, there was a focus on MAKO robotic systems. Therefore, other semi-active (e.g. NAVIO Surgical System; Smith & Nephew, USA) and fully active robotic systems were excluded from analysis. If multiple studies reported results from the same patient cohort, only the study with the higher quality score was included.	Inclusion: Original meta-analyses (Level I–IV) that: – Reported on studies evaluating either active or semiactive robot-assisted versus conventional UKA or TKA for any indication. – Reported at least one of the following outcomes: – Complications rates (intra- and post-operative complications). – Implant survival or revision rates (such as Kaplan–Meier, cumulative incidence function). – Clinical scores (such as Hospital for Special Surgeries Knee Scoring System (HSS), Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC), Oxford Knee Score (OKS), Knee Society Score (KSS)). – Component positioning and alignment (such as hip–knee–ankle (HKA) angle, femoral flexion angle and tibial slope angle). Exclusion:

			Exclusion: Meta-analyses that: – Reported outcomes for robotic assistance during surgery of other joints without distinguishing data for UKA or TKA. – Were published in languages other than English to avoid translation errors.
Follow-up period	Not reported	1 to 60 months	0 to 132 months

Main results	Outliers of the femoral and tibial component on frontal plane Seven studies (38.8%) reported the rate of outliers for femoral and tibial component on the frontal plane. For the femoral component, the rate of outliers was lower in the robotic group than in the PSI group (risk ratio 0.00 [95% CI0.00 to 0.55]) and greater in the PSI group than in the navigation group (risk ratio 305.1 [95% CI 1.50 to 1,27e+07]), with I2 = 0.0%. Robot had the highest probability of having the lowest proportion of outlier in frontal plane for the femoral component. For the tibial component, no differences between the different cutting guides were found with I2 = 4.0%. PSI had the highest probability of having the lowest proportion of outlier in frontal plane for the tibial component. KSS within one- and two-years post-surgery Four studies (22.2%) reported the KSS score within one- and two- years	Learning curve. One study reported the learning curves for RAUKA: Kayani et al found RAUKA was associated with a learning curve of six cases for operating time ($p < 0.001$) and surgical team confidence levels ($p < 0.001$). There was no learning curve in RAUKA for precision of implant positioning, joint line restoration, postoperative limb alignment, clinical outcome, or complications. Implant alignment. Five studies compared implant alignment and component positioning between RAUKA and mUKA. Four of the five studies reported that RAUKA resulted in more precise implant positioning. Both Park et al and Bell et al concluded that RAUKA resulted in fewer outliers for both femoral and tibial implant positioning. The reporting of alignment was found to be heterogeneous across the studies, with some studies reporting on root	The four meta-analyses on UKA included a combined total of 18 studies reporting outcomes of 787 robot-assisted versus 941 conventional UKA procedures. Of the 18 studies, 13 (76%) reported on the MAKO semi-active robot (Stryker, Kalamazoo, MI, USA), and 9 (53%) were performed in the United Kingdom. Complications and revision rates, and operation time were assessed in all four meta-analyses, functional outcomes in three, and component positioning and alignment in three. One meta-analysis included 13 studies on UKA, one of which did not report on robotic assistance, but instead compared patient-specific to conventional instrumentation in terms of postoperative knee alignment and knee society score (KSS). One meta-analysis was found to be of “good quality”, and three were found to be of ‘critically low quality’ due to weaknesses in more than two critical domains. Three

	KSS score within one- and two-years post-surgery. We found no differences between the different cutting guides with I2 = 1.0%. Robot had the highest probability of leading to the highest KSS mean values, although no significant differences were found. Rate of complications Ten studies (45.5%) reported the surgical time. We found no differences between the different cutting guides with I2 = 0.0%. The robot guide had the highest probability of having the lowest rate of complication, although no significant differences were found. Secondary outcomes Regarding HKA angle, rate of outliers was lower in the robotic group than in the conventional guide group (risk ratio 0.00 [95% CI 0.00 to 0.01]) and than in the navigation group (risk ratio 0.00 [95% CI 0.00 to 0.02]). Regarding the rate of outliers in sagittal plane	with some studies reporting on root mean square error (RMSE), some comparing the mean angle postoperatively, and some not reporting the standard deviation (SD). The authors of two studies (Kayani et al and Bell et al) were contacted for the SDs of the RMSEs reported. The meta-analysis showed that the implant position was significantly more accurate, and there were fewer outliers among the RAUKA group compared to the mUKA group. There was variability in the alignment targets for the RAUKA technique, as the method individualizes the bone cuts to native joint anatomy. While all the mUKAs were performed using standard jig references, specific targets of under-correction and posterior slopes were not specifically declared in three out of five of the studies included. Functional outcomes. Six clinical studies reported the	than two critical domains. Three meta-analyses reported no differences in revision rates between robot-assisted and conventional UKA, but one reported that robotic assistance lowered overall complications rates. Robotic assistance improved KSS knee and function scores, but it extended operation times by 15.7 min and 17.1 min. Robotic assistance reduced deviations from the target femoral valgus and flexum angle, the target tibial varus angle and tibial slope, and the target tibial rotation angle. Robotic assistance also reduced the risk of positioning the tibial component more than ± 2° outside a target range, and reduced the likelihood of limb alignment outliers from a ± 3° target range.

	for the tibial component, the proportion was lower in the robotic group and in the navigation group than in the conventional guide group (respectively, risk ratio 0.26 [95% CI 0.10 to 077] and risk ratio 0.41 [95% CI 0.17 to 0.97]). Concerning the other secondary radiological outcome, found no differences between the different cutting guides. Regarding at 6 months, between one- and two years and after two years post-surgery, we found no differences between the different cutting guides fort the KSS score, OKS score, the WOMAC score, the Joint Forgotten Score, the SF-12 and for the range of motion. Blood loss was not different between groups. Finally, regarding the rate of revision and the mean surgical time, no differences were observed. 3.5. Grade evaluation We performed the GRADE evaluation for the three main outcomes. For the	functional outcomes following RAUKA compared to mUKA. Different outcome scores were used across the included studies, with the KSS being the most reported, followed by WOMAC. Neither meta-analysis demonstrated a difference in the KSS (mean difference 1.64 (95% CI -3.00 to 6.27); p = 0.490, z-test) or WOMAC score (mean difference -0.58 (95% CI -3.55 to 2.38); p = 0.700, z-test) between RAUKA and mUKA in short- to mid-term follow-up. Complications and survivorship. Five studies reported on the complications between RAUKA and mUKA groups. Overall complication rates were low, and the most common complications were superficial or deep infections. No study reported any pin-site fractures. Six studies compared revision rates between RAUKA and mUKA. A forest plot of pooled reported complication	

		for the three main outcomes. For the rate of outliers in frontal plane, it indicates that the evidence is moderate for PSI/conventional and low for other comparisons. For the KSS between one- and two years, it suggests that the evidence is moderate for PSI/conventional and high for other comparisons. For the complication rate, it suggests that the evidence is high PSI/conventional and moderate for other comparisons.	plot of pooled reported complication data demonstrated no significant differences in superficial and deep infection rates (OR 2.8 (95% CI 0.93 to 8.38); p = 0.070, z-test) or in early re-intervention rates (OR 2.20 (95% CI 0.79 to 6.09); p = 0.130, z-test) in the mUKA group compared to RAUKA group in short-term follow-up (Figure 6). However, the overall complication rate was higher in mUKA compared to RAUKA (OR 2.18 (95% CI 1.06 to 4.49); p = 0.040, z-test). Registry data are typically not included in systematic reviews, as they do not appear on the search engines commonly used. However, this review included a study from the Australian registry, as it is the only published paper evaluating the early survivorship of RAUKA prostheses compared with mUKA systems using registry data. Our pooled data, with a mean follow-up of 1.71 years (SD 0.93), demonstrated a 1.72% revision rate for RAUKA, whereas the mUKA	

			revision rate was 3.32%, which is consistent with mUKA data from UK and New Zealand national joint registries with reported three-year revision rates of 3.71% and 3.7%,31,32 respectively. Cost. Three studies reported on cost in relation to RAUKA.Two studies used Markov decision analysis to report the cost-effectiveness, with both reporting RAUKA to be a cost-effective procedure. In the UK, Clement et al used a model with annual case volume of 100 cases and found the excess cost per quality-adjusted life year (QALY) of RAUKA to be £1,170 relative to mUKA. For a high-volume centre performing 200 RAUKAs per year with a length of stay of one day less than manual UKA, the cost per QALY may be as low as £574. In the USA, Moschetti et al concluded that although RAUKA was more costly than		

		although RAUKA was more costly than mUKA, it offered a slightly better outcome, with an additional 0.06 QALYs at an incremental cost of $47,180 per QALYs, given a case volume of 100 cases annually. They found RAUKA was cost-effective when case volume exceeded 94 cases per year, two-year failure rates were below 1.2%, and total system costs were < $1.426 million. Cool et al was the only study comparing mean costs between RAUKA and mUKA. It reported that RAUKA incurred lower mean costs for the index stay plus revisions ($26,001 vs $27,915; p > 0.05) than mUKA over a 24-month period; however, this was not statistically significant.	

Key findings (use Results and Conclusion in Abstract)	Results: Eighteen RCTs involving 1562 patients with 1564 UKA were included Regarding the prosthetic components' positions, we found a significant increase of the outliers rate using PSI for the femoral component, compared to robotic surgery (risk ratio 0.00 [95% CI 0.00 to 0.55]) and navigated surgery (risk ratio 305.1 [95% CI 1.50 to 1,27e + 07]). We didn't emphasize any difference regarding the tibial component's position, the KSS value at 24 months postoperatively, and the complication rate. Regarding secondary outcomes, robotics provided a better precision in bone cuts in the sagittal plane for the tibial component and the lower limb alignment. No other differences were observed. Conclusion: In the light of these results, the robot seems to be the most precise cutting instrument to perform UKA. However, this did not	Results A total of 179 articles were identified from initial screening, of which 14 articles satisfied the inclusion criteria and were included for analysis. The papers analyzed include one on learning curve, five on implant positioning, six on functional outcomes, five on complications, six on survivorship, and three on cost. The learning curve was six cases for operating time and zero for precision. There was consistent evidence of more precise implant positioning with MAKO RAUKA. Meta-analysis demonstrated lower overall complication rates associated with MAKO RAUKA (OR 2.18 (95% confidence interval (CI) 1.06 to 4.49); p = 0.040) but no difference in re-intervention, infection, Knee Society Score (KSS; mean difference 1.64 (95% CI -3.00 to 6.27); p = 0.490), or Western Ontario and McMaster Universities Arthritis Index (WOMAC) score (mean difference -0.58 (95% CI -	Robot-assisted knee arthroplasty enabled more accurate component positioning and placement within target zones, but extended operation time considerably. Although robotic assistance improved component positioning, its benefits regarding clinical scores, patient satisfaction and implant survivorship remains to be confirmed. Finally, this overview revealed that six of the ten meta-analyses were of 'critically low quality', calling for caution when interpreting results.

	perform UKA. However, this did not demonstrate any difference in functional or clinical outcome. The cost of this technology can be a major economic brake, especially in surgical centers that do not have an exclusive prosthetic activity. Further outcome and survivorship data is needed to recommend one cutting instrument over the other.	score (mean difference -0.88 (95% CI -3.55 to 2.38); p = 0.700). MAKO RAUKA was shown to be a cost-effective procedure, but this was directly related to volume. Conclusion MAKO RAUKA was associated with improved precision of component positioning but was not associated with improved PROMs using the KSS and WOMAC scores. Future longer-term studies should report functional outcomes, potentially using scores with minimal ceiling effects and survival to assess whether the improved precision of MAKO RAUKA results in better outcomes.	
AMSTAR Assessment	Critically low (Quality assessment)	Critically low (Quality assessment)	High (Quality assessment)
What is the lowest evidence study included in the SR?	RCT, Level 1	Retrospective comparative study or case series, Level 3	Retrospective comparative study or case series, Level 3
Level of evidence (Oxford 2011)	Level 2, downgraded due to critically low AMSTAR	Level 4, downgraded due to critically low AMSTAR	Level 2, upgraded due to high AMSTAR

68. Statement	Neu 2024
Die Evidenz ist nicht ausreichend für eine breite Empfehlung zur lateralen Schlittenprothese bei isolierter lateraler hochgradiger Gonarthrose.	
Level of Evidence (Oxford 2011) 5 5	 van der List et al. 2016 Piovan et al. 2022
Konsensstärke:	93% (Konsens)

1. Schlüsselfrage undPICO Format	
clinical key question	Does lateral UKA reduce pain and improve function in knees with clinically and radiographically confirmed isolated lateral OA, **compared to other surgical treatments**?
population	Adults with isolated medial or lateral: • symptomatic knee OA (clinically confirmed), and • K/L stage 2/3/4 (radiographically confirmed)
intervention	Unicompartmental knee arthroplasty
Comparison	• Surgical intervention o Corrective osteotomy (HTO, DFO, and DLO) o Total knee arthroplasty o Arthroscopic lavage and/or debridement • Conservative treatment (e.g. exercises) • Medical treatment (e.g. analgesics)
outcome	• Progression of OA (within same/other compartments) • Adverse events requiring readmission, reoperation,or arthroplasty • Clinical and functional scores (validated PROMS): o Pain o Physical function o Health related quality of life o Satisfaction

2. Recherche Zusammenfassung

Identifier	*ID Ordinal 17*
PICO(T) question	Does lateral UKA reduce pain and improve function in knees with clinically and radiographically confirmed isolated lateral OA, compared to other surgical treatments?
Search characteristics	
Date of search	27/04/2023 & 04/10/2023 (Comparative studies)
Initials of primary reader	JHM
Database(s)	*PubMed*
Keywords	*Knee* *osteoarthritis; arthritis; osteoarthros*; gonitis; gonarthritis; gonarthros** UKA
Search strings	*#1 Animals[Title] OR Cadaver[Title] OR animal*[Title] OR dog[Title] OR dogs[Title] OR canine[Title] OR cats[Title] OR feline[Title] OR horse*[Title] OR equine[Title] OR mouse[Title] OR mice[Title] OR rat[Title] OR rats[Title] OR rabbit*[Title] OR sheep[Title] OR porcine[Title] OR pig[Title] OR pigs[Title] OR rodent*[Title] OR monkey*[Title] OR cadaver*[Title/Abstract] OR "in vitro"[Title/Abstract] OR comment[Publication Type] OR editorial[Publication Type] OR letter[Publication Type] OR "historical article"[Publication Type] OR address[Publication Type] OR news[Publication Type] OR "newspaper article" [Publication Type] OR "case reports"[Publication Type] OR case report*[Title] OR abstracts[Title] OR editorial[Title] OR reply[Title] OR comment*[Title] OR commentary[Title] OR letter[Title] OR biomechanic*[Title]* *#2 "randomized-controlled-trial" OR "Randomized-Controlled-Trials" OR "random-allocation" OR random*[Title] OR RCT* *#3 (systematic* AND review*) OR meta-analys*[Title/Abstract] OR meta-analysis OR systematic-review* *#4 (Knee)*

	~~*#5 (Osteoarthritis OR arthritis OR osteoarthros* OR gonitis OR gonarthritis OR gonarthros*)*~~ #6 (UKA OR "unilateral knee arthroplasty" OR "uni-lateral knee arthroplasty" OR "unicompartmental knee arthroplasty" OR "uni-compartmental knee arthroplasty" OR "lateral knee arthroplasty " OR "lateral knee replacement" OR "lateral condyle replacement" OR "unicondylar knee replacement") #7 (#4 AND ~~#5 AND~~ #6) NOT(#1) #8 (#7 AND #2) #9 (#7 AND #3)
Number of hits	
RCTs (#8)	116
SR(+MA) (#9)	90
Studies published before 2003	116-106 + 90-88 = 8
Comparatives (#6 AND #4 NOT(#2 OR #3 OR #1))	1985 (1743 published since 2003)
Articles to consider	
DOIs MAs	10.1007/s00590-015-1610-9 10.1177/0363546520948861 10.1186/s12891-023-06403-z 10.1016/j.arth.2017.10.025 10.1016/j.arth.2016.08.019 10.1016/j.knee.2016.11.006 10.1016/s0140-6736(18)32531-5 10.1016/j.arth.2022.01.068 10.1097/md.0000000000009268 10.1371/journal.pone.0228150 10.1007/s00402-020-03336-3 10.1007/s00590-018-2358-9 10.1016/j.joca.2012.11.014 10.1186/s13018-017-0552-9 10.1007/s43465-022-00620-9 10.1111/ans.18244 10.1136/bmj.l352 10.1016/j.knee.2020.10.013
DOIs SRs	10.1007/s00167-020-06129-8 10.1007/s00167-019-05357-x 10.1007/s00264-017-3662-4 10.1111/j.1445-2197.2007.04021.x PMCID: PMC5100444

	10.1016/j.jisako.2022.06.001 10.1016/j.knee.2015.09.011 28005097 10.1007/s00167-016-4167-1
DOIs RCTs	10.1055/s-0031-1280970 10.1016/j.arth.2022.02.076
Include/Excluded after FT screening	
10.1007/s00590-015-1610-9	Exclude – Not on Lateral UKA
10.1177/0363546520948861	Exclude – Not on Lateral UKA
10.1186/s12891-023-06403-z	Exclude – Not on Lateral UKA
10.1016/j.arth.2017.10.025	Exclude – Not on Lateral UKA
10.1016/j.arth.2016.08.019	Exclude – Not on Lateral UKA
10.1016/j.knee.2016.11.006	No Forest plots
10.1016/s0140-6736(18)32531-5	Exclude – Not on Lateral UKA
10.1016/j.arth.2022.01.068	Interesting
10.1097/md.0000000000009268	Exclude – Not on Lateral UKA
10.1371/journal.pone.0228150	Interesting
10.1007/s00402-020-03336-3	Interesting
10.1007/s00590-018-2358-9	Exclude – Not on Lateral UKA
10.1016/j.joca.2012.11.014	Not relevant
10.1186/s13018-017-0552-9	Exclude – Not on Lateral UKA
10.1007/s43465-022-00620-9	Exclude – Not on Lateral UKA
10.1111/ans.18244	Interesting
10.1136/bmj.l352	Exclude – Not on Lateral UKA
10.1016/j.knee.2020.10.013	Interesting
10.1007/s00167-020-06129-8	Interesting
10.1007/s00167-019-05357-x	Interesting
10.1007/s00264-017-3662-4	Interesting
10.1111/j.1445-2197.2007.04021.x	Exclude – Not on Lateral UKA
PMCID: PMC5100444	Exclude – Not on Lateral UKA
10.1016/j.jisako.2022.06.001	Interesting
10.1016/j.knee.2015.09.011	Interesting
28005097	Not retrievable
10.1007/s00167-016-4167-1	Interesting
10.1055/s-0031-1280970	Exclude – Not on Lateral UKA
10.1016/j.arth.2022.02.076	Exclude – Not on Lateral UKA
10.1016/j.knee.2016.06.007	Include
10.1186/s43019-022-00164-0	Include

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#10	•••		Search: **(#5 AND #4) NOT(#2 OR #3 OR #1)** Filters: **from 1900 - 2023/10/4**	1,958	04:15:28
#9	•••		Search: **(#5 AND #4) NOT(#2 OR #3 OR #1)**	1,958	04:14:54
#8	•••		Search: **#6 AND #3** Filters: **from 1900 - 2023/4/27**	90	04:12:03
#7	•••		Search: **#6 AND #2** Filters: **from 1900 - 2023/4/27**	116	04:11:13
#6	•••		Search: **(#4 AND #5) NOT(#1)** Filters: **from 1900 - 2023/4/27**	2,462	04:08:44
#5	•••		Search: **(UKA OR "unilateral knee arthroplasty" OR "uni-lateral knee arthroplasty" OR "unicompartmental knee arthroplasty" OR "uni-compartmental knee arthroplasty" OR "lateral knee arthroplasty " OR "lateral knee replacement" OR "lateral condyle replacement" OR "unicondylar knee replacement")** Filters: **from 1900 - 2023/4/27**	8,783	04:07:29
#4	•••		Search: **(Knee)** Filters: **from 1900 - 2023/4/27**	206,894	04:07:19
#3	•••		Search: **(systematic* AND review*) OR meta-analys* [Title/Abstract] OR meta-analysis OR systematic-review** Filters: **from 1900 - 2023/4/27**	536,020	04:07:09
#2	•••		Search: **"randomized-controlled-trial" OR "Randomized-Controlled-Trials" OR "random-allocation" OR random*[Title] OR RCT** Filters: **from 1900 - 2023/4/27**	996,164	04:07:01
#1	•••		Search: **Animals[Title] OR Cadaver[Title] OR animal*[Title] OR dog[Title] OR dogs[Title] OR canine[Title] OR cats[Title] OR feline[Title] OR horse*[Title] OR equine[Title] OR mouse[Title] OR mice[Title] OR rat[Title] OR rats[Title] OR rabbit*[Title] OR sheep[Title] OR porcine[Title] OR pig[Title] OR pigs[Title] OR rodent*[Title] OR monkey*[Title] OR cadaver*[Title/Abstract] OR "in vitro"[Title/Abstract] OR comment[Publication Type] OR editorial[Publication Type] OR letter[Publication Type] OR "historical article"[Publication Type] OR address[Publication Type] OR news[Publication Type] OR "newspaper article"[Publication Type] OR "case reports"[Publication Type] OR case**	8,482,469	04:06:47

Search	Actions	Details	Query	Results	Time
			report*[Title] OR abstracts[Title] OR editorial[Title] OR reply[Title] OR comment*[Title] OR commentary[Title] OR letter[Title] OR biomechanic*[Title] Filters: **from 1900 - 2023/4/27**		

Showing 1 to 10 of 10 entries

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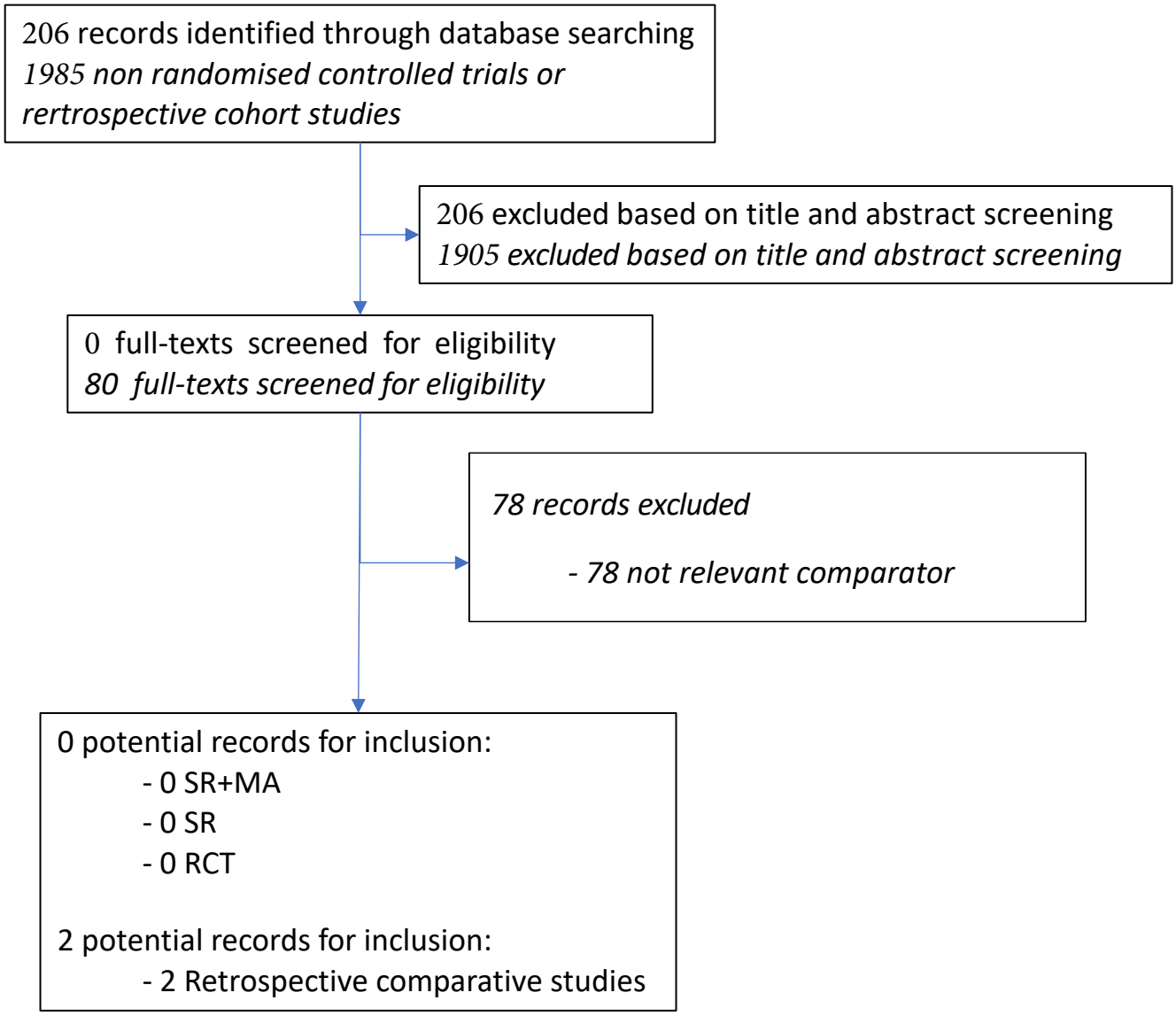
4. Studienselektion: Flowchart

PubMed Search: Does lateral UKA reduce pain and improve function in knees with clinically and radiographically confirmed isolated lateral OA, compared to other surgical treatments?
27/04/2023 & (04/10/2023; Comparative studies)



[1,2]

1. van der List JP, Chawla H, Zuiderbaan HA, Pearle AD (2016) Patients with isolated lateral osteoarthritis: Unicompartmental or total knee arthroplasty? Knee 23 (6):968-974. doi:10.1016/j.knee.2016.06.007
2. Piovan G, Farinelli L, Screpis D, Iacono V, Povegliano L, Bonomo M, Auregli L, Zorzi C (2022) Distal femoral osteotomy versus lateral unicompartmental arthroplasty for isolated lateral tibiofemoral osteoarthritis with intra-articular and extra-articular deformity: a propensity score-matched analysis. Knee Surg Relat Res 34 (1):34. doi:10.1186/s43019-022-00164-0

PICO number:	17	17	17
PICO Question:	Does lateral UKA reduce pain and improve function in knees with clinically and radiographically confirmed isolated lateral OA, compared to other surgical treatments?	Does lateral UKA reduce pain and improve function in knees with clinically and radiographically confirmed isolated lateral OA, compared to other surgical treatments?	Does lateral UKA reduce pain and improve function in knees with clinically and radiographically confirmed isolated lateral OA, compared to other surgical treatments?
Article name:	Patients with isolated lateral osteoarthritis: Unicompartmental or total knee arthroplasty?	Distal femoral osteotomy versus lateral unicompartmental arthroplasty for isolated lateral tibiofemoral osteoarthritis with intra-articular and extra-articular deformity: a propensity score-matched analysis	NO OTHER STUDIES AVAILABLE
Lead author	van der List	Piovan	
Year published	2016	2022	
Number of included studies (if SR with or without MA)	0	0	
Description of intervention group (optional for SRs)	Lateral UKA for isolated lateral OA	Patients who underwent opening-wedge DFO for symptomatic lateral knee OA in valgus knee	

Description of control group (optional for SRs)	TKA for for isolated lateral OA	Patients who underwent lateral UKA for for symptomatic lateral knee OA in valgus knee	
Number of patients in intervention group	61	29	
Number of patients in control group	43	29	
Mean age with range of intervention group	66.2	52.4	
Mean age with range of control group	66.8	53.8	

Inclusion criteria (on patient-level if clinical study; on article-level if SR) **Examples:** **Clinical study: "The inclusion criteria were (i) primary ACLR in (ii) patients aged over 50 years. The exclusion criteria were (iii) severe concomitant ligament injury (grade 3), (iv) tibiofemoral osteoarthritis visible on weight-bearing anteroposterior and/or sagittal radiographs (> 50% joint space narrowing), and (v) history of intra- or extra-articular ligament surgery in either knee."** **SR: "Studies comparing the diagnostic accuracy of physical examination (clinical tests or ultrasound) versus arthroscopy for the assessment of LHBT pathologies"**	Inclusion criteria for the lateral UKA cohort were (I) primary indication of isolated lateral OA, (II) use of tibial onlay implants and (III) functional outcome scores between two-year and five-year follow-up. Inclusion criteria for the TKA cohort were (I) primary indication of isolated lateral OA, (II) functional outcome scores between two-year and five-year follow-up and (III) intact anterior cruciate ligament. Patients were excluded from either cohort if (I) there was OA presence of the medial compartment (KL score > 1) or if there was significant OA of the patellofemoral compartment (i.e. KL score > 2).	We included patients who met the following criteria: lateral knee OA defined as Kellgren–Lawrence (KL) grade III–IV; aged 45–60 years; body mass index (BMI) < 30; Tegner activity level > 4; joint line convergence angle (J LCA) > 3° and mechanical lateral distal femoral angle (mLDFA) < 87°; minimum 2 years of follow-up. We excluded patients who underwent associated procedures during DFO such as meniscus or osteochondral alograft transplant. Patients with preoperative valgus alignment of the lower limb with a hip-knee-ankle (HKA) angle greater than 15° were excluded.	
Follow-up period	2.7 vs 2.9 years	6 years	

Main results	At follow-up, patients undergoing lateral UKA had significantly better overall outcomes (90.5± 11.7 vs. 81.8 ± 17.9, p=0.017), less pain (92.5 ± 11.1 vs. 86.0 ± 14.9, p = 0.036), less stiffness (86.6 ± 16.3 vs. 76.6 ± 19.4, p = 0.024) and better function (90.2 ± 12.6 vs. 80.7 ± 19.3, p = 0.015) than patients undergoing TKA. Regression analysis showed that lateral UKA outcomes were better than TKA outcomes (p = 0.036) when corrected for BMI and OA severity of lateral compartment. No perioperative complications or revisions were reported in both groups at short-term follow-up. Three re-operations of manipulation under anesthesia were performed in the TKA group and one reoperation of partial medial meniscectomy with synovectomy was performed in the lateral UKA group for recurrent hemarthrosis. This was not statistically different (p=0.163). Median and mean postoperative lengths of stay were two and 2.6± 1.0	The DFO group and lateral UKA group consisted of 29 patients. No statistically significant differences in gender, age, BMI, length of follow-up, or limb deformity were reported between the two groups. The medial tibiofemoral and patellofemoral joints were also characterized by a low grade of osteoarthritis in both groups. In the DFO group, OKS was reported to improve from 27.51 to 38.59 ($p < 0.05$) and KOOS from 51.14 to 67.2 ($p < 0.05$). Similarly, in the UKA group, OKS improved from 26.23 to 35.43 ($p < 0.05$) and KOOS from 50.12 to 65.91 ($p < 0.05$). However, the improvement in OKS and KOOS (delta) did not differ between groups ($p = 0.35$ and $p = 0.95$). Moreover, no statistically significant differences were reported between the UKA and DFO groups in terms of baseline or follow-up KOOS values ($p = 0.42$ and $p = 0.63$). Similarly, no significant differences	

	lengths of stay were two and 2.8± 1.0 days (range: one to five), respectively, in the lateral UKA group. This was significantly shorter ($p < 0.001$) when compared to length of stay following TKA surgery (mean 3.9±1.1 days, range: three to seven, median four). In patients younger than 75 years, lateral UKA patients reported better overall outcomes (92.1 ± 9.9 vs. 81.3 ± 19.6, $p = 0.014$), less pain and better function. In patients older than 75 years, neither significant nor clinically relevant differences were observed between lateral UKA and TKA. In patients with BMI below 30, no differences were noted between patients undergoing lateral UKA and TKA in overall outcome (92.1 ± 10.8 vs. 89.1 ± 15.6, $p = 0.406$) and stiffness, pain or function. Similarly, in patients with high BMI, no significant differences were seen,	Similarly, no significant differences were observed for OKS at baseline ($p = 0.40$) or follow-up ($p = 0.75$) between the two groups. No patients in the UKA group underwent revision or other knee surgeries during follow-up. Regarding complications, no infections were detected in either group. In the DFO group, no cases of nonunion or delayed union were reported. However, 40% of DFO patients underwent plate removal. One patient in each group was characterized by the progression of medial OA with Kellgren–Lawrence (KL) grade > 3. The DFO and UKA groups were characterized by similar postoperative alignment of −3.26 and −3.0, respectively. Hence, no significant difference in terms of the HKA angle was reported between the two groups postoperatively ($p = 0.65$).	

	although the number of patients in the lateral UKA group was low. In females, it was noted that patients undergoing lateral UKA reported better overall outcomes (91.6± 9.9 vs. 81.0± 18.2, p=0.014), less pain (93.4±10.0 vs. 84.8±16.3, p=0.029), less stiffness (88.4±14.4 vs. 73.0 ± 24.6, p=0.010) and better function (91.3 ± 10.9 vs. 80.7 ± 19.2, p=0.021)when compared to TKA. In males neither statistically significant nor clinically relevant differences were noted between lateral UKA patients and TKA patients in pain (90.3 ± 13.0 vs. 89.0 ± 11.0, respectively, p = 0.705), stiffness (83.2 ± 19.2 vs. 85.1 ± 16.5, respectively, p = 0.800) and function (88.1 ± 15.3 vs. 80.6 ± 20.8, respectively, p = 0.291) and thus overall outcomes.		

Key findings (use Results and Conclusion in Abstract)	Results: Mean follow-up was 2.8 years (range: 2.0 – 5.0 years). Preoperatively, no differences between lateralUKA and TKA were seen (50.1 ± 13.5 and 53.3±17.1, respectively, p=0.551). Postoperatively, lateral UKA patients reported better overall outcomes than TKA (90.5 ± 11.7 vs. 81.8 ± 17.9, p=0.017). Subgroup analysis showed better outcomes following lateral UKA than TKA in patients younger than 75 years (92.1± 9.9 vs. 81.3 ± 19.6, p = 0.014) and in females (91.6 ± 9.9 vs. 81.0 ± 18.2, p = 0.014). Conclusion: These findings indicate that lateral UKA has superior short-term functional outcomes compared to TKA in patients with isolated lateral OA. Better outcomes were especially seen in younger patients and females. These findings may help orthopedic surgeons choose treatment for patients presenting with lateral OA and optimize	Results: The DFO and lateral UKA groups consisted of 29 patients each. No statistically significant differences in gender, age, body mass index (BMI), length of follow-up, or limb deformity were reported between the two groups. In the DFO group, OKS was reported to improve from 27.51 to 38.59 ($p < 0.05$) and KOOS from 51.14 to 67.2 ($p < 0.05$). Similarly, in the UKA group, OKS improved from 26.23 to 35.43 ($p < 0.05$) and KOOS from 50.12 to 65.91 ($p < 0.05$). However, the improvement in OKS and KOOS (delta) did not differ between groups ($p = 0.35$ and $p = 0.95$). The DFO and UKA groups were characterized by similar postoperative hip-knee-ankle (HKA) angle measurements of −3.26 and −3.00, respectively ($p = 0.65$). No patients in the UKA group underwent revision or other knee surgeries during follow-up. No infections were detected in either group. In the DFO group, no cases of nonunion or	

	and optimize treatment for individual patients.	group, no cases of nonunion or delayed union were reported. However, 40% of DFO patients underwent plate removal. One patient in each group was characterized by progression of medial OA with Kellgren-Lawrence (KL) grade > 3. Conclusion: UKA and DFO represent an effective treatment in lateral knee OA with intra-articular and extra-articular deformity. Both surgeries were able to provide a significant and comparable clinical improvement.	
Assessment tool	ROBINS I	ROBINS I	
ROBINS I Assessment	High	High	
Level of evidence (OxFord 2011)	5	5	

1. Schlüsselfrage und PICO Format	
clinical key question	In adult patients with osteoarthritis undergoing lateral UKA for predominantly unicompartmental OA, are outcomes and/or implant survivorship improved compared to those patients undergoing osteotomy (distal femoral for lateral compartment involvement, proximal tibial for medial compartment involvement, and tibial tubercle for patellofemoral involvement)?
population	patients (> 18) Symptomatic knee oa X ray verified K/L stage 3/4 in one or two compartments indication for partial or total knee arthroplasty
intervention	Unicompartmental lateral knee arthroplasty
comparison	distal femoral for lateral compartment involvement, proximal tibial for medial compartment involvement, and tibial tubercle for patellofemoral involvement
outcome	Primary outcomes (critical): • Pain (validated PROMS) • Physical function (validated PROMS) • Health related quality of life (validated PROMS) Secondary outcomes (important): • Progression to joint replacement • Serious adverse events

2. Recherche Zusammenfassung

Identifier	*ID Ordinal 30*
PICO(T) question	In adult patients with osteoarthritis undergoing lateral UKA for predominantly unicompartmental OA, are outcomes and/or implant survivorship improved compared to those patients undergoing osteotomy (distal femoral for lateral compartment involvement, proximal tibial for medial compartment involvement, and tibial tubercle for patellofemoral involvement)?
Search characteristics	
Date of search	03/05/2023 & 04/10/2023 (Comparative studies)
Initials of primary reader	JHM
Database(s)	*PubMed*
Keywords	*Knee* *osteoarthritis; arthritis; osteoarthros*; gonitis; gonarthritis; gonarthros** UKA HTO DFO DLO
Search strings	*#1 Animals[Title] OR Cadaver[Title] OR animal*[Title] OR dog[Title] OR dogs[Title] OR canine[Title] OR cats[Title] OR feline[Title] OR horse*[Title] OR equine[Title] OR mouse[Title] OR mice[Title] OR rat[Title] OR rats[Title] OR rabbit*[Title] OR sheep[Title] OR porcine[Title] OR pig[Title] OR pigs[Title] OR rodent*[Title] OR monkey*[Title] OR cadaver*[Title/Abstract] OR "in vitro"[Title/Abstract] OR comment[Publication Type] OR editorial[Publication Type] OR letter[Publication Type] OR "historical article"[Publication Type] OR address[Publication Type] OR news[Publication Type] OR "newspaper article" [Publication Type] OR "case reports"[Publication Type] OR case report*[Title] OR abstracts[Title] OR editorial[Title] OR reply[Title] OR comment*[Title] OR commentary[Title] OR letter[Title] OR biomechanic*[Title]* *#2 "randomized-controlled-trial" OR "Randomized-Controlled-Trials" OR "random-allocation" OR random*[Title] OR RCT* *#3 (systematic* AND review*) OR meta-analys*[Title/Abstract] OR meta-analysis OR systematic-review* *#4 (Knee)*

	~~#5 (Osteoarthritis OR arthritis OR osteoarthros* OR gonitis OR gonarthritis OR gonarthros*)~~ #6 (UKA OR "unilateral knee arthroplasty" OR "uni-lateral knee arthroplasty" OR "unicompartmental knee arthroplasty" OR "uni-compartmental knee arthroplasty" OR "lateral knee arthroplasty " OR "lateral knee replacement" OR "lateral condyle replacement" OR "unicondylar knee replacement") AND (osteotomy OR “high tibial osteotomy” OR HTO OR “distal femoral osteotomy” OR DFO) #7 (#4 AND ~~#5 AND~~ #6) NOT(#1) #8 (#7 AND #2) #9 (#7 AND #3)
Number of hits	
RCTs (#8)	8
SR(+MA) (#9)	15
Studies published before 2003	
Comparatives (#6 AND #4 NOT(#2 OR #3 OR #1))	2817 (2550 published since 2003)
Articles to consider	
DOIs MAs	10.1177/0363546520948861 10.1016/j.arth.2017.10.025 10.1016/j.arth.2013.02.010
DOIs SRs	10.1111/j.1445-2197.2007.04021.x
DOIs RCTs	
Include/Excluded after FT screening	
10.1177/0363546520948861	Exclude – not on lateral UKA
10.1016/j.arth.2017.10.025	Exclude – not on lateral UKA
10.1016/j.arth.2013.02.010	Exclude – not on lateral UKA
10.1111/j.1445-2197.2007.04021.x	Exclude – not on lateral UKA
10.1186/s43019-022-00164-0	Include

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ADD

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Query box

Enter / edit your search query here

Add to History

Quoted phrases not found in phrase index: "uni-lateral knee arthroplasty", "lateral knee replacement", "lateral condyle replacement"

History and Search Details

Search	Actions	Details	Query	Results	Time
#9	•••		Search: **#7 AND #3**	15	09:00:05
#8	•••		Search: **#7 AND #2**	8	08:59:56
#7	•••		Search: **(#4 AND #6) NOT(#1)**	234	08:59:45
#6	•••		Search: **(UKA OR "unilateral knee arthroplasty" OR "uni-lateral knee arthroplasty" OR "unicompartmental knee arthroplasty" OR "uni-compartmental knee arthroplasty" OR "lateral knee arthroplasty " OR "lateral knee replacement" OR "lateral condyle replacement" OR "unicondylar knee replacement") AND (osteotomy OR "high tibial osteotomy" OR HTO OR "distal femoral osteotomy" OR DFO)**	760	08:59:05
#5	•••		Search: **(Osteoarthritis OR arthritis OR osteoarthros* OR gonitis OR gonarthritis OR gonarthros*)**	416,596	08:58:57
#4	•••		Search: **Knee**	206,123	08:58:28
#3	•••		Search: **(systematic* AND review*) OR meta-analys* [Title/Abstract] OR meta-analysis OR systematic-review**	529,145	08:58:23
#2	•••		Search: **"randomized-controlled-trial" OR "Randomized-Controlled-Trials" OR "random-allocation" OR random*[Title] OR RCT**	990,513	08:58:16
#1	•••		Search: **Animals[Title] OR Cadaver[Title] OR animal*[Title] OR dog[Title] OR dogs[Title] OR canine[Title] OR cats[Title] OR feline[Title] OR horse*[Title] OR equine[Title] OR mouse[Title] OR mice[Title] OR rat[Title] OR rats[Title] OR rabbit*[Title] OR sheep[Title] OR porcine[Title] OR pig[Title] OR pigs[Title] OR rodent*[Title] OR monkey*[Title] OR cadaver*[Title/Abstract] OR "in vitro"[Title/Abstract] OR comment[Publication Type] OR editorial[Publication Type] OR letter[Publication Type] OR "historical article"[Publication Type] OR address[Publication Type] OR news[Publication Type] OR "newspaper article" [Publication Type] OR "case reports"[Publication Type] OR case report*[Title] OR abstracts[Title] OR editorial[Title] OR reply[Title] OR comment*[Title] OR commentary[Title] OR letter[Title] OR biomechanic*[Title]**	8,459,001	08:58:07

Showing 1 to 9 of 9 entries

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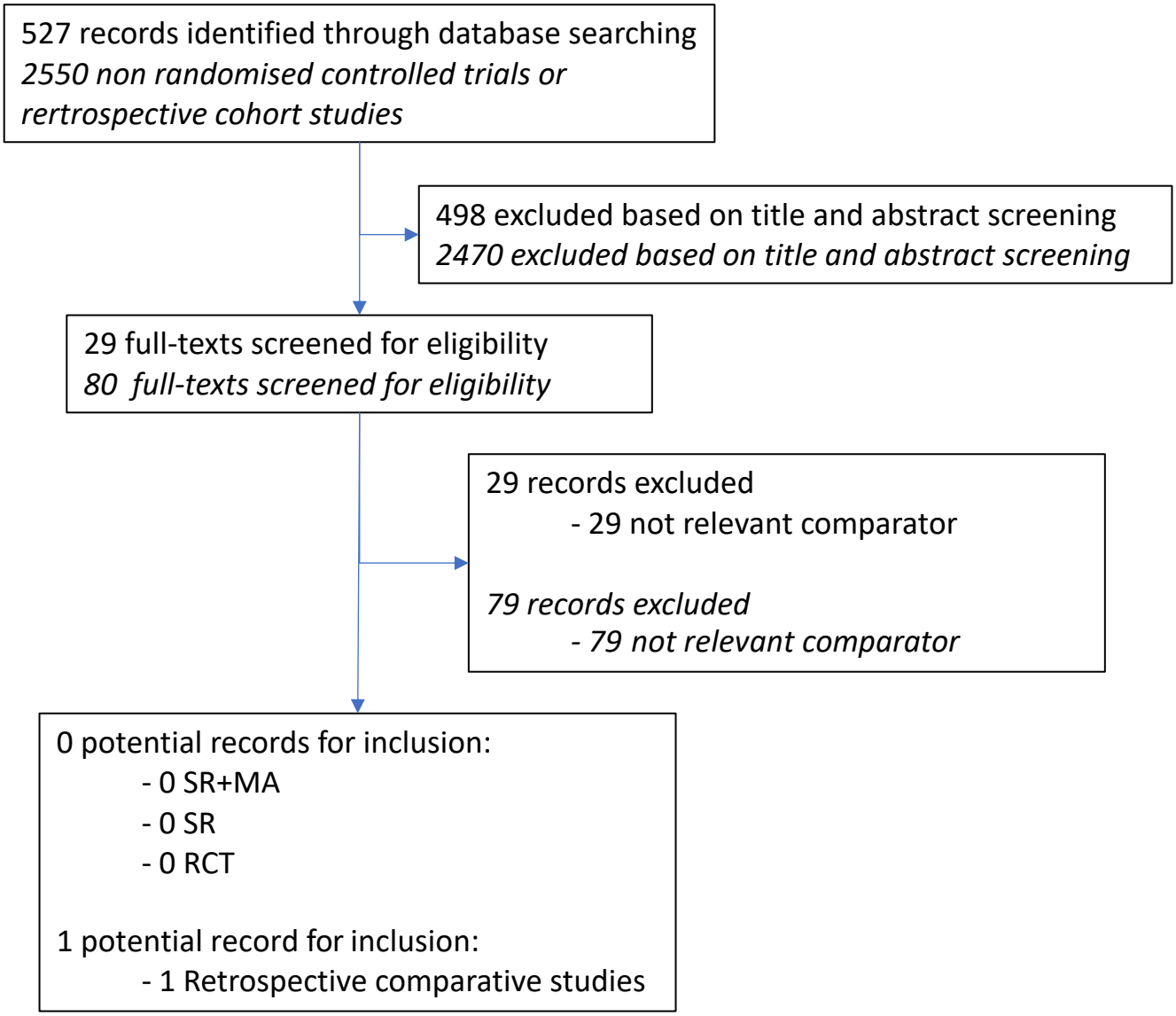
4. Studienselektion: Flowchart

PubMed Search: In adult patients with osteoarthritis undergoing lateral UKA for predominantly unicompartmental OA, are outcomes and/or implant survivorship improved compared to those patients undergoing osteotomy (distal femoral for lateral compartment involvement, proximal tibial for medial compartment involvement, and tibial tubercle for patellofemoral involvement)?27/04/2023 & (04/10/2023; Comparative studies)



Included comparative

(1)

1. Piovan G, Farinelli L, Screpis D, Iacono V, Povegliano L, Bonomo M, Auregli L, Zorzi C (2022) Distal femoral osteotomy versus lateral unicompartmental arthroplasty for isolated lateral tibiofemoral osteoarthritis with intra-articular and extra-articular deformity: a propensity score-matched analysis. Knee Surg Relat Res 34 (1):34. doi:10.1186/s43019-022-00164-0

5. Charakteristika der eingeschlossenen Studien

PICO number:	30	30	30
PICO Question:	In adult patients with osteoarthritis undergoing lateral UKA for predominantly unicompartmental OA, are outcomes and/or implant survivorship improved compared to those patients undergoing osteotomy (distal femoral for lateral compartment involvement, proximal tibial for medial compartment involvement, and tibial tubercle for patellofemoral involvement)?	In adult patients with osteoarthritis undergoing lateral UKA for predominantly unicompartmental OA, are outcomes and/or implant survivorship improved compared to those patients undergoing osteotomy (distal femoral for lateral compartment involvement, proximal tibial for medial compartment involvement, and tibial tubercle for patellofemoral involvement)?	In adult patients with osteoarthritis undergoing lateral UKA for predominantly unicompartmental OA, are outcomes and/or implant survivorship improved compared to those patients undergoing osteotomy (distal femoral for lateral compartment involvement, proximal tibial for medial compartment involvement, and tibial tubercle for patellofemoral involvement)?
Article name:	Distal femoral osteotomy versus lateral unicompartmental arthroplasty for isolated lateral tibiofemoral osteoarthritis with intra-articular and extra-articular deformity: a propensity score-matched analysis	NO OTHER STUDIES AVAILABLE	NO OTHER STUDIES AVAILABLE
Lead author	Piovan		
Year published	2022		
Number of included studies (if SR with or without MA)	0		
Description of intervention group (optional for SRs)	Patients who underwent opening-wedge DFO for symptomatic lateral knee OA in valgus knee		
Description of control group (optional for SRs)	Patients who underwent lateral UKA for for symptomatic lateral knee OA in valgus knee		
Number of patients in intervention group	29		
Number of patients in control group	29		
Mean age with range of intervention group	52.4		
Mean age with range of control group	53.8		

Inclusion criteria (on patient-level if clinical study; on article-level if SR) **Examples:** **Clinical study: "The inclusion criteria were (i) primary ACLR in (ii) patients aged over 50 years. The exclusion criteria were (iii) severe concomitant ligament injury (grade 3), (iv) tibiofemoral osteoarthritis visible on weight-bearing anteroposterior and/or sagittal radiographs (> 50% joint space narrowing), and (v) history of intra- or extra-articular ligament surgery in either knee."** **SR: "Studies comparing the diagnostic accuracy of physical examination (clinical tests or ultrasound) versus arthroscopy for the assessment of LHBT pathologies"**	We included patients who met the following criteria: lateral knee OA defined as Kellgren–Lawrence (KL) grade III–IV; aged 45–60 years; body mass index (BMI) < 30; Tegner activity level > 4; joint line convergence angle (J LCA) > 3° and mechanical lateral distal femoral angle (mLDFA) < 87°; minimum 2 years of follow-up. We excluded patients who underwent associated procedures during DFO such as meniscus or osteochondral alograft transplant. Patients with preoperative valgus alignment of the lower limb with a hip-knee-ankle (HKA) angle greater than 15° were excluded.		
Follow-up period	6 years		

Main results	The DFO group and lateral UKA group consisted of 29 patients. No statistically significant differences in gender, age, BMI, length of follow-up, or limb deformity were reported between the two groups. The medial tibiofemoral and patellofemoral joints were also characterized by a low grade of osteoarthritis in both groups. In the DFO group, OKS was reported to improve from 27.51 to 38.59 ($p < 0.05$) and KOOS from 51.14 to 67.2 ($p < 0.05$). Similarly, in the UKA group, OKS improved from 26.23 to 35.43 ($p < 0.05$) and KOOS from 50.12 to 65.91 ($p < 0.05$). However, the improvement in OKS and KOOS (delta) did not differ between groups ($p = 0.35$ and $p = 0.95$). Moreover, no statistically significant differences were reported between the UKA and DFO groups in terms of baseline or follow-up KOOS values ($p = 0.42$ and $p = 0.63$). Similarly, no significant differences were observed for OKS at baseline ($p = 0.40$) or follow-up ($p = 0.75$) between the two groups. No patients in the UKA group underwent revision or other knee surgeries during follow-up. Regarding complications, no infections were detected in either group. In the DFO group, no cases of nonunion or delayed union were reported. However, 40% of DFO		

	were reported. However, 40% of DFO patients underwent plate removal. One patient in each group was characterized by the progression of medial OA with Kellgren–Lawrence (KL) grade > 3. The DFO and UKA groups were characterized by similar postoperative alignment of −3.26 and −3.0, respectively. Hence, no significant difference in terms of the HKA angle was reported between the two groups postoperatively (p = 0.65).		

Key findings (use Results and Conclusion in Abstract)	Results: The DFO and lateral UKA groups consisted of 29 patients each. No statistically significant differences in gender, age, body mass index (BMI), length of follow-up, or limb deformity were reported between the two groups. In the DFO group, OKS was reported to improve from 27.51 to 38.59 ($p < 0.05$) and KOOS from 51.14 to 67.2 ($p < 0.05$). Similarly, in the UKA group, OKS improved from 26.23 to 35.43 ($p < 0.05$) and KOOS from 50.12 to 65.91 ($p < 0.05$). However, the improvement in OKS and KOOS (delta) did not differ between groups ($p = 0.35$ and $p = 0.95$). The DFO and UKA groups were characterized by similar postoperative hip-knee-ankle (HKA) angle measurements of −3.26 and −3.00, respectively ($p = 0.65$). No patients in the UKA group underwent revision or other knee surgeries during follow-up. No infections were detected in either group. In the DFO group, no cases of nonunion or delayed union were reported. However, 40% of DFO patients underwent plate removal. One patient in each group was characterized by progression of medial OA with Kellgren-Lawrence (KL) grade > 3. Conclusion: UKA and DFO represent an effective treatment in lateral knee OA with intra-articular and extra-articular deformity. Both surgeries were able to provide a significant and comparable clinical improvement.		
Type of Study	Retrospective non-randomised study (ROBINS I)		

Assessment tool	ROBINS I		
Overall Assessment	High		
Level of evidence (Oxford 2011)	5		

1. Schlüsselfrage und PICO Format	
clinical key question	In adult patients with osteoarthritis undergoing lateral UKA for predominantly unicompartmental OA, are outcomes and/or implant survivorship improved compared to those patients undergoing TKA?
population	Adults with isolated medial or lateral: • symptomatic knee OA (clinically confirmed), and • K/L stage 2/3/4 (radiographically confirmed)
intervention	Unicompartmental knee arthroplasty
Comparison	• Total knee arthroplasty
outcome	• Progression of OA (within same/other compartments) • Adverse events requiring readmission, reoperation, or arthroplasty • Clinical and functional scores (validated PROMS): o Pain o Physical function o Health related quality of life o Satisfaction

2. Recherche Zusammenfassung

Identifier	*ID Ordinal 32*
PICO(T) question	In adult patients with osteoarthritis undergoing lateral UKA for predominantly unicompartmental OA, are outcomes and/or implant survivorship improved compared to those patients undergoing TKA?
Search characteristics	
Date of search	03/05/2023 & 04/10/2023 (Comparative studies)
Initials of primary reader	JHM
Database(s)	*PubMed*
Keywords	*Knee* *osteoarthritis; arthritis; osteoarthros*; gonitis; gonarthritis; gonarthros** UKA TKA
Search strings	*#1 Animals[Title] OR Cadaver[Title] OR animal*[Title] OR dog[Title] OR dogs[Title] OR canine[Title] OR cats[Title] OR feline[Title] OR horse*[Title] OR equine[Title] OR mouse[Title] OR mice[Title] OR rat[Title] OR rats[Title] OR rabbit*[Title] OR sheep[Title] OR porcine[Title] OR pig[Title] OR pigs[Title] OR rodent*[Title] OR monkey*[Title] OR cadaver*[Title/Abstract] OR "in vitro"[Title/Abstract] OR comment[Publication Type] OR editorial[Publication Type] OR letter[Publication Type] OR "historical article"[Publication Type] OR address[Publication Type] OR news[Publication Type] OR "newspaper article" [Publication Type] OR "case reports"[Publication Type] OR case report*[Title] OR abstracts[Title] OR editorial[Title] OR reply[Title] OR comment*[Title] OR commentary[Title] OR letter[Title] OR biomechanic*[Title]* *#2 "randomized-controlled-trial" OR "Randomized-Controlled-Trials" OR "random-allocation" OR random*[Title] OR RCT* *#3 (systematic* AND review*) OR meta-analys*[Title/Abstract] OR meta-analysis OR systematic-review* *#4 (Knee)*

	~~*#5 (Osteoarthritis OR arthritis OR osteoarthros* OR gonitis OR gonarthritis OR gonarthros*)*~~ #6 (UKA OR "unilateral knee arthroplasty" OR "uni-lateral knee arthroplasty" OR "unicompartmental knee arthroplasty" OR "uni-compartmental knee arthroplasty" OR "lateral knee arthroplasty " OR "lateral knee replacement" OR "lateral condyle replacement" OR "unicondylar knee replacement") AND (TKA OR TKR OR "total knee arthroplasty" OR "total knee replacement") #7 (#4 AND ~~#5 AND~~ #6) NOT(#1) #8 (#7 AND #2) #9 (#7 AND #3)
Number of hits	
RCTs (#8)	89
SR(+MA) (#9)	47
Studies published before 2003	89-80 + 47-46 = 10
Comparatives (#6 AND #4 NOT(#2 OR #3 OR #1))	2817 (2550 published since 2003)
Articles to consider	
DOIs MAs	10.1016/j.joca.2012.11.014
DOIs SRs	
DOIs RCTs	
Include/Excluded after FT screening	
10.1016/j.joca.2012.11.014	Not relevant – Not on lateral UKA
10.1016/j.knee.2016.06.007	Include

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PubMed Advanced Search Builder

Add terms to the query box

All Fields

Enter a search term

ADD

Show Index

Query box

Enter / edit your search query here

Add to History

Quoted phrases not found in phrase index: "uni-lateral knee arthroplasty", "lateral knee replacement", "lateral condyle replacement"

History and Search Details

Search	Actions	Details	Query	Results	Time
#9	•••		Search: **#7 AND #3**	47	09:19:33
#8	•••		Search: **(#7 AND #2)**	89	09:19:23
#7	•••		Search: **(#4 AND #6) NOT(#1)**	1,485	09:18:57
#6	•••		Search: **(UKA OR "unilateral knee arthroplasty" OR "uni-lateral knee arthroplasty" OR "unicompartmental knee arthroplasty" OR "uni-compartmental knee arthroplasty" OR "lateral knee arthroplasty " OR "lateral knee replacement" OR "lateral condyle replacement" OR "unicondylar knee replacement") AND (TKA OR TKR OR "total knee arthroplasty" OR "total knee replacement")**	3,474	09:18:43
#5	•••		Search: **(Osteoarthritis OR arthritis OR osteoarthros* OR gonitis OR gonarthritis OR gonarthros*)**	416,596	08:58:57
#4	•••		Search: **Knee**	206,123	08:58:28
#3	•••		Search: **(systematic* AND review*) OR meta-analys* [Title/Abstract] OR meta-analysis OR systematic-review**	529,145	08:58:23
#2	•••		Search: **"randomized-controlled-trial" OR "Randomized-Controlled-Trials" OR "random-allocation" OR random*[Title] OR RCT**	990,513	08:58:16
#1	•••		Search: **Animals[Title] OR Cadaver[Title] OR animal*[Title] OR dog[Title] OR dogs[Title] OR canine[Title] OR cats[Title] OR feline[Title] OR horse*[Title] OR equine[Title] OR mouse[Title] OR mice[Title] OR rat[Title] OR rats[Title] OR rabbit*[Title] OR sheep[Title] OR porcine[Title] OR pig[Title] OR pigs[Title] OR rodent*[Title] OR monkey*[Title] OR cadaver*[Title/Abstract] OR "in vitro"[Title/Abstract] OR comment[Publication Type] OR editorial[Publication Type] OR letter[Publication Type] OR "historical article"[Publication Type] OR address[Publication Type] OR news[Publication Type] OR "newspaper article" [Publication Type] OR "case reports"[Publication Type] OR case report*[Title] OR abstracts[Title] OR editorial[Title] OR reply[Title] OR comment*[Title] OR commentary[Title] OR letter[Title] OR biomechanic*[Title]**	8,459,001	08:58:07

Showing 1 to 9 of 9 entries

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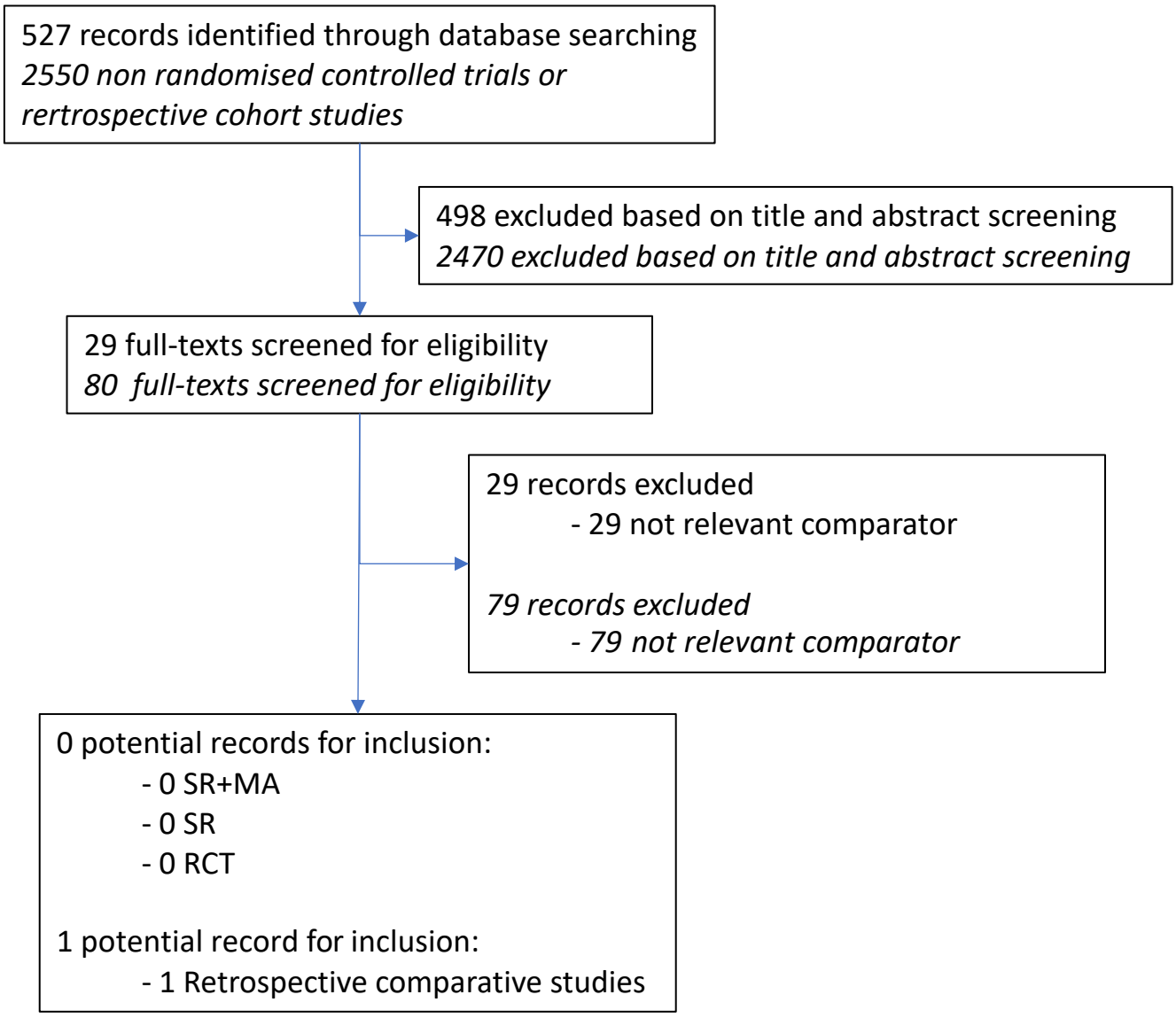
4. Studienselektion: Flowchart

PubMed Search: In adult patients with osteoarthritis undergoing lateral UKA for predominantly unicompartmental OA, are outcomes and/or implant survivorship improved compared to those patients undergoing TKA?27/04/2023 & (04/10/2023; Comparative studies)



Included comparative study

1. van der List JP, Chawla H, Zuiderbaan HA, Pearle AD. Patients with isolated lateral osteoarthritis: Unicompartmental or total knee arthroplasty? Knee. 2016 Dec;23(6):968-974. doi: 10.1016/j.knee.2016.06.007. Epub 2016 Oct 31. PMID: 27810429.

5. Charakteristika der eingeschlossenen Studien

PICO number:	32	32	32
PICO Question:	In adult patients with osteoarthritis undergoing lateral UKA for predominantly unicompartmental OA, are outcomes and/or implant survivorship improved compared to those patients undergoing TKA?	In adult patients with osteoarthritis undergoing lateral UKA for predominantly unicompartmental OA, are outcomes and/or implant survivorship improved compared to those patients undergoing TKA?	In adult patients with osteoarthritis undergoing lateral UKA for predominantly unicompartmental OA, are outcomes and/or implant survivorship improved compared to those patients undergoing TKA?
Article name:	Patients with isolated lateral osteoarthritis: Unicompartmental or total knee arthroplasty?	NO OTHER STUDIES AVAILABLE	NO OTHER STUDIES AVAILABLE
Lead author	van der List		
Year published	2016		
Number of included studies (if SR with or without MA)	0		
Description of intervention group (optional for SRs)	Lateral UKA for isolated lateral OA		
Description of control group (optional for SRs)	TKA for for isolated lateral OA		
Number of patients in intervention group	61		
Number of patients in control group	43		
Mean age with range of intervention group	66.2		
Mean age with range of control group			

Inclusion criteria (on patient-level if clinical study; on article-level if SR) **Examples:** **Clinical study: "The inclusion criteria were (i) primary ACLR in (ii) patients aged over 50 years. The exclusion criteria were (iii) severe concomitant ligament injury (grade 3), (iv) tibiofemoral osteoarthritis visible on weight-bearing anteroposterior and/or sagittal radiographs (> 50% joint space narrowing), and (v) history of intra- or extra-articular ligament surgery in either knee."** **SR: "Studies comparing the diagnostic accuracy of physical examination (clinical tests or ultrasound) versus arthroscopy for the assessment of LHBT pathologies"**	Inclusion criteria for the lateral UKA cohort were (I) primary indication of isolated lateral OA, (II) use of tibial onlay implants and (III) functional outcome scores between two-year and five-year follow-up. Inclusion criteria for the TKA cohort were (I) primary indication of isolated lateral OA, (II) functional outcome scores between two-year and five-year follow-up and (III) intact anterior cruciate ligament. Patients were excluded from either cohort if (I) there was OA presence of the medial compartment (KL score > 1) or if there was significant OA of the patellofemoral compartment (i.e. KL score > 2).		
Follow-up period	2.7 vs 2.9 years		

Main results	At follow-up, patients undergoing lateral UKA had significantly better overall outcomes (90.5± 11.7 vs. 81.8 ± 17.9, p=0.017), less pain (92.5 ± 11.1 vs. 86.0 ± 14.9, p = 0.036), less stiffness (86.6 ± 16.3 vs. 76.6 ± 19.4, p = 0.024) and better function (90.2 ± 12.6 vs. 80.7 ± 19.3, p = 0.015) than patients undergoing TKA. Regression analysis showed that lateral UKA outcomes were better than TKA outcomes (p = 0.036) when corrected for BMI and OA severity of lateral compartment. No perioperative complications or revisions were reported in both groups at short-term follow-up. Three re-operations of manipulation under anesthesia were performed in the TKA group and one reoperation of partial medial meniscectomy with synovectomy was performed in the lateral UKA group for recurrent hemarthrosis. This was not statistically different (p=0.163). Median and mean postoperative lengths of stay were two and 2.6± 1.0 days (range: one to five), respectively, in the lateral UKA group. This was significantly shorter (p < 0.001) when compared to length of stay following TKA surgery (mean 3.9±1.1 days, range: three to seven, median four). In patients younger than 75 years, lateral UKA patients reported better		

	patients reported better overall outcomes (92.1 ± 9.9 vs. 81.3 ± 19.6, p = 0.014), less pain and better function. In patients older than 75 years, neither significant nor clinically relevant differences were observed between lateral UKA and TKA. In patients with BMI below 30, no differences were noted between patients undergoing lateral UKA and TKA in overall outcome (92.1 ± 10.8 vs. 89.1 ± 15.6, p = 0.406) and stiffness, pain or function. Similarly, in patients with high BMI, no significant differences were seen, although the number of patients in the lateral UKA group was low. In females, it was noted that patients undergoing lateral UKA reported better overall outcomes (91.6± 9.9 vs. 81.0± 18.2, p=0.014), less pain (93.4±10.0 vs. 84.8±16.3, p=0.029), less stiffness (88.4±14.4 vs. 73.0 ± 24.6, p=0.010) and better function (91.3 ± 10.9 vs. 80.7 ± 19.2, p=0.021)when compared to TKA. In males neither statistically significant nor clinically relevant differences were noted between lateral UKA patients and TKA patients in pain (90.3 ± 13.0 vs. 89.0 ± 11.0, respectively, p = 0.705), stiffness (83.2 ± 19.2 vs. 85.1 ± 16.5, respectively, p = 0.800) and function (88.1 ± 15.3 vs. 80.6 ± 20.8, respectively, p = 0.291) and thus overall outcomes.		

Key findings (use Results and Conclusion in Abstract)	Results: Mean follow-up was 2.8 years (range: 2.0 – 5.0 years). Preoperatively, no differences between lateralUKA and TKA were seen (50.1 ± 13.5 and 53.3±17.1, respectively, p=0.551). Postoperatively, lateral UKA patients reported better overall outcomes than TKA (90.5 ± 11.7 vs. 81.8 ± 17.9, p=0.017). Subgroup analysis showed better outcomes following lateral UKA than TKA in patients younger than 75 years (92.1± 9.9 vs. 81.3 ± 19.6, p = 0.014) and in females (91.6 ± 9.9 vs. 81.0 ± 18.2, p = 0.014). Conclusion: These findings indicate that lateral UKA has superior short-term functional outcomes compared to TKA in patients with isolated lateral OA. Better outcomes were especially seen in younger patients and females. These findings may help orthopedic surgeons choose treatment for patients presenting with lateral OA and optimize treatment for individual patients.		
Type of Study	Retrospective non-randomised study (ROBINS I)		
Assessment tool	ROBINS I		
Overall Assessment	High		
Level of evidence (Oxford 2011)	5		

70. Statement	Neu 2024
Aufgrund fehlender Evidenz ist eine Empfehlung zu Roboter-Assistenzsystemen bei lateralen unikondylären Endoprothesen nicht möglich. Die Leitlinienkommission vermutet ähnliche Ergebnisse beim lateralen unikompartimentellen Kniegelenksersatz und PFA hinsichtlich des radiologischen und funktionellen Ergebnisses durch den Einsatz von Roboter-Assistenzsystemen wie beim medialen unikompartimentellen Kniegelenksersatz (siehe 67. Empfehlung).	
Konsensstärke	100% (starker Konsens)

1. Schlüsselfrage und PICO Format	**(Lateral UKA)**
clinical key question	In adult patients with osteoarthritis undergoing lateral UKA, does robotic assistance technology improve outcomes and/or decrease complications when compared to other techniques?
Population	patients (> 18) Symptomatic knee oa X ray verified K/L stage 2/3/4 indications for lateral UKA
intervention	UKA with robotic-assistance technology
comparison	standard care UKA
outcome	Primary outcomes (critical): • survival of implant • Serious adverse events • Pain (validated PROMS) • Physical function (validated PROMS) • Health related quality of life (validated PROMS)

2. Recherche Zusammenfassung

Identifier	*ID Ordinal 53*
PICO(T) question	In adult patients with osteoarthritis undergoing lateral UKA, does robotic assistance technology improve outcomes and/or decrease complications when compared to other techniques?
Search characteristics	
Date of search	18/05/2023
Initials of primary reader	JHM
Database(s)	*PubMed*
Keywords	*Knee* *osteoarthritis; arthritis; osteoarthros*; gonitis; gonarthritis; gonarthros** Robot; lateral UKA
Search strings	*#1 Animals[Title] OR Cadaver[Title] OR animal*[Title] OR dog[Title] OR dogs[Title] OR canine[Title] OR cats[Title] OR feline[Title] OR horse*[Title] OR equine[Title] OR mouse[Title] OR mice[Title] OR rat[Title] OR rats[Title] OR rabbit*[Title] OR sheep[Title] OR porcine[Title] OR pig[Title] OR pigs[Title] OR rodent*[Title] OR monkey*[Title] OR cadaver*[Title/Abstract] OR "in vitro"[Title/Abstract] OR comment[Publication Type] OR editorial[Publication Type] OR letter[Publication Type] OR "historical article"[Publication Type] OR address[Publication Type] OR news[Publication Type] OR "newspaper article" [Publication Type] OR "case reports"[Publication Type] OR case report*[Title] OR abstracts[Title] OR editorial[Title] OR reply[Title] OR comment*[Title] OR commentary[Title] OR letter[Title] OR biomechanic*[Title]* *#2 "randomized-controlled-trial" OR "Randomized-Controlled-Trials" OR "random-allocation" OR random*[Title] OR RCT* *#3 (systematic* AND review*) OR meta-analys*[Title/Abstract] OR meta-analysis OR systematic-review* *#4 (Knee)*

	~~*#5 (Osteoarthritis OR arthritis OR osteoarthros* OR gonitis OR gonarthritis OR gonarthros*)*~~ #6 ("knee arthroplasty" OR "knee replacement" OR KA) AND (robot OR robotic OR robot*) #7 (#4 AND ~~#5 AND~~ #6) NOT(#1) #8 (#7 AND #2) #9 (#7 AND #3)
Number of hits	
RCTs (#8)	69
SR(+MA) (#9)	73
Studies published before 2003	(69-68) + (73-73) = 1
Comparatives (#6 AND #4 NOT(#2 OR #3 OR #1))	2817 (2550 published since 2003)
Articles to consider	
DOIs MAs	
DOIs SRs	
DOIs RCTs	
DOIs Comparative	
Include/Excluded after FT screening	

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All Fields

Enter a search term

ADD

Show Index

Query box

Enter / edit your search query here

Add to History

History and Search Details

Search	Actions	Details	Query	Results	Time
#9	•••		Search: **#7 AND #3**	73	06:12:38
#8	•••		Search: **#7 AND #2**	69	06:12:30
#7	•••		Search: **(#4 AND #6) NOT #1**	778	06:12:21
#6	•••		Search: **("knee arthroplasty" OR "knee replacement" OR KA) AND (robot OR robotic OR robot*)**	1,037	06:11:58
#5	•••		Search: **(Osteoarthritis OR arthritis OR osteoarthros* OR gonitis OR gonarthritis OR gonarthros*)**	417,332	06:11:50
#4	•••		Search: **Knee**	206,608	06:11:43
#3	•••		Search: **(systematic* AND review*) OR meta-analys* [Title/Abstract] OR meta-analysis OR systematic-review**	531,599	06:11:37
#2	•••		Search: **"randomized-controlled-trial" OR "Randomized-Controlled-Trials" OR "random-allocation" OR random*[Title] OR RCT**	992,466	06:11:30
#1	•••		Search: **Animals[Title] OR Cadaver[Title] OR animal*[Title] OR dog[Title] OR dogs[Title] OR canine[Title] OR cats[Title] OR feline[Title] OR horse*[Title] OR equine[Title] OR mouse[Title] OR mice[Title] OR rat[Title] OR rats[Title] OR rabbit*[Title] OR sheep[Title] OR porcine[Title] OR pig[Title] OR pigs[Title] OR rodent*[Title] OR monkey*[Title] OR cadaver*[Title/Abstract] OR "in vitro"[Title/Abstract] OR comment[Publication Type] OR editorial[Publication Type] OR letter[Publication Type] OR "historical article"[Publication Type] OR address[Publication Type] OR news[Publication Type] OR "newspaper article"[Publication Type] OR "case reports"[Publication Type] OR case report*[Title] OR abstracts[Title] OR editorial[Title] OR reply[Title] OR comment*[Title] OR commentary[Title] OR letter[Title] OR biomechanic*[Title]**	8,471,453	06:11:23

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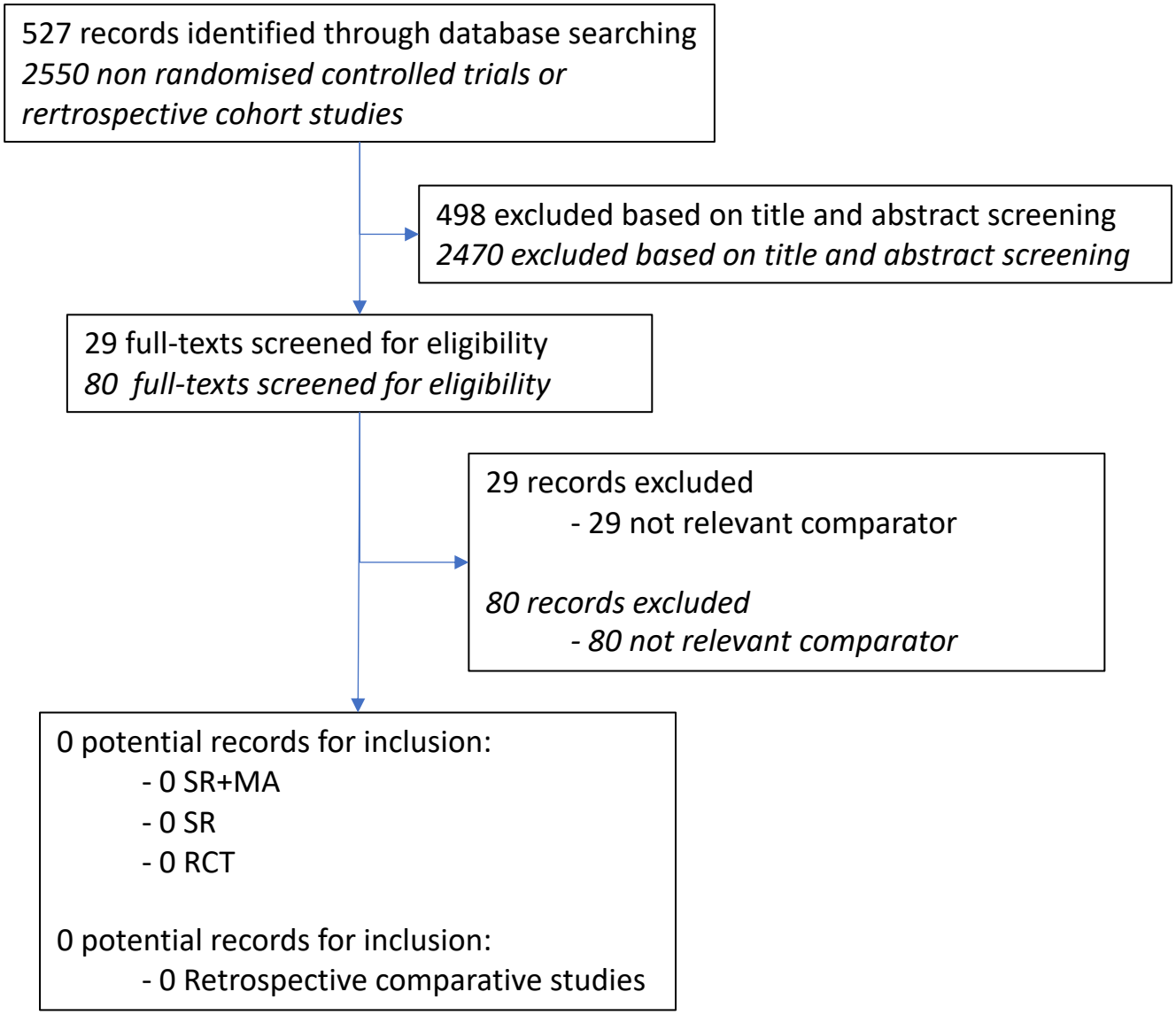
4. Studienselektion: Flowchart

PubMed Search: In adult patients with osteoarthritis undergoing lateral UKA, does robotic assistance technology improve outcomes and/or decrease complications when compared to other techniques?27/04/2023 & (04/10/2023; Comparative studies)



1. Schlüsselfrage und PICO Format	
clinical key question	In adult patients with osteoarthritis undergoing PFA, does robotic assistance technology improve outcomes and/or decrease complications when compared to other techniques?
Population	patients (> 18) Symptomatic knee oa X ray verified K/L stage 2/3/4 indications for PFA
intervention	PFA with robotic-assistance technology
comparison	standard care PFA
outcome	Primary outcomes (critical): • survival of implant • Serious adverse events • Pain (validated PROMS) • Physical function (validated PROMS) • Health related quality of life (validated PROMS)

2. Recherche Zusammenfassung

Identifier	*ID Ordinal 54*
PICO(T) question	In adult patients with osteoarthritis undergoing PFA, does robotic assistance technology improve outcomes and/or decrease complications when compared to other techniques?
Search characteristics	
Date of search	18/05/2023
Initials of primary reader	JHM
Database(s)	*PubMed*
Keywords	*Knee* *osteoarthritis; arthritis; osteoarthros*; gonitis; gonarthritis; gonarthros** Robot; PFA
Search strings	*#1 Animals[Title] OR Cadaver[Title] OR animal*[Title] OR dog[Title] OR dogs[Title] OR canine[Title] OR cats[Title] OR feline[Title] OR horse*[Title] OR equine[Title] OR mouse[Title] OR mice[Title] OR rat[Title] OR rats[Title] OR rabbit*[Title] OR sheep[Title] OR porcine[Title] OR pig[Title] OR pigs[Title] OR rodent*[Title] OR monkey*[Title] OR cadaver*[Title/Abstract] OR "in vitro"[Title/Abstract] OR comment[Publication Type] OR editorial[Publication Type] OR letter[Publication Type] OR "historical article"[Publication Type] OR address[Publication Type] OR news[Publication Type] OR "newspaper article" [Publication Type] OR "case reports"[Publication Type] OR case report*[Title] OR abstracts[Title] OR editorial[Title] OR reply[Title] OR comment*[Title] OR commentary[Title] OR letter[Title] OR biomechanic*[Title]* *#2 "randomized-controlled-trial" OR "Randomized-Controlled-Trials" OR "random-allocation" OR random*[Title] OR RCT* *#3 (systematic* AND review*) OR meta-analys*[Title/Abstract] OR meta-analysis OR systematic-review* *#4 (Knee)*

	~~*#5 (Osteoarthritis OR arthritis OR osteoarthros* OR gonitis OR gonarthritis OR gonarthros*)*~~ #6 ("knee arthroplasty" OR "knee replacement" OR KA) AND (robot OR robotic OR robot*) #7 (#4 AND ~~#5 AND~~ #6) NOT(#1) #8 (#7 AND #2) #9 (#7 AND #3)
Number of hits	
RCTs (#8)	69
SR(+MA) (#9)	73
Studies published before 2003	(69-68) + (73-73) = 1
Comparative studies (Non RCTs) (#6 AND #4) NOT(#1 OR #2 OR #3)	401
Articles to consider	
DOIs MAs	
DOIs SRs	
DOIs RCTs	
Include/Excluded after FT screening	

Data extraction

DOI		
Study type		
Setting		
Population		
Intervention		
Comparator		
Outcomes (Adhere to the outcomes added in the PICO statements for DGOU)		
Timeframe		
Key/Concluding statements		

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History and Search Details

Search	Actions	Details	Query	Results	Time
#9	•••		Search: **#7 AND #3**	73	06:12:38
#8	•••		Search: **#7 AND #2**	69	06:12:30
#7	•••		Search: **(#4 AND #6) NOT #1**	778	06:12:21
#6	•••		Search: **("knee arthroplasty" OR "knee replacement" OR KA) AND (robot OR robotic OR robot*)**	1,037	06:11:58
#5	•••		Search: **(Osteoarthritis OR arthritis OR osteoarthros* OR gonitis OR gonarthritis OR gonarthros*)**	417,332	06:11:50
#4	•••		Search: **Knee**	206,608	06:11:43
#3	•••		Search: **(systematic* AND review*) OR meta-analys* [Title/Abstract] OR meta-analysis OR systematic-review**	531,599	06:11:37
#2	•••		Search: **"randomized-controlled-trial" OR "Randomized-Controlled-Trials" OR "random-allocation" OR random*[Title] OR RCT**	992,466	06:11:30
#1	•••		Search: **Animals[Title] OR Cadaver[Title] OR animal*[Title] OR dog[Title] OR dogs[Title] OR canine[Title] OR cats[Title] OR feline[Title] OR horse*[Title] OR equine[Title] OR mouse[Title] OR mice[Title] OR rat[Title] OR rats[Title] OR rabbit*[Title] OR sheep[Title] OR porcine[Title] OR pig[Title] OR pigs[Title] OR rodent*[Title] OR monkey*[Title] OR cadaver*[Title/Abstract] OR "in vitro"[Title/Abstract] OR comment[Publication Type] OR editorial[Publication Type] OR letter[Publication Type] OR "historical article"[Publication Type] OR address[Publication Type] OR news[Publication Type] OR "newspaper article"[Publication Type] OR "case reports"[Publication Type] OR case report*[Title] OR abstracts[Title] OR editorial[Title] OR reply[Title] OR comment*[Title] OR commentary[Title] OR letter[Title] OR biomechanic*[Title]**	8,471,453	06:11:23

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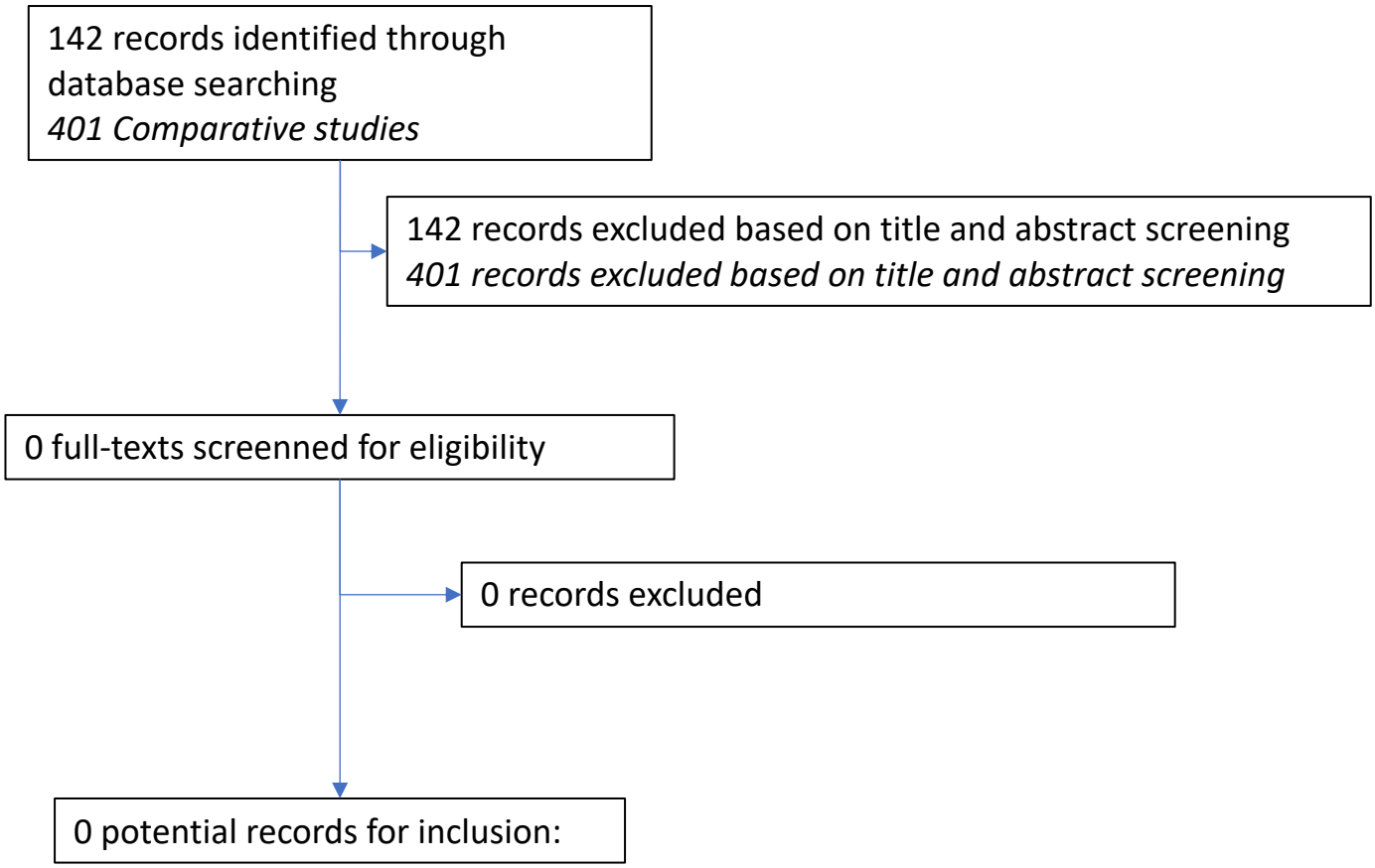
4. Studienselektion: Flowchart

PubMed Search: In adult patients with osteoarthritis undergoing PFA, does robotic assistance technology improve outcomes and/or decrease complications when compared to other techniques? (16/05/2023 & 11/10/2023)



71. Empfehlung	Modifiziert 2024
Empfehlungsgrad ⇔	Bei Patient*innen mit klinisch symptomatischer und radiologisch bestätigter isolierter patellofemoraler Gonarthrose kann die Implantation eines isolierten Patellofemoralgelenkersatzes in Erwägung gezogen werden.
Level of Evidence (Oxford 2011) 3 4 4	 Elbardesy et al. 2022 Tarassoli et al. 2012 van Jonbergen et al. 2010
Konsensstärke	100 % (starker Konsens)

1. Schlüsselfrage und PICO Format	
clinical key question	Does PFA reduce pain and improve function of knees with clinically/symptomatic and radiographically confirmed isolated patellofemoral OA and/or trochlear dysplasia, compared to other surgical treatments?
population	Adults with isolated: • symptomatic patellofemoral OA (clinically confirmed), and • IWANO grade 2/3/4 (Xray confirmed), and/or • trochlear dysplasia
intervention	Patellofemoral arthroplasty (PFA)
comparison	• Surgical intervention: Total knee arthroplasty • Conservative treatment (e.g. exercises) • Medical treatment (e.g. analgesics)
outcome	• Clinical and functional scores (validated PROMS): o Pain o Physical function o Health related quality of life o Satisfaction • Clinical outcomes: o Progression of OA o Conversion to total knee arthroplasty (TKA)

2. Recherche Zusammenfassung

Identifier	*ID Ordinal 18*
PICO(T) question	Does PFA reduce pain and improve function of knees with clinically/symptomatic and radiographically confirmed isolated patellofemoral OA and/or trochlear dysplasia, compared to other surgical treatments?
Search characteristics	
Date of search	28/04/2023
Initials of primary reader	JHM
Database(s)	*PubMed*
Keywords	*Knee* *osteoarthritis; arthritis; osteoarthros*; gonitis; gonarthritis; gonarthros** PFA
Search strings	*#1 Animals[Title] OR Cadaver[Title] OR animal*[Title] OR dog[Title] OR dogs[Title] OR canine[Title] OR cats[Title] OR feline[Title] OR horse*[Title] OR equine[Title] OR mouse[Title] OR mice[Title] OR rat[Title] OR rats[Title] OR rabbit*[Title] OR sheep[Title] OR porcine[Title] OR pig[Title] OR pigs[Title] OR rodent*[Title] OR monkey*[Title] OR cadaver*[Title/Abstract] OR "in vitro"[Title/Abstract] OR comment[Publication Type] OR editorial[Publication Type] OR letter[Publication Type] OR "historical article"[Publication Type] OR address[Publication Type] OR news[Publication Type] OR "newspaper article" [Publication Type] OR "case reports"[Publication Type] OR case report*[Title] OR abstracts[Title] OR editorial[Title] OR reply[Title] OR comment*[Title] OR commentary[Title] OR letter[Title] OR biomechanic*[Title]* *#2 "randomized-controlled-trial" OR "Randomized-Controlled-Trials" OR "random-allocation" OR random*[Title] OR RCT* *#3 (systematic* AND review*) OR meta-analys*[Title/Abstract] OR meta-analysis OR systematic-review* *#4 (Knee)*

	~~*#5 (Osteoarthritis OR arthritis OR osteoarthros* OR gonitis OR gonarthritis OR gonarthros*)*~~ #6 ("patellofemoral arthroplasty" OR "patello-femoral arthroplasty" OR PFA OR PFR OR "patellofemoral replacement" OR "patellofemoral joint replacement" OR PJR) #7 (#4 AND ~~#5 AND~~ #6) NOT(#1) #8 (#7 AND #2) #9 (#7 AND #3)
Number of hits	
RCTs (#8)	4
SR(+MA) (#9)	16
Studies published before 2003	0
Articles to consider	
DOIs MAs	10.1007/s00402-021-03882-4
DOIs SRs	10.1055/s-2008-1039000 10.1016/j.knee.2023.01.001 10.1007/s00167-017-4692-6 10.2174/1874325001206010340 10.1007/s00167-015-3878-z 10.3109/17453671003628756
DOIs RCTs	10.1302/0301-620x.102b4.Bjj-2018-1580.R3
Include/Excluded after FT screening	
10.1007/s00402-021-03882-4	Include
10.1055/s-2008-1039000	Interesting (German – not retrievable)
10.1016/j.knee.2023.01.001	Interesting
10.1007/s00167-017-4692-6	Interesting
10.2174/1874325001206010340	Include
10.1007/s00167-015-3878-z	Interesting
10.3109/17453671003628756	Include
10.1302/0301-620x.102b4.Bjj-2018-1580.R3	Include

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History and Search Details

Search	Actions	Details	Query	Results	Time
#9	•••		Search: **#7 AND #3**	16	05:26:35
#8	•••		Search: **#7 AND #2**	4	05:26:28
#7	•••		Search: **(#4 AND #6) NOT(#1)**	221	05:26:14
#6	•••		Search: **("patellofemoral arthroplasty" OR "patello-femoral arthroplasty" OR PFA OR PFR OR "patellofemoral replacement" OR "patellofemoral joint replacement" OR PJR)**	7,253	05:25:52
#5	•••		Search: **(Osteoarthritis OR arthritis OR osteoarthros* OR gonitis OR gonarthritis OR gonarthros*)**	416,293	05:25:44
#4	•••		Search: **Knee**	205,932	05:25:37
#3	•••		Search: **(systematic* AND review*) OR meta-analys* [Title/Abstract] OR meta-analysis OR systematic-review**	528,066	05:25:31
#2	•••		Search: **"randomized-controlled-trial" OR "Randomized-Controlled-Trials" OR "random-allocation" OR random*[Title] OR RCT**	989,763	05:25:25
#1	•••		Search: **Animals[Title] OR Cadaver[Title] OR animal*[Title] OR dog[Title] OR dogs[Title] OR canine[Title] OR cats[Title] OR feline[Title] OR horse*[Title] OR equine[Title] OR mouse[Title] OR mice[Title] OR rat[Title] OR rats[Title] OR rabbit*[Title] OR sheep[Title] OR porcine[Title] OR pig[Title] OR pigs[Title] OR rodent*[Title] OR monkey*[Title] OR cadaver*[Title/Abstract] OR "in vitro"[Title/Abstract] OR comment[Publication Type] OR editorial[Publication Type] OR letter[Publication Type] OR "historical article"[Publication Type] OR address[Publication Type] OR news[Publication Type] OR "newspaper article" [Publication Type] OR "case reports"[Publication Type] OR case report*[Title] OR abstracts[Title] OR editorial[Title] OR reply[Title] OR comment*[Title] OR commentary[Title] OR letter[Title] OR biomechanic*[Title]**	8,454,055	05:25:19

Showing 1 to 9 of 9 entries

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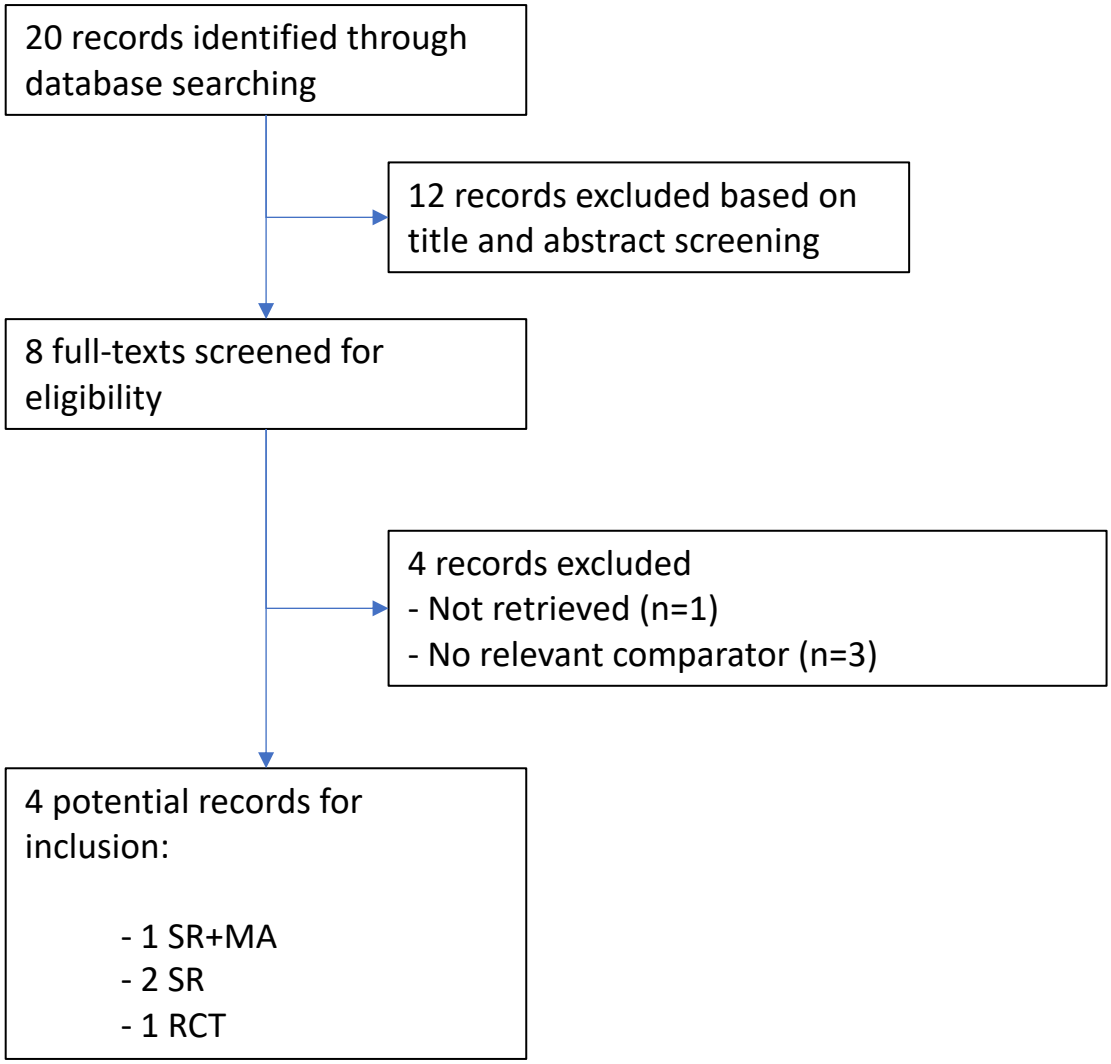
4. Studienselektion: Flowchart

PubMed Search: Does PFA reduce pain and improve function of knees with clinically/symptomatic and radiographically confirmed isolated patellofemoral OA and/or trochlear dysplasia, compared to other surgical treatments? (28/04/2023)



Included SRs and MAs

(1-3)

1. Elbardesy H, McLeod A, Gul R, Harty J. Midterm results of modern patellofemoral arthroplasty versus total knee arthroplasty for isolated patellofemoral arthritis: systematic review and meta-analysis of comparative studies. Arch Orthop Trauma Surg. 2022;142(5):851-9. doi: 10.1007/s00402-021-03882-4
2. Tarassoli P, Punwar S, Khan W, Johnstone D. Patellofemoral arthroplasty: a systematic review of the literature. Open Orthop J. 2012;6:340-7. doi: 10.2174/1874325001206010340
3. van Jonbergen HP, Poolman RW, van Kampen A. Isolated patellofemoral osteoarthritis. Acta Orthop. 2010;81(2):199-205. doi: 10.3109/17453671003628756

Included RCTs

(1)

1. Fredborg C, Odgaard A, Sørensen J. Patellofemoral arthroplasty is cheaper and more effective in the short term than total knee arthroplasty for isolated patellofemoral osteoarthritis: cost-effectiveness analysis based on a randomized trial. Bone Joint J. 2020;102-b(4):449-57. doi: 10.1302/0301-620x.102b4.Bjj-2018-1580.R3

5. Charakteristika der eingeschlossenen Studien

PICO number:	18	18	18
PICO Question:	Does PFA reduce pain and improve function of knees with clinically/symptomatic and radiographically confirmed isolated patellofemoral OA and/or trochlear dysplasia, compared to other surgical treatments?	Does PFA reduce pain and improve function of knees with clinically/symptomatic and radiographically confirmed isolated patellofemoral OA and/or trochlear dysplasia, compared to other surgical treatments?	Does PFA reduce pain and improve function of knees with clinically/symptomatic and radiographically confirmed isolated patellofemoral OA and/or trochlear dysplasia, compared to other surgical treatments?
Article name:	Isolated patellofemoral osteoarthritis: A systematic review of treatment options using the GRADE approach	Midterm results of modern patellofemoral arthroplasty versus total knee arthroplasty for isolated patellofemoral arthritis: systematic review and meta-analysis of comparative studies	Patellofemoral Arthroplasty: A Systematic Review of the Literature
Lead author	van Jonbergen	Elbardesy	Tarassoli
Year published	2010	2021	2012
Number of included studies (if SR with or without MA)	44	5	17
Description of intervention group (optional for SRs)	Nonoperative treatment of isolated patellofemoral osteoarthritis	PFA	PFA
Description of control group (optional for SRs)	Operative treatment of isolated patellofemoral osteoarthritis	TKA	TKA
Number of patients in intervention group	122	231	907
Number of patients in control group	>2000 on Arthrosocpy, realignment, TKA and PFA. (538-812 SR on PFA; 15 to 240 Prospective on PFA; 12 to 65 Retrospective on PFA)	228	111

Mean age with range of intervention group	Not reported	50-65	48-66
Mean age with range of control group	Not reported	50-69	52-73
Inclusion criteria (on patient-level if clinical study; on article-level if SR) **Examples:** **Clinical study: "The inclusion criteria were (i) primary ACLR in (ii) patients aged over 50 years. The exclusion criteria were (iii) severe concomitant ligament injury (grade 3), (iv) tibiofemoral osteoarthritis visible on weight-bearing anteroposterior and/or sagittal radiographs (> 50% joint space narrowing), and (v) history of intra- or extra-articular ligament surgery in either knee."** **SR: "Studies comparing the diagnostic accuracy of physical examination (clinical tests or ultrasound) versus arthroscopy for the assessment of LHBT pathologies"**	We searched for studies that fulfilled certain inclusion criteria. Publications in the English, French, Dutch, or German language that describe the clinical outcome of nonoperative or operative treatments for isolated patellofemoral osteoarthritis in 10 or more patients were included. Publications reporting the results of treatment of patellofemoral pain syndrome without osteoarthritis were excluded, as were studies with incompletely described patient populations, insufficient descriptions of treatment, and studies lacking the use of validated or commonly used outcome measures.	To be eligible for selection, research papers had to be fulltext randomised controlled trials (RCTs) or high-quality observational cohort studies that compared complications and PROM for both PFA (second generation only) and TKA. Studies that did not meet these criteria were excluded.	Terms used with Boolean operators were: (patellafemoral OR patell* OR femoropatell* OR femoro-patell*) AND (arthroplasty OR replacement OR resurfacing). Studies excluded were those that were not in the English language, were not fully published articles or were review articles. Further grounds for exclusion was at the discretion of the reviewers and comprised but was not limited to factors such as poor or incompletely described methodology, low patient population (<20) or studies reporting results from treatment of conditions other than osteoarthritis as the primary indication for surgery.
Follow-up period	See in Main results	24 to 120	48 to 204 months

Main results	Nonoperative treatment options Physiotherapy. Initially, patients with isolated patellofemoral osteoarthritis can be treated using a nonoperative approach such as activity modification, weight loss, and physiotherapy. 1 randomized controlled trial described the short-term outcome of a commonly used physiotherapy package (patellar taping, functional exercises, education, quadriceps strengthening exercises, postural advice, and education) compared with no physical therapy (Quilty et al. 2003). The physiotherapy intervention was delivered by a single physiotherapist in nine 30-minute sessions over 10 weeks, with advice to continue thereafter. The treatment group had a small reduction in pain and a substantial increase in the quadriceps strength of the index knee 10 weeks after treatment compared with the no-treatment group. After 12	UCLA score Two studies reported on UCLA score after five years' follow-up, encompassing a total of 104 knees. Heterogeneity analysis demonstrated major statistical evidence for variation within the study (I2 = 86%). Data pooled by random-effects model suggested no statistically significant difference in UCLA score between the PFA and TKA groups (RR, 0.07; 95% CI 1.94-1.79; P < 0.001). WOMAC score Two studies reported on WOMAC score after five years' follow-up with a total of 100 knees. Heterogeneity analysis demonstrated moderate statistical evidence for variation within the study (I2 = 65%). Data pooled by random-effects model suggested better WOMAC score for PFA cohort, but this was not significant (RR, 2.00; 95% CI 1.83-18.03; P < 0.09).	STUDIES REPORTING RESULTS FROM PATELLOFEMORAL ARTHROPLASTY The prosthesis with the greatest reported numbers in the studies reviewed was the Avon which is produced by Stryker (New Jersey, USA). There was only one study which reported results from a custom made prosthesis. All of the included studies specified isolated PFOA as the primary diagnosis and the indication to embark on surgery. There were several studies that were identified in the literature which had good numbers and sound methodology however the primary pre-operative diagnosis was not restricted to PFOA. One particular study reported results of the Avon PFA and give an excellent independent verdict of the prosthesis, however, within their population they included one patient who had had a failed autologous chondrocyte implantation of the patella. As the pathology of this

	with the no-treatment group. After 12 months, no differences in patient relevant outcome measures were noted between groups (Quilty et al. 2003). According to GRADE, the quality of this evidence is high, with a weak recommendation for use of the intervention. Taping. A randomized crossover trial using visual analog scale ratings for pain demonstrated a 25% reduction in knee pain when the patella was taped medially. However, each tape (medial, lateral, or neutral) was applied for only 4 days, with 3 days of no treatment between tape positions (Cushnaghan et al. 1994). According to GRADE, the quality of the evidence is moderate, with a weak recommendation for use of this intervention. Intra-articular injections/visco-supplementation	Patients' satisfaction Two studies reported on patient's satisfaction after 5-year follow-up, including a total of 151 knees. They demonstrated better patient satisfaction with TKA patients at 5-year follow-up; however, this was not statistically significant. Heterogeneity analysis demonstrated no statistical evidence for variation within the study (I2 = 0%). The cumulative RD was insignificant at 0.06 (95% CI 0.07-0.19; P = 0.95). Operation time Two studies including 145 knees reported on operation time. Both studies reported shorter operation times with PFA; however, this was not statistically significant. Heterogeneity analysis demonstrated moderate evidence for variation within the study (I2 = 50%). The cumulative MD was insignificant at 2.92 (95% CI 17.16-22.96; P = 0.16).	patella. As the pathology of this condition is limited to the patellofemoral joint and as it was an isolated case, its impact on the overall study was deemed to be small and hence it was included in this review. Other studies which cited PFOA as the primary diagnosis and had adequate methodology were not included as their series were smaller in comparison to others. We chose a minimum cut-off study population of 20 prostheses/knees (after loss to follow up) for this review. Seven studies included a pre-operative assessment whereas the other 7 studies included only a postoperative assessment of the patient. There were two studies which had published preliminary results from their series previously in the literature. The earlier studies were therefore not included in this review. Two studies were identified that reported on custom prostheses for PFA. The studies by Merchant were

	The clinical effect of intra-articular visco-supplementation with hylan G-F 20 (Synvisc; Genzyme Corporation, Cambridge, MA) was assessed in a non-randomized clinical trial with use of a patient-relevant outcome instrument. Pain upon stair climbing improved 4 weeks after the initial injection and the improvement was maintained to 26 and 52 weeks (Clarke et al. 2005). According to GRADE, the evidence is of very low quality, with a weak recommendation for use of this intervention. Operative treatment options Arthroscopy. We did not identify any studies describing the results of arthroscopic debridement of articular cartilage for patients with isolated patellofemoral osteoarthritis. However, we did include 2 methodologically sound randomized controlled trials, although they describe the results of arthroscopy in osteoarthritis of the	Mean postoperative inpatient Two studies reported on mean postoperative inpatient time involving a total of 130 knees. They both demonstrated a shorter mean postoperative inpatient time for patients under- going PFA, and this was statistically significant. Heterogeneity analysis demonstrated moderate statistical evidence for variation within the study (I2 = 74%). The cumulative MD was significant at 0.53 (95% CI 0.44-1.50; P < 0.001).	not included because of low patient numbers. STUDIES REPORTING RESULTS FROM TOTAL KNEE ARTHROPLASTY Three studies were identified from the search. Two of these studies compared a cohort of patients with isolated PFOA with a matched group. Meding et al. reported on 27 patients who had undergone 33 TKAs and were all younger than 60 years of age, and compared this group with another identical in number (27 patients - 33 TKAs) with primary tibiofemoral OA (TFOA). The comparison group was also matched according to surgeon, gender, bilaterality, and age. Body mass index was matched within 2kg/m2. Similarly Laskin et al. compared their group of 44 knees with PFOA to another group of 46 knees with tricompartmental OA (TCOA) and matched for gender and age but not for any other criteria. Of note their TCOA group had

	arthroscopy in osteoarthritis of the knee, and were not specifically limited to isolated patellofemoral osteoarthritis (Moseley et al. 2002, Kirkley et al. 2008). No differences in outcome were found between surgical placebo treatment and arthroscopy, and between arthroscopy combined with physiotherapy as opposed to nonoperative treatment with physiotherapy only. Although these papers do not strictly describe the results of arthroscopic treatment for isolated patellofemoral osteoarthritis, indirect evidence is given. Based on these high-quality studies, arthroscopy is not recommended for osteoarthritis of the knee. In the case of indirect evidence, the GRADE group advises reducing the level of quality from high to moderate (Guyatt et al. 2008), with a strong recommendation against the use of this intervention.		note their TUKA group had significantly higher body mass. The third study by Mont et al. had no comparison group but reported pre-operative assessment and outcomes from their use of three different prostheses in their group of 30 knees in 27 patients. The Knee Society objective and functional scores were used to report on results. The three included studies on TKA for isolated PFOA have an average of 7 years follow up and feature a combined total of 111 prostheses. Functional and objective outcome scores are comparable to TKA and amongst the best when compared to PFA. Additionally there have been no reported cases of revision of any of the prostheses. This had led to authors to conclude that this may be the best course of action for patients with isolated PFOA.

Key findings (use Results and Conclusion in Abstract)	Results We extracted data from 44 articles. The best available evidence for treatment of isolated patellofemoral osteoarthritis is sparse and of generally low methodological quality. Nonoperative treatment using physiotherapy (GRADE: high quality, weak recommendation for use), taping (GRADE: moderate quality, weak recommendation for use), or injection therapy (GRADE: very low quality, weak recommendation for use) may result in short-term relief. Joint-preserving surgical treatment may result in insufficient, unpredictable, or only short-term improvement (GRADE: low quality, weak recommendation against use). Total knee replacement with patellar resurfacing results in predictable and good, durable results (GRADE: low quality, weak recommendation for use). Outcome after patellofemoral arthroplasty in selected patients is good to excellent (GRADE: low	Results No significant difference was found between both TKA and PFA in the context of operating time. No significant difference after five years,Äô follow-up was found between the two treatment options in terms of UCLA score and patient satisfaction. PFA showed significant improvement in WOMAC score at five-year follow-up, less postoperative inpatient time, better cost-effectiveness and significantly less blood loss. Conclusion PFA seems to be a viable alternative to TKA for treatment of isolated PFOA in appropriately selected patients. PFA showed less postoperative inpatient time and blood loss with similar PROMs to the TKA. Moreover, it is an economically beneficial joint preserving procedure.	Patellofemoral arthroplasty is certainly a technically demanding procedure with narrow indications. Nevertheless a patellofemoral arthroplasty has the advantage of being a less invasive operation, with quicker post-operative recovery and preservation of bone stock, with the option to convert to TKA at a later time. Evidence presented from the studies above points to certain poor prognostic factors which should be considered when selecting patients for PFA. With newer, more anatomical prosthetic designs and with strict selectioncriteria, PFA can provide highly satisfactory outcomes. Patient Characteristics Relating to Poor Outcome in PFA: Evidence of tibiofemoral osteoarthritis prior to surgery BMI>30 Kg/m2 Prior meniscectomy Patella alta or baja Ligamentous instability

	good to excellent (GRADE: low quality, weak recommendation for use). Interpretation Methodologically good quality comparative studies, preferably using a patient-relevant outcome instrument, are needed to establish the optimal treatment strategy for patients with isolated patellofemoral osteoarthritis.		
Type of Study	Systematic review with or without meta-analysis (AMSTARII)	Systematic review with or without meta-analysis (AMSTARII)	Systematic review with or without meta-analysis (AMSTARII)
Assessment tool	AMSTAR	AMSTAR	AMSTAR
Overall Assessment	Critically low (Quality assessment)	Critically low (Quality assessment)	Critically low (Quality assessment)
What is the lowest evidence study included in the SR?	Retrospective comparative study or case series, Level 3	Prospective comparative study, Level 2	Retrospective comparative study or case series, Level 3
Level of evidence (Oxford 2011)	Level 4, downgraded due to critically low AMSTAR	Level 3, downgraded due to critically low AMSTAR	Level 4, downgraded due to critically low AMSTAR

73. Empfehlung	Neu 2024
Empfehlungsgrad ⇑⇑	Übergewichtige Patient*innen mit Gonarthrose, welche sich der Implantation einer Knieendoprothese unterziehen haben ein erhöhtes Komplikationsrisiko, insbesondere bei BMI > 40 kg/m^2. Der Gewinn an Funktion und Lebensqualität ist jedoch mit nicht übergewichtigen Patient*innen vergleichbar. Wir empfehlen, übergewichtige Patient*innen auf dieses erhöhte Komplikationsrisiko hinzuweisen und die Indikation bei BMI > 40 kg/m^2 in Zusammenschau mit weiteren Risikofaktoren besonders kritisch zu prüfen. Ein generelles Vorenthalten einer Knieendoprothese ist ethisch nicht gerechtfertigt.
Level of Evidence „high“	Übernahme aufbereiteter Evidenz aus: AAOS Surgical Management of Osteoarthritis of the Knee (1)
Konsensstärke	100 % (starker Konsens)

Die PICO-Frage sowie die Standard-Einschlusskriterien sind dem e-Appendix 1 der Quellleitlinie (S. 3) zu entnehmen:

https://www.aaos.org/globalassets/quality-and-practice-resources/surgical-management-knee/smoak-eappendix-1.pdf

Die Literatursuchhistorie und -strategie sind dem e-Appendix 1 der Quellleitlinie (S. 5 ff) zu entnehmen:

https://www.aaos.org/globalassets/quality-and-practice-resources/surgical-management-knee/smoak-eappendix-1.pdf

Evidenztabellen sind e-Appendix 2 der Quellleitlinie (S. 214ff) zu entnehmen:

https://www.aaos.org/globalassets/quality-and-practice-resources/surgical-management-knee/smoak-eappendix-2.pdf

Empfehlung der zugrundeliegenden Quellleitlinie:

Leitlinie (Erscheinungsjahr)	Surgical Management of Osteoarthritis of the Knee - Evidence-Based Clinical Practice Guideline (Dec 2022) (1)
Empfehlung:	There is no difference in postoperative functional scores between patients with a BMI < 30 and obese patients (BMI 30-39.9); however, there may be increased risk of complications in morbidly obese patients (≥40), in particular, surgical site infections.
Empfehlungsgrad:	„Strong“
Evidenzgrad:	„High“ *Evidence from two or more “High” quality studies with consistent findings for recommending for or against the intervention.*
Referenzen:	• American Academy of Orthopaedic Surgeons. Surgical Management of Osteoarthritis of the Knee – Evidence Based Clinical Practice Guideline (Dec 2022) • „Supplement to the Clinical Practice Guideline for the Surgical Management of Osteoarthritis of the Knee“- e-Appendix 1 • „Supplement to the Clinical Practice Guideline for the Surgical Management of Osteoarthritis of the Knee“- e-Appendix 2

1. (AAOS), American Academy of Orthopaedic Surgeons. Surgical Management of Osteoarthritis of the Knee Evidence-Based Clinical Practice Guideline. Rosemont, IIlinois: American Academy of Orthopaedic Surgeons 2022 [First Edition].https://www.aaos.org/globalassets/quality-and-practice-resources/surgical-management-knee/smoak2cpg.pdf [Date Accessed: 02.07.2024].

74. Empfehlung	Neu 2024
Empfehlungsgrad ⇑⇑	Bei Patient*innen mit Gonarthrose, welche sich der Implantation einer Knieendoprothese unterziehen, empfehlen wir die Gabe von Tranexamsäure bei Nichtvorliegen von Kontraindikationen: • Intravenöse Applikation • ohne Nierenfunktionsstörung zusätzlich 1 g bis 2 g topische (intraartikuläre) Tranexamsäure unter Sicherstellung, dass die kombinierte Gesamtdosis von Tranexamsäure 3 g nicht überschreitet. • Mit Nierenfunktionsstörung Dosisreduktion der intravenös verabreichten Tranexamsäure
Level of Evidence (GRADE) Auszugsweise <u>iA vs. nTxa:</u> Transfusion: ⊕⊕⊕ Gesamtblutverlust ⊕ Blutung post OP: ⊕⊕⊕⊕ <u>oral vs. nTxa:</u> Mortalität: ⊕⊕ Transfusion: ⊕ Gesamtblutverlust: ⊕⊕⊕ <u>iv vs. nTxa:</u> Mortalität: ⊕ Transfusion: ⊕ TVT: ⊕⊕⊕ Gesamtblutverlust: ⊕ Blutung post OP: ⊕⊕⊕⊕	Adoption einer evidenzbasierten Empfehlung aus NICE Guideline NG157 (Punkt 1.4.1) (1)
Konsensstärke	100 % (starker Konsens)

Schlüsselfrage und PICO Format sind dem Evidence Review G der Quellleitlinie zu entnehmen hier:

https://www.nice.org.uk/guidance/ng157/evidence/g-tranexamic-acid-to-minimise-blood-loss-pdf-8771013044 (ab Seite 6)

Suchhistorie und Recherche Flowchart sind den Appendices B-C des Evidence Review G zu entnehmen hier:

https://www.nice.org.uk/guidance/ng157/evidence/g-tranexamic-acid-to-minimise-blood-loss-pdf-8771013044 (ab Seite 118)

Evidenztabellen nach GRADE sind dem Appendix F des Evidence Review G der Quellleitlinie zu entnehmen hier:

https://www.nice.org.uk/guidance/ng157/evidence/g-tranexamic-acid-to-minimise-blood-loss-pdf-8771013044 (ab Seite 532)

Empfehlung der zugrundeliegenden Quellleitlinie:

Leitlinie (Erscheinungsjahr)	NICE NG157 (2022) (1)
Empfehlung:	1.4.1 „For primary elective hip or knee replacement: Give intravenous tranexamic acid. If there is no renal impairment, also apply 1 g to 2 g of topical (intra-articular) tranexamic acid diluted in saline after the final wash-out and before wound closure. Ensure that the total combined dose of tranexamic acid does not exceed 3 g. If there is renal impairment, give a reduced dose of intravenous tranexamic acid on its own.“
Empfehlungsgrad:	„strong“
Evidenzgrad:	Kein Gesamtevidenzgrad angegeben. GRADE Profile siehe Appendices F des Evidence Review G ab Seite 532
Referenzen:	Siehe Evidence Review G Tabelle 2 ab Seite 8 https://www.nice.org.uk/guidance/ng157/evidence/g-tranexamic-acid-to-minimise-blood-loss-pdf-8771013044

1. (NICE), National Institute for Health and Care Excellence. Joint replacement (primary): hip, knee and shoulder (NICE Guideline NG157). London: National Institute for Health and Care Excellence; 2020 June 04.https://www.nice.org.uk/guidance/ng157 [Date Accessed: 02.07.2024].

75. Empfehlung	Neu 2024
Empfehlungsgrad ⇔	Bei Patient*innen mit Gonarthrose, welche sich der Implantation einer Knietotalendoprothese unterziehen, können kreuzbandresezierende und kreuzbanderhaltene Prothesen verwendet werden. Es zeigen sich keine Unterschiede hinsichtlich der klinischen und funktionellen Ergebnisse sowie des Auftretens von Komplikationen
Level of Evidence (GRADE) moderat	Dowsey et al. 2020 (89) Beaupre et al. 2017 (90) Chaudhary et al. 2008 (91) Harato et al. 2008 (92) Lynch et al. 2021 (93) Molt et Toksvig-Larsen 2014 (94) Öztürk et al. 2016 (95) Van de Groes et al. 2015 (96) Van den Boom et al. 2020 (97) Victor et al. 2005 (98) Yagishita et al. 2012 (99)
Konsensstärke	100 % (starker Konsens)

1. Schlüsselfrage und PICO Format	
clinical key question	In adult patients with osteoarthritis undergoing TKA, does the use of [posterior] cruciate retaining arthroplasty design improve outcomes and/or decrease complications when compared to patients with [posterior] cruciate sacrificing arthroplasty design (postero-stabilised, ultra-congruent, medial pivot)?
population	Adults with: • symptomatic knee OA (clinically confirmed), and • K/L stage 2/3/4 (radiographically confirmed)
intervention	TKA using [posterior] cruciate retaining design
comparison	TKA using a cruciate sacrificing design
outcome	• Pain (critical) • Function (critical) • Survivorship (important) • Complication rate (important)

2. Recherche Zusammenfassung

Identifier	*ID Ordinal 47*
PICO(T) question	In adult patients with osteoarthritis undergoing TKA, does the use of [posterior] cruciate retaining arthroplasty design improve outcomes and/or decrease complications when compared to patients with [posterior] cruciate sacrificing arthroplasty design (postero-stabilised, ultra-congruent, medial pivot)?
Search characteristics	
Date of search	16/05/2023
Initials of primary reader	JHM
Database(s)	*PubMed*
Keywords	*Knee* *osteoarthritis; arthritis; osteoarthros*; gonitis; gonarthritis; gonarthros** TKA designs
Search strings	*#1 Animals[Title] OR Cadaver[Title] OR animal*[Title] OR dog[Title] OR dogs[Title] OR canine[Title] OR cats[Title] OR feline[Title] OR horse*[Title] OR equine[Title] OR mouse[Title] OR mice[Title] OR rat[Title] OR rats[Title] OR rabbit*[Title] OR sheep[Title] OR porcine[Title] OR pig[Title] OR pigs[Title] OR rodent*[Title] OR monkey*[Title] OR cadaver*[Title/Abstract] OR "in vitro"[Title/Abstract] OR comment[Publication Type] OR editorial[Publication Type] OR letter[Publication Type] OR "historical article"[Publication Type] OR address[Publication Type] OR news[Publication Type] OR "newspaper article" [Publication Type] OR "case reports"[Publication Type] OR case report*[Title] OR abstracts[Title] OR editorial[Title] OR reply[Title] OR comment*[Title] OR commentary[Title] OR letter[Title] OR biomechanic*[Title]* *#2 "randomized-controlled-trial" OR "Randomized-Controlled-Trials" OR "random-allocation" OR random*[Title] OR RCT* *#3 (systematic* AND review*) OR meta-analys*[Title/Abstract] OR meta-analysis OR systematic-review*

	#4 (Knee) ~~*#5 (Osteoarthritis OR arthritis OR osteoarthros* OR gonitis OR gonarthritis OR gonarthros*)*~~ #6 (TKA OR TKR OR "total knee arthroplasty" OR "total knee replacement") AND ("cruciate retaining" OR "cruciate retention" OR "cruciate substituting" OR "cruciate substitution" OR "posterior stabilized" OR "posterior stabilised" OR "postero stabilized" OR "postero-stabilized" OR "postero stabilised" OR "postero-stabilised" OR "medial pivot" OR "ultracongruent") #7 (#4 AND ~~#5 AND~~ #6) NOT(#1) #8 (#7 AND #2) #9 (#7 AND #3)
Number of hits	
RCTs (#8)	234
SR(+MA) (#9)	64
Studies published before 2003	(234-225) + (64-64) = 11
Articles to consider	
DOIs MAs	10.1007/s43465-021-00494-3 10.1007/s00167-018-4872-z 10.1016/j.arth.2012.08.008 10.52628/87.4.12 10.1302/2046-3758.310.2000290 10.5435/JAAOSGlobal-D-22-00170 10.1002/14651858.CD004803.pub2 10.1080/17453670510045345 10.1371/journal.pone.0147865 10.1007/s00167-022-07238-2 10.1186/s40634-023-00583-2 10.1186/s13018-022-03047-y 10.1007/s00167-012-2275-0 10.1016/j.knee.2022.03.010 10.1016/j.knee.2011.12.005 10.1007/s00590-019-02370-1 10.1007/s00167-020-06358-x 10.1186/s13018-022-03285-0 10.1016/j.knee.2013.03.002 10.1097/md.0000000000023809 10.1007/s43465-022-00678-5

DOIs SRs	10.1007/s00402-021-04210-6 10.1016/j.jor.2021.02.022 10.1016/j.arth.2020.02.026 10.1055/s-0037-1603902 10.1007/s43465-022-00693-6 10.1186/s42836-023-00165-8 10.1002/14651858.CD004803.pub3 10.1007/s00167-021-06833-z 10.1007/s00402-022-04410-8
DOIs RCTs	10.1007/s00167-020-06275-z 10.1007/s43465-021-00494-3 10.1007/s00264-013-1798-4 10.1007/s00167-020-06343-4 10.1016/j.arth.2016.08.030 31675299 10.1007/s00167-022-07206-w 10.1016/j.arth.2021.01.013 10.2106/jbjs.G.00995 10.1080/17453674.2021.1983709 10.1016/j.arth.2020.01.085 10.1055/s-0039-1678524 10.1002/jor.24613 10.1007/s00167-019-05827-2 10.1016/j.knee.2007.12.007 10.1007/s00167-021-06710-9 10.1007/s11999-010-1493-3 10.1016/j.arth.2019.03.062 10.1007/s00167-022-07238-2 10.2106/jbjs.20.00279 10.1007/s00167-014-3489-0 10.1186/s13018-021-02311-x 10.1002/jor.25476 10.4055/cios19141 10.1097/01.blo.0000155013.31327.dc 10.1007/s00167-016-4331-7 10.1007/s00167-021-06545-4 10.1302/0301-620x.103b1.Bjj-2020-0958.R1 10.1016/j.arth.2003.09.010 10.1016/j.knee.2014.05.012 10.1016/j.knee.2018.08.005 10.1007/s00264-012-1749-5 10.1007/s00402-016-2482-0 10.1007/s00167-022-07036-w 10.1016/j.arth.2016.06.012 10.4103/abr.abr_165_21 10.1016/j.arth.2017.11.037 10.2106/jbjs.22.00549

	10.1016/j.arth.2014.03.050 12892188 10.2106/00004623-200402000-00016 26790797 10.1186/1471-2474-10-119 10.1055/s-0039-1693023 10.1302/0301-620x.87b5.15602 15553604 10.1016/j.arth.2011.05.008
Include/Excluded after FT screening	
10.1007/s43465-021-00494-3	Include
10.1007/s00167-018-4872-z	Include
10.1016/j.arth.2012.08.008	Include
10.52628/87.4.12	Include
10.1302/2046-3758.310.2000290	Include
10.5435/JAAOSGlobal-D-22-00170	Include
10.1002/14651858.CD004803.pub2	Include
10.1080/17453670510045345	Include (duplicate? 10.1002/14651858.CD004803.pub2)
10.1371/journal.pone.0147865	Include
10.1007/s00167-022-07238-2	Include
10.1186/s40634-023-00583-2	Include
10.1186/s13018-022-03047-y	Include
10.1007/s00167-012-2275-0	Include
10.1016/j.knee.2022.03.010	Include
10.1016/j.knee.2011.12.005	Include
10.1007/s00590-019-02370-1	Include
10.1007/s00167-020-06358-x	Include
10.1186/s13018-022-03285-0	Include
10.1016/j.knee.2013.03.002	Include
10.1097/md.0000000000023809	Include
10.1007/s43465-022-00678-5	Not retrieved
10.1007/s00402-021-04210-6	Include
10.1016/j.jor.2021.02.022	Include
10.1016/j.arth.2020.02.026	Include
10.1055/s-0037-1603902	Include
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10.1186/s42836-023-00165-8	Include
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10.1007/s00167-021-06833-z	Include
10.1007/s00402-022-04410-8	Include
10.1007/s00167-020-06275-z	Include
10.1007/s43465-021-00494-3	Exclude – Not RCT
10.1007/s00264-013-1798-4	Include

10.1007/s00167-020-06343-4	Include
10.1016/j.arth.2016.08.030	Include
31675299	Not retrieved
10.1007/s00167-022-07206-w	Include
10.1016/j.arth.2021.01.013	Include
10.2106/jbjs.G.00995	Include
10.1080/17453674.2021.1983709	Include
10.1016/j.arth.2020.01.085	Include
10.1055/s-0039-1678524	Include
10.1002/jor.24613	Include
10.1007/s00167-019-05827-2	Include
10.1016/j.knee.2007.12.007	Include
10.1007/s00167-021-06710-9	Include
10.1007/s11999-010-1493-3	Include
10.1016/j.arth.2019.03.062	Include
10.1007/s00167-022-07238-2	Exclude – Not RCT
10.2106/jbjs.20.00279	Not retrieved
10.1007/s00167-014-3489-0	Include
10.1186/s13018-021-02311-x	Include
10.1002/jor.25476	Include
10.4055/cios19141	Include
10.1097/01.blo.0000155013.31327.dc	Include
10.1007/s00167-016-4331-7	Include
10.1007/s00167-021-06545-4	Include
10.1302/0301-620x.103b1.Bjj-2020-0958.R1	Include
10.1016/j.arth.2003.09.010	Include
10.1016/j.knee.2014.05.012	Include
10.1016/j.knee.2018.08.005	Include
10.1007/s00264-012-1749-5	Include
10.1007/s00402-016-2482-0	Include
10.1007/s00167-022-07036-w	Include
10.1016/j.arth.2016.06.012	Include
10.4103/abr.abr_165_21	Include
10.1016/j.arth.2017.11.037	Include
10.2106/jbjs.22.00549	Not retrieved
10.1016/j.arth.2014.03.050	Include
12892188	Include
10.2106/00004623-200402000-00016	Not retrieved
26790797	Include
10.1055/s-0039-1693023	Include
10.1302/0301-620x.87b5.15602	Include
15553604	Include
10.1016/j.arth.2011.05.008	Include

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#9	•••		Search: **#7 AND #3**	64	07:42:15
#8	•••		Search: **#7 AND #2**	234	07:42:08
#7	•••		Search: **#4 AND #6 NOT #1**	1,883	07:41:58
#6	•••		Search: **(TKA OR TKR OR "total knee arthroplasty" OR "total knee replacement") AND ("cruciate retaining" OR "cruciate retention" OR "cruciate substituting" OR "cruciate substitution" OR "posterior stabilized" OR "posterior stabilised" OR "postero stabilized" OR "postero-stabilized" OR "postero stabilised" OR "postero-stabilised" OR "medial pivot" OR "ultracongruent")**	2,202	07:41:11
#5	•••		Search: **(Osteoarthritis OR arthritis OR osteoarthros* OR gonitis OR gonarthritis OR gonarthros*)**	417,228	07:41:03
#4	•••		Search: **Knee**	206,537	07:40:55
#3	•••		Search: **(systematic* AND review*) OR meta-analys* [Title/Abstract] OR meta-analysis OR systematic-review**	531,316	07:40:50
#2	•••		Search: **"randomized-controlled-trial" OR "Randomized-Controlled-Trials" OR "random-allocation" OR random*[Title] OR RCT**	992,223	07:40:43
#1	•••		Search: **Animals[Title] OR Cadaver[Title] OR animal*[Title] OR dog[Title] OR dogs[Title] OR canine[Title] OR cats[Title] OR feline[Title] OR horse*[Title] OR equine[Title] OR mouse[Title] OR mice[Title] OR rat[Title] OR rats[Title] OR rabbit*[Title] OR sheep[Title] OR porcine[Title] OR pig[Title] OR pigs[Title] OR rodent*[Title] OR monkey*[Title] OR cadaver*[Title/Abstract] OR "in vitro"[Title/Abstract] OR comment[Publication Type] OR editorial[Publication Type] OR letter[Publication Type] OR "historical article"[Publication Type] OR address[Publication Type] OR news[Publication Type] OR "newspaper article"[Publication Type] OR "case reports"[Publication Type] OR case report*[Title] OR abstracts[Title] OR editorial[Title] OR reply[Title] OR comment*[Title] OR commentary[Title] OR letter[Title] OR biomechanic*[Title]**	8,470,046	07:40:34

Showing 1 to 9 of 9 entries

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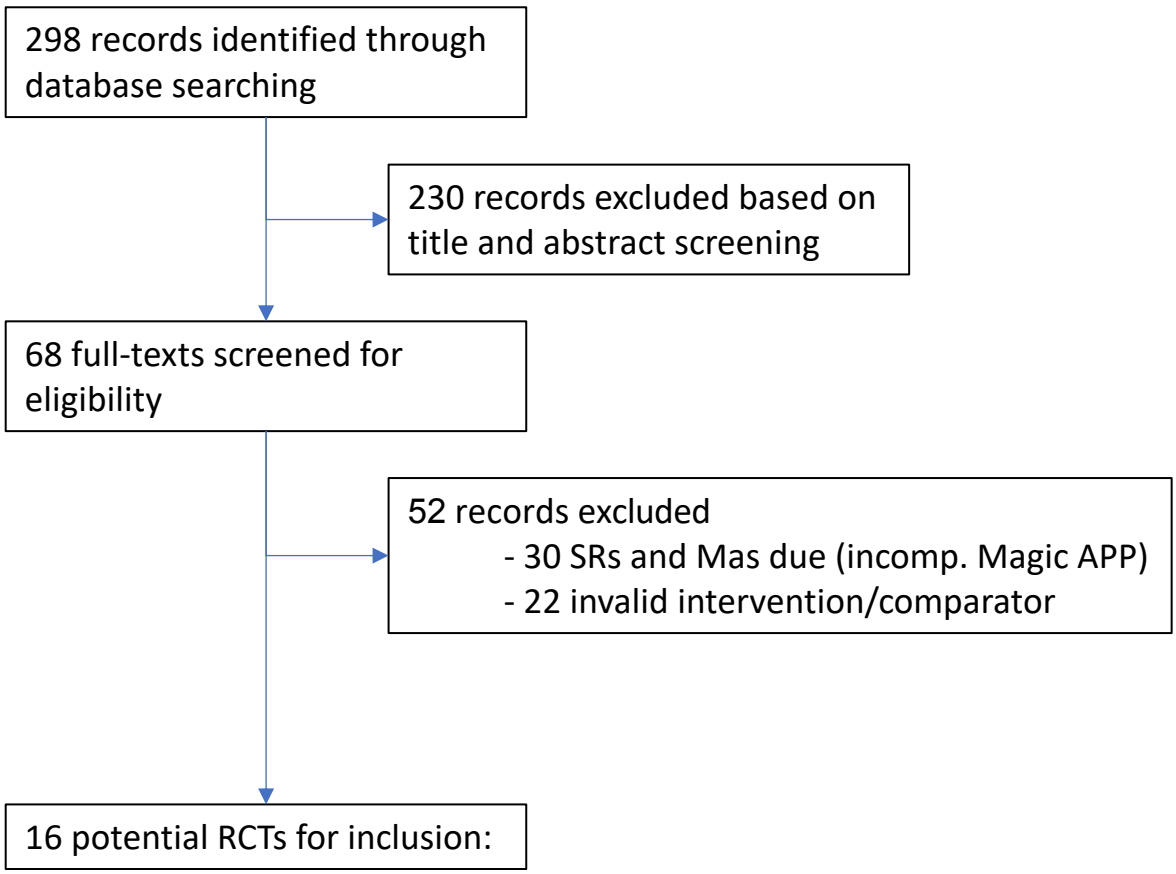
4. Studienselektion: Flowchart

PubMed Search: In adult patients with osteoarthritis undergoing TKA, does the use of [posterior] cruciate retaining arthroplasty design improve outcomes and/or decrease complications when compared to patients with [posterior] cruciate sacrificing arthroplasty design (postero-stabilised, ultra-congruent, medial pivot)? (16/05/2023)



Included RCTs

(1-16)

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GRADE Summary of Findings table Empfehlung #75

Endpunkt Zeitrahmen	**Ergebnisse und Messwerte**	**Absolute Effektschätzer** CS	CR	**Gewissheit der Evidenz** (Vertrauenswürdigkeit der Evidenz)	**Zusammenfassung**
Complications 1-5 years	Odds ratio: 0.94 (CI 95% 0.58 - 1.55) Basierend auf Daten von 482 patienter und 5 Studien[1]	**158** pro 1000	**150** pro 1000 Differenz: **8 weniger pro 1000** (CI 95% 60 weniger - 67 mehr)	**Hoch** [2]	Bezüglich des Auftretens von Komplikationen 1-5 Jahre postoperativ gibt es wenig bis keinen signifikanten Unterschied im Vergleich von Knietotalendoprothesen mit erhaltenem und entferntem hinteren Kreuzband.
Survivorship > 5 years	Odds ratio: 1.16 (CI 95% 0.07 - 19.52) Basierend auf Daten von 117 patienter und 2 Studien[3]	**981** pro 1000	**984** pro 1000 Differenz: **3 mehr pro 1000** (CI 95% 198 weniger - 18 mehr)	**Moderat** Due to serious imprecision[4]	Bezüglich des Überlebens/Revisionsfreiheit >5 Jahre postoperativ gibt es wenig bis keinen signifikanten Unterschied im Vergleich von Knietotalendoprothesen mit erhaltenem und entferntem hinteren Kreuzband.
Survivorship 1-5 years	Odds ratio: 0.35 (CI 95% 0.01 - 8.73) Basierend auf Daten von 411 patienter und 4 Studien[5]	**1000** pro 1000	**1000** pro 1000 Differenz: **0 weniger pro 1000** (CI 95% 0 weniger - 0 weniger)	**Moderat** Due to serious imprecision[6]	Bezüglich des Überlebens/Revisionsfreiheit 1-5 Jahre postoperativ gibt es wenig bis keinen signifikanten Unterschied im Vergleich von Knietotalendoprothesen mit erhaltenem und entferntem hinteren Kreuzband.
Function (1989 KSS: Function)[7] preoperative	Gemessen mit: 1989 KSS: Function Skala: 0 - 100 Höher ist besser Basierend auf Daten von 344 patienter und 3 Studien[8]	**38.8** Mittelwert	**39.7** Mittelwert Differenz: **MD 0.96 Größer** (CI 95% 5.05 kleiner - 6.98 Größer)	**Niedrig** Due to very serious inconsistency[9]	preoperative data, favored direction not applicable
Function (1989 KSS: Function)[10] < 1 year	Gemessen mit: 1989 KSS: Function Skala: 0 - 100 Höher ist besser Basierend auf Daten von 152 patienter und 2 Studien[11]	**58.3** Mittelwert	**60.6** Mittelwert Differenz: **MD 2.33 Größer** (CI 95% 3.86 kleiner - 8.52 Größer)	**Moderat** Due to serious imprecision[12]	Bezüglich des Knee Society Function Scores <1Jahr postoperativ gibt es wenig bis keinen signifikanten Unterschied im Vergleich von Knietotalendoprothesen mit erhaltenem und entferntem hinteren Kreuzband.
Function (1989 KSS: Function)[13] 1-5 years	Gemessen mit: 1989 KSS: Function Skala: 0 - 100 Höher ist besser Basierend auf Daten von 422 patienter und 3 Studien[14]	**72.5** Mittelwert	**73.0** Mittelwert Differenz: **MD 0.53 Größer** (CI 95% 3.26 kleiner - 4.32 Größer)	**Sehr niedrig** Due to serious risk of bias, Due to serious inconsistency, Due to serious imprecision[15]	Bezüglich des Knee Society Function Scores 1-5 Jahre postoperativ gibt es wenig bis keinen signifikanten Unterschied im Vergleich von Knietotalendoprothesen mit erhaltenem und

				entferntem hinteren Kreuzband.
Function (Extension)[16] preoperative	Gemessen mit: Extension Skala: - Basierend auf Daten von 503 patienter und 5 Studien[17]	**-2.6** Mittelwert **-3.2** Mittelwert Differenz: **MD 0.55 kleiner** (CI 95% 1.64 kleiner - 0.54 Größer)	**Moderat** Due to serious imprecision[18]	preoperative data, favored direction not applicable
Function (Extension)[19] < 1 year	Gemessen mit: Extension Skala: - Basierend auf Daten von 367 patienter und 3 Studien[20]	**-4.3** Mittelwert **-2.6** Mittelwert Differenz: **MD 1.66 Größer** (CI 95% 1.48 Größer - 1.83 Größer)	**Niedrig** Due to very serious inconsistency[21]	Bezüglich des Funktions-Outcome Streckung <1Jahr postoperativ gibt es lediglich einen geringen Vorteil von Knietotalendoprothesen mit erhaltenem im Vergleich zu jenen mit entferntem hinteren Kreuzband.
Function (Extension)[22] 1-5 years	Gemessen mit: Extension Skala: - Basierend auf Daten von 503 patienter und 5 Studien[23]	**-1.4** Mittelwert **-1.1** Mittelwert Differenz: **MD 0.32 Größer** (CI 95% 0.16 Größer - 0.48 Größer)	**Niedrig** Due to very serious inconsistency[24]	Bezüglich des Funktions-Outcome Streckung 1-5 Jahre postoperativ gibt es lediglich einen geringen Vorteil von Knietotalendoprothesen mit erhaltenem im Vergleich zu jenen mit entferntem hinteren Kreuzband.
Function (Extension)[25] > 5 years	Gemessen mit: Extension Skala: - Basierend auf Daten von 61 patienter und 1 Studien[26]	**0.3** Mittelwert **0.5** Mittelwert Differenz: **MD 0.20 kleiner** (CI 95% 0.83 kleiner - 0.43 Größer)	**Niedrig** Due to serious risk of bias, Due to serious imprecision[27]	Bezüglich des Funktions-Outcome Streckung >5 Jahre postoperativ gibt es keinen Vorteil von Knietotalendoprothesen mit erhaltenem im Vergleich zu jenen mit entferntem hinteren Kreuzband.
Function (Flexion)[28] preoperative	Gemessen mit: Flexion Skala: - Basierend auf Daten von 550 patienter und 6 Studien[29]	**115.9** Mittelwert **116.4** Mittelwert Differenz: **MD 0.56 Größer** (CI 95% 1.80 kleiner - 2.92 Größer)	**Hoch** 30	preoperative data, favored direction not applicable
Function (Flexion)[31] < 1 year	Gemessen mit: Flexion Skala: - Basierend auf Daten von 367 patienter und 3 Studien[32]	**116.1** Mittelwert **113.3** Mittelwert Differenz: **MD 2.83 kleiner** (CI 95% 3.23 kleiner - 2.42 kleiner)	**Moderat** Due to serious inconsistency[33]	Bezüglich des Funktions-Outcome Beugung <1Jahr postoperativ gibt es einen geringen Nachteil von Knietotalendoprothesen mit erhaltenem im Vergleich zu jenen mit entferntem hinteren Kreuzband.
Function (Flexion)[34] 1-5 years	Gemessen mit: Flexion Skala: - Basierend auf Daten von 550 patienter und 6 Studien[35]	**119.0** Mittelwert **116.9** Mittelwert Differenz: **MD 2.13 kleiner** (CI 95% 2.53 kleiner - 1.74 kleiner)	**Niedrig** Due to very serious inconsistency[36]	Bezüglich des Funktions-Outcome Beugung 1-5Jahre postoperativ gibt es einen geringen Nachteil von Knietotalendoprothesen mit erhaltenem im Vergleich zu jenen mit entferntem hinteren Kreuzband.

Function (Flexion)[37] > 5 years	Gemessen mit: Flexion Skala: - Basierend auf Daten von 61 patienter und 1 Studien[38]	**121.1** Mittelwert **112.3** Mittelwert Differenz: **MD 8.80 kleiner** (CI 95% 12.29 kleiner - 5.31 kleiner)	**Niedrig** Due to serious risk of bias, Due to serious imprecision[39]	Bezüglich des Funktions-Outcome Beugung <1Jahr postoperativ gibt es einen geringen Nachteil von Knietotalendoprothesen mit erhaltenem im Vergleich zu jenen mit entferntem hinteren Kreuzband.
Function (SF-36 Physical function)[40] preoperative	Gemessen mit: SF-36 Physical function Skala: 0 - 100 Höher ist besser Basierend auf Daten von 170 patienter und 2 Studien[41]	**33.2** Mittelwert **37.5** Mittelwert Differenz: **MD 4.23 Größer** (CI 95% 3.09 Größer - 5.38 Größer)	**Hoch** 42	preoperative data, favored direction not applicable
Function (SF-36 Physical function)[43] < 1 year	Gemessen mit: SF-36 Physical function Skala: 0 - 100 Höher ist besser Basierend auf Daten von 228 patienter und 1 Studien[44]	**58.5** Mittelwert **61.7** Mittelwert Differenz: **MD 3.17 Größer** (CI 95% 2.83 kleiner - 9.17 Größer)	**Niedrig** Due to serious imprecision, Due to serious publication bias[45]	Bezüglich des SF36 Physical Function Scores < 1Jahr postoperativ gibt es wenig bis keinen signifikanten Unterschied im Vergleich von Knietotalendoprothesen mit erhaltenem und entferntem hinteren Kreuzband.
Function (SF-36 Physical function)[46] 1-5 years	Gemessen mit: SF-36 Physical function Skala: 0 - 100 Höher ist besser Basierend auf Daten von 170 patienter und 2 Studien[47]	**65.7** Mittelwert **62.7** Mittelwert Differenz: **MD 2.99 kleiner** (CI 95% 4.27 kleiner - 1.71 kleiner)	**Niedrig** Due to very serious inconsistency[48]	Bezüglich des SF36 Physical Function Scores 1-5 Jahre postoperativ gibt es einen geringen Nachteil von Knietotalendoprothesen mit erhaltenem im Vergleich zu jenen mit entferntem hinteren Kreuzband.
Function (SF-36 Physical function)[49] > 5 years	Gemessen mit: SF-36 Physical function Skala: 0 - 100 Höher ist besser Basierend auf Daten von 56 patienter und 1 Studien[50]	**42.4** Mittelwert **50.3** Mittelwert Differenz: **MD 7.90 Größer** (CI 95% 7.32 kleiner - 23.12 Größer)	**Moderat** Due to serious imprecision[51]	Bezüglich des SF36 Physical Function Scores >5 Jahr postoperativ gibt es wenig bis keinen signifikanten Unterschied im Vergleich von Knietotalendoprothesen mit erhaltenem und entferntem hinteren Kreuzband.
Function (SF-36 Role physical)[52] preoperative	Gemessen mit: SF-36 Role physical Skala: 0 - 100 Höher ist besser Basierend auf Daten von 170 patienter und 2 Studien[53]	**19.8** Mittelwert **23.5** Mittelwert Differenz: **MD 3.63 Größer** (CI 95% 0.16 kleiner - 7.43 Größer)	**Hoch** 54	preoperative data, favored direction not applicable
Function (SF-36 Role physical)[55] < 1 year	Gemessen mit: SF-36 Role physical Skala: 0 - 100 Höher ist besser Basierend auf Daten von 114 patienter und 1 Studien[56]	**72.0** Mittelwert **61.6** Mittelwert Differenz: **MD 10.40 kleiner** (CI 95% 26.59 kleiner - 5.79 Größer)	**Sehr niedrig** Due to very serious imprecision, Due to serious publication bias[57]	Bezüglich des SF36 Körperliche Rollenfunktion < 1Jahr postoperativ gibt es eine leichte Unterlegenheit von Knietotalendoprothesen mit erhaltenem im Vergleich zu jenen mit

				entferntem hinteren Kreuzband.
Function (SF-36 Role physical)[58] 1-5 years	Gemessen mit: SF-36 Role physical Skala: 0 - 100 Höher ist besser Basierend auf Daten von 170 patienter und 2 Studien[59]	**66.5** Mittelwert **67.2** Mittelwert Differenz: **MD 0.67 Größer** (CI 95% 1.60 kleiner - 2.93 Größer)	**Hoch** 60	Bezüglich des SF36 Körperliche Rollenfunktion 1-5 Jahre postoperativ gibt es keinen Unterschied von Knietotalendoprothesen mit erhaltenem im Vergleich zu jenen mit entferntem hinteren Kreuzband.
Function (SF-36 Role physical)[61] > 5 years	Gemessen mit: SF-36 Role physical Skala: 0 - 100 Höher ist besser Basierend auf Daten von 56 patienter und 1 Studien[62]	**46.0** Mittelwert **47.7** Mittelwert Differenz: **MD 1.70 Größer** (CI 95% 23.47 kleiner - 26.87 Größer)	**Niedrig** Due to very serious imprecision[63]	Bezüglich des SF36 Körperliche Rollenfunktion >5 Jahre postoperativ gibt es keinen Unterschied von Knietotalendoprothesen mit erhaltenem im Vergleich zu jenen mit entferntem hinteren Kreuzband.
Function (WOMAC Function)[64] preoperative	Gemessen mit: WOMAC Function Skala: 0 - 100 Höher ist besser Basierend auf Daten von 413 patienter und 5 Studien[65]	**50.0** Mittelwert **50.3** Mittelwert Differenz: **MD 0.34 Größer** (CI 95% 0.55 kleiner - 1.23 Größer)	**Hoch** 66	preoperative data, favored direction not applicable
Function (WOMAC Function)[67] < 1 year	Gemessen mit: WOMAC Function Skala: 0 - 100 Höher ist besser Basierend auf Daten von 471 patienter und 4 Studien[68]	**80.6** Mittelwert **79.6** Mittelwert Differenz: **MD 1.06 kleiner** (CI 95% 1.59 kleiner - 0.52 kleiner)	**Moderat** Due to serious publication bias[69]	Bezüglich des WOMAC-Scores (Funktion) <1 Jahr postoperativ gibt es keinen Unterschied von Knietotalendoprothesen mit erhaltenem im Vergleich zu jenen mit entferntem hinteren Kreuzband.
Function (WOMAC Function)[70] 1-5 years	Gemessen mit: WOMAC Function Skala: 0 - 100 Höher ist besser Basierend auf Daten von 491 patienter und 5 Studien[71]	**84.2** Mittelwert **80.5** Mittelwert Differenz: **MD 3.80 kleiner** (CI 95% 4.64 kleiner - 2.96 kleiner)	**Hoch** 72	Bezüglich des WOMAC-Scores (Funktion) 1-5 Jahre postoperativ gibt es eine leichte Unterlegenheit von Knietotalendoprothesen mit erhaltenem im Vergleich zu jenen mit entferntem hinteren Kreuzband.
Function (WOMAC Function)[73] > 5 years	Gemessen mit: WOMAC Function Skala: 0 - 100 Höher ist besser Basierend auf Daten von 56 patienter und 1 Studien[74]	**67.9** Mittelwert **72.7** Mittelwert Differenz: **MD 4.80 Größer** (CI 95% 8.10 kleiner - 17.70 Größer)	**Niedrig** Due to very serious imprecision[75]	Bezüglich des WOMAC-Scores (Funktion) >5 Jahre postoperativ gibt es keinen Unterschied von Knietotalendoprothesen mit erhaltenem im Vergleich zu jenen mit entferntem hinteren Kreuzband.
Function, Pain (1989 KSS: Knee Score)[76] preoperative	Gemessen mit: 1989 KSS: Knee Score Skala: 0 - 100 Höher ist besser Basierend auf Daten von 119 patienter und 2 Studien[77]	**37.0** Mittelwert **38.2** Mittelwert Differenz: **MD 1.19 Größer** (CI 95% 4.64 kleiner - 7.01 Größer)	**Moderat** Due to serious risk of bias[78]	preoperative data, favored direction not applicable

Function, Pain (1989 KSS: Knee Score)[79] < 1 year	Gemessen mit: 1989 KSS: Knee Score Skala: 0 - 100 Höher ist besser Basierend auf Daten von 61 patienter und 1 Studien[80]	**84.6** Mittelwert **81.0** Mittelwert Differenz: **MD 3.60 kleiner** (CI 95% 6.72 kleiner - 0.48 kleiner)	**Niedrig** Due to serious risk of bias, Due to serious inconsistency, Due to serious imprecision[81]	Bezüglich des Knee Society Knee-Scores >1 Jahr postoperativ gibt es eine leichte Unterlegenheit von Knietotalendoprothesen mit erhaltenem im Vergleich zu jenen mit entferntem hinteren Kreuzband.
Function, Pain (1989 KSS: Knee Score)[82] 1-5 years	Gemessen mit: 1989 KSS: Knee Score Skala: 0 - 100 Höher ist besser Basierend auf Daten von 119 patienter und 2 Studien[83]	**90.9** Mittelwert **90.4** Mittelwert Differenz: **MD 0.56 kleiner** (CI 95% 2.34 kleiner - 1.22 Größer)	**Niedrig** Due to serious risk of bias, Due to serious inconsistency[84]	Bezüglich des Knee Society Knee-Scores 1-5 Jahre postoperativ gibt es keinen Unterschied von Knietotalendoprothesen mit erhaltenem im Vergleich zu jenen mit entferntem hinteren Kreuzband.
Function, Pain (1989 KSS: Knee Score)[85] > 5 years	Gemessen mit: 1989 KSS: Knee Score Skala: 0 - 100 Höher ist besser Basierend auf Daten von 61 patienter und 1 Studien[86]	**86.2** Mittelwert **87.9** Mittelwert Differenz: **MD 1.70 Größer** (CI 95% 0.27 kleiner - 3.67 Größer)	**Niedrig** Due to serious risk of bias, Due to serious imprecision[87]	Bezüglich des Knee Society Knee-Scores >1 Jahr postoperativ gibt es keinen Unterschied von Knietotalendoprothesen mit erhaltenem im Vergleich zu jenen mit entferntem hinteren Kreuzband.
Function, Pain (1989 KSS: Total KSS)[88] preoperative	Gemessen mit: 1989 KSS: Total KSS Skala: 0 - 100 Höher ist besser Basierend auf Daten von 306 patienter und 2 Studien[89]	**45.8** Mittelwert **50.7** Mittelwert Differenz: **MD 4.91 Größer** (CI 95% 2.73 Größer - 7.09 Größer)	**Hoch** 90	preoperative data, favored direction not applicable
Function, Pain (1989 KSS: Total KSS)[91] < 1 year	Gemessen mit: 1989 KSS: Total KSS Skala: 0 - 100 Höher ist besser Basierend auf Daten von 228 patienter und 1 Studien[92]	**75.0** Mittelwert **76.9** Mittelwert Differenz: **MD 2.32 Größer** (CI 95% 0.84 kleiner - 5.48 Größer)	**Niedrig** Due to serious imprecision, Due to serious publication bias[93]	Bezüglich des Knee Society Gesamt-Scores 1 Jahr postoperativ gibt es keinen Unterschied von Knietotalendoprothesen mit erhaltenem im Vergleich zu jenen mit entferntem hinteren Kreuzband.
Function, Pain (1989 KSS: Total KSS)[94] 1-5 years	Gemessen mit: 1989 KSS: Total KSS Skala: 0 - 100 Höher ist besser Basierend auf Daten von 306 patienter und 2 Studien[95]	**80.2** Mittelwert **78.9** Mittelwert Differenz: **MD 1.24 kleiner** (CI 95% 2.0 kleiner - 0.48 kleiner)	**Hoch** 96	Bezüglich des Knee Society Gesamt-Scores 1-5 Jahre postoperativ gibt es keinen Unterschied von Knietotalendoprothesen mit erhaltenem im Vergleich zu jenen mit entferntem hinteren Kreuzband.
Function, Pain (Total WOMAC)[97] preoperative	Gemessen mit: Total WOMAC Skala: 0 - 100 Höher ist besser Basierend auf Daten von 414 patienter und 3 Studien[98]	**62.9** Mittelwert **60.3** Mittelwert Differenz: **MD 2.42 kleiner** (CI 95% 5.22 kleiner - 0.38 Größer)	**Moderat** Due to serious publication bias[99]	preoperative data, favored direction not applicable
	Gemessen mit: Total WOMAC	**79.2** Mittelwert **77.2** Mittelwert	**Moderat** Due to serious publication bias[102]	Bezüglich des WOMAC-Scores (total) <1 Jahr

Function, Pain (Total WOMAC)[100] < 1 year	Skala: 0 - 100 Höher ist besser Basierend auf Daten von 336 patienter und 2 Studien[101]	Differenz: **MD 2.04 kleiner** (CI 95% 5.64 kleiner - 1.56 Größer)		postoperativ gibt es keinen Unterschied von Knietotalendoprothesen mit erhaltenem im Vergleich zu jenen mit entferntem hinteren Kreuzband.
Function, Pain (Total WOMAC)[103] 1-5 years	Gemessen mit: Total WOMAC Skala: 0 - 100 Höher ist besser Basierend auf Daten von 300 patienter und 2 Studien[104]	**87.8** Mittelwert **86.3** Mittelwert Differenz: **MD 1.46 kleiner** (CI 95% 4.77 kleiner - 1.84 Größer)	**Hoch** 105	Bezüglich des WOMAC-Scores (total) 1-5 Jahre postoperativ gibt es keinen Unterschied von Knietotalendoprothesen mit erhaltenem im Vergleich zu jenen mit entferntem hinteren Kreuzband.
Pain (KSS Pain in Knee Score)[106] preoperative	Gemessen mit: KSS Pain in Knee Score Skala: 0 - 50 Höher ist besser Basierend auf Daten von 102 patienter und 2 Studien[107]	**21.0** Mittelwert **20.1** Mittelwert Differenz: **MD 0.91 kleiner** (CI 95% 4.16 kleiner - 2.34 Größer)	**Moderat** Due to serious risk of bias[108]	preoperative data, favored direction not applicable
Pain (KSS Pain in Knee Score)[109] < 1 year	Gemessen mit: KSS Pain in Knee Score Skala: 0 - 50 Höher ist besser Basierend auf Daten von 44 patienter und 1 Studien[110]	**43.6** Mittelwert **48.3** Mittelwert Differenz: **MD 4.70 Größer** (CI 95% 1.15 kleiner - 10.55 Größer)	**Niedrig** Due to serious risk of bias, Due to serious imprecision[111]	Bezüglich des Knee Society-Scores (Schmerz) <1Jahr postoperativ gibt es keinen Unterschied von Knietotalendoprothesen mit erhaltenem im Vergleich zu jenen mit entferntem hinteren Kreuzband.
Pain (KSS Pain in Knee Score)[112] 1-5 years	Gemessen mit: KSS Pain in Knee Score Skala: 0 - 50 Höher ist besser Basierend auf Daten von 180 patienter und 2 Studien[113]	**48.5** Mittelwert **49.6** Mittelwert Differenz: **MD 1.03 Größer** (CI 95% 0.14 kleiner - 2.20 Größer)	**Moderat** Due to serious risk of bias[114]	Bezüglich des Knee Society-Scores (Schmerz) 1-5 Jahre postoperativ gibt es keinen Unterschied von Knietotalendoprothesen mit erhaltenem im Vergleich zu jenen mit entferntem hinteren Kreuzband.
Pain (VAS Pain)[115] preoperative	Gemessen mit: VAS Pain Skala: 0 - 100 Niedriger ist besser Basierend auf Daten von 132 patienter und 2 Studien[116]	**51.0** Mittelwert **49.1** Mittelwert Differenz: **MD 1.92 kleiner** (CI 95% 10.10 kleiner - 6.27 Größer)	**Moderat** Due to serious imprecision[117]	preoperative data, favored direction not applicable
Pain (VAS Pain)[118] 1-5 years	Gemessen mit: VAS Pain Skala: 0 - 100 Niedriger ist besser Basierend auf Daten von 132 patienter und 2 Studien[119]	**11.2** Mittelwert **15.0** Mittelwert Differenz: **MD 3.89 Größer** (CI 95% 2.06 Größer - 5.72 Größer)	**Moderat** Due to serious inconsistency[120]	Bezüglich des Schmerzes (VAS) 1-5 Jahre postoperativ gibt es eine leichte Unterlegenheit von Knietotalendoprothesen mit erhaltenem im Vergleich zu jenen mit entferntem hinteren Kreuzband.
Pain (WOMAC Pain)[121] preoperative	Gemessen mit: WOMAC Pain Skala: 0 - 100 Höher ist besser Basierend auf Daten von 413 patienter und 5 Studien[122]	**46.8** Mittelwert **47.0** Mittelwert Differenz: **MD 0.19 Größer** (CI 95% 4.14 kleiner - 4.52 Größer)	**Niedrig** Due to serious risk of bias, Due to very serious inconsistency[123]	preoperative data, favored direction not applicable

Pain (WOMAC Pain)[124] < 1 year	Gemessen mit: WOMAC Pain Skala: 0 - 100 Höher ist besser Basierend auf Daten von 471 patienter und 4 Studien[125]	**83.0** Mittelwert **83.1** Mittelwert Differenz: **MD 0.08 Größer** (CI 95% 0.5 kleiner - 0.66 Größer)	**Sehr niedrig** Due to very serious inconsistency, Due to serious publication bias[126]	Bezüglich des Schmerz-Subskala des WOMAC <1 Jahr postoperativ gibt es keinen Unterschied zwischen Knietotalendoprothesen mit erhaltenem im Vergleich zu jenen mit entferntem hinteren Kreuzband.
Pain (WOMAC Pain)[127] 1-5 years	Gemessen mit: WOMAC Pain Skala: 0 - 100 Höher ist besser Basierend auf Daten von 491 patienter und 5 Studien[128]	**88.2** Mittelwert **84.2** Mittelwert Differenz: **MD 3.95 kleiner** (CI 95% 4.78 kleiner - 3.13 kleiner)	**Moderat** Due to serious inconsistency[129]	Bezüglich des Schmerz-Subskala des WOMAC 1-5 Jahre postoperativ gibt es eine leichte Unterlegenheit von Knietotalendoprothesen mit erhaltenem im Vergleich zu jenen mit entferntem hinteren Kreuzband.
Pain (WOMAC Pain)[130] > 5 years	Gemessen mit: WOMAC Pain Skala: 0 - 100 Höher ist besser Basierend auf Daten von 56 patienter und 1 Studien[131]	**84.0** Mittelwert **78.3** Mittelwert Differenz: **MD 5.70 kleiner** (CI 95% 17.31 kleiner - 5.91 Größer)	**Niedrig** Due to very serious imprecision[132]	Bezüglich des Schmerz-Subskala des WOMAC >5 Jahren postoperativ gibt es keinen Unterschied zwischen Knietotalendoprothesen mit erhaltenem im Vergleich zu jenen mit entferntem hinteren Kreuzband.

1. Systematic review [534] mit eingeschlossenen Studien: Yagishita 2012, Molt 2014, Lynch 2021, [542], [539], [549], [544], [543], Lynch 2021, Harato 2008, Dowsey 2020, Dowsey 2020 **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
2. **Inkonsistenz: keine.** Point estimates vary widely, The direction of the effect is not consistent between the included studies;
3. Systematic review [534] mit eingeschlossenen Studien: [545], Ozturk 2016, [540], Beaupre 2017 **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
4. **Risiko für Bias: keine.** Missing intention-to-treat analysis; **Unzureichende Präzision: schwerwiegend.** Wide confidence intervals;
5. Systematic review [534] mit eingeschlossenen Studien: Lynch 2021, Lynch 2021, Harato 2008, Chaudhary 2008, Victor 2004, [541], [548], [543], [542] **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
6. **Unzureichende Präzision: schwerwiegend.** Wide confidence intervals;
7. undefined
8. Systematic review [534] mit eingeschlossenen Studien: [542], [539], Victor 2004, Harato 2008, Dowsey 2020, Dowsey 2020, [548] **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
9. **Risiko für Bias: keine.** Missing intention-to-treat analysis; **Inkonsistenz: sehr schwerwiegend.** Point estimates vary widely, The confidence interval of some of the studies do not overlap with those of most included studies/ the point estimate of some of the included studies., The direction of the effect is not consistent between the included studies, The magnitude of statistical heterogeneity was high, with I^2:... %.; **Unzureichende Präzision: keine.** Wide confidence intervals; **Publikationsbias: keine.** Mostly commercially funded studies;
10. undefined
11. Systematic review [534] mit eingeschlossenen Studien: Dowsey 2020, Dowsey 2020, Victor 2004, [548], [539] **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
12. **Unzureichende Präzision: schwerwiegend.** Wide confidence intervals; **Publikationsbias: keine.** Mostly commercially funded studies;
13. undefined
14. Systematic review [534] mit eingeschlossenen Studien: [548], [542], [539], Dowsey 2020, Dowsey 2020, Harato 2008, Victor 2004, Victor 2004, Victor 2004 **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
15. **Risiko für Bias: schwerwiegend.** Missing intention-to-treat analysis, Incomplete data and/or large loss to follow up; **Inkonsistenz: schwerwiegend.** The direction of the effect is not consistent between the included studies, Point estimates vary widely; **Unzureichende Präzision: schwerwiegend.** Wide confidence intervals;
16. undefined
17. Systematic review [534] mit eingeschlossenen Studien: Van den Boom 2019, Yagishita 2012, [549], [547], [545], [542], [541], Chaudhary 2008, Harato 2008, Ozturk 2016 **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
18. **Risiko für Bias: keine.** Missing intention-to-treat analysis; **Inkonsistenz: keine.** The direction of the effect is not consistent between the included studies; **Unzureichende Präzision: schwerwiegend.** Wide confidence intervals; **Publikationsbias: keine.** Mostly commercially funded studies;
19. undefined
20. Systematic review [534] mit eingeschlossenen Studien: [541], Chaudhary 2008, Ozturk 2016, Van den Boom 2019, Van den Boom 2019, [547], [545] **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
21. **Inkonsistenz: sehr schwerwiegend.** Point estimates vary widely, The confidence interval of some of the studies do not overlap with those of most included studies/ the point estimate of some of the included studies., The magnitude of statistical heterogeneity was high, with I^2:... %.; **Publikationsbias: keine.** Mostly commercially funded studies;
22. undefined
23. Systematic review [534] mit eingeschlossenen Studien: Chaudhary 2008, Harato 2008, [549], Ozturk 2016, [547], Van den Boom 2019, [545], Yagishita 2012, [542], [541] **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
24. **Risiko für Bias: keine.** Missing intention-to-treat analysis; **Inkonsistenz: sehr schwerwiegend.** Point estimates vary widely, The confidence interval of some of the studies do not overlap with those of most included studies/ the point estimate of some of the included studies., The

direction of the effect is not consistent between the included studies, The magnitude of statistical heterogeneity was high, with I^2:... %.; **Publikationsbias: keine.** Mostly commercially funded studies;
25. undefined
26. Systematic review [534] mit eingeschlossenen Studien: Ozturk 2016, [545] **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
27. **Risiko für Bias: schwerwiegend.** Inadequate/lack of blinding of participants and personnel, resulting in potential for performance bias, Inadequate/lack of blinding of outcome assessors, resulting in potential for detection bias, Missing intention-to-treat analysis; **Unzureichende Präzision: schwerwiegend.** Only data from one study;
28. undefined
29. Systematic review [534] mit eingeschlossenen Studien: Van de Groes 2015, Van den Boom 2019, Yagishita 2012, [549], [547], [546], [545], [542], [541], Chaudhary 2008, Harato 2008, Ozturk 2016 **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
30. **Risiko für Bias: keine.** Missing intention-to-treat analysis; **Inkonsistenz: keine.** The direction of the effect is not consistent between the included studies;
31. undefined
32. Systematic review [534] mit eingeschlossenen Studien: [545], [541], Chaudhary 2008, Ozturk 2016, Van den Boom 2019, Van den Boom 2019, [547] **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
33. **Inkonsistenz: schwerwiegend.** Point estimates vary widely, The confidence interval of some of the studies do not overlap with those of most included studies/ the point estimate of some of the included studies., The magnitude of statistical heterogeneity was high, with I^2:... %.; **Unzureichende Präzision: keine.** Wide confidence intervals; **Publikationsbias: keine.** Mostly commercially funded studies;
34. undefined
35. Systematic review [534] mit eingeschlossenen Studien: Chaudhary 2008, Harato 2008, Ozturk 2016, [549], Van de Groes 2015, [547], Van den Boom 2019, [546], Yagishita 2012, [545], [542], [541] **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
36. **Risiko für Bias: keine.** Missing intention-to-treat analysis; **Inkonsistenz: sehr schwerwiegend.** Point estimates vary widely, Point estimates vary widely, The confidence interval of some of the studies do not overlap with those of most included studies/ the point estimate of some of the included studies., The direction of the effect is not consistent between the included studies, The magnitude of statistical heterogeneity was high, with I^2:... %.;
37. undefined
38. Systematic review [534] mit eingeschlossenen Studien: Ozturk 2016, [545] **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
39. **Risiko für Bias: schwerwiegend.** Inadequate/lack of blinding of participants and personnel, resulting in potential for performance bias, Inadequate/lack of blinding of outcome assessors, resulting in potential for detection bias, Missing intention-to-treat analysis; **Unzureichende Präzision: schwerwiegend.** Only data from one study;
40. undefined
41. Systematic review [534] mit eingeschlossenen Studien: [547], [540], Beaupre 2017, Van den Boom 2019 **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
42. **Unzureichende Präzision: keine.** Wide confidence intervals; **Publikationsbias: keine.** Mostly commercially funded studies;
43. undefined
44. Systematic review [534] mit eingeschlossenen Studien: Van den Boom 2019, Van den Boom 2019, [547] **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
45. **Inkonsistenz: keine.** The magnitude of statistical heterogeneity was high, with I^2:... %., The direction of the effect is not consistent between the included studies; **Unzureichende Präzision: schwerwiegend.** Only data from one study, Wide confidence intervals; **Publikationsbias: schwerwiegend.** Mostly commercially funded studies;
46. undefined
47. Systematic review [534] mit eingeschlossenen Studien: [547], [540], Beaupre 2017, Van den Boom 2019 **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
48. **Inkonsistenz: sehr schwerwiegend.** Point estimates vary widely, The direction of the effect is not consistent between the included studies, The magnitude of statistical heterogeneity was high, with I^2:... %.; **Unzureichende Präzision: keine.** Wide confidence intervals; **Publikationsbias: keine.** Mostly commercially funded studies;
49. undefined
50. Systematic review [534] mit eingeschlossenen Studien: [540], Beaupre 2017 **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
51. **Unzureichende Präzision: schwerwiegend.** Only data from one study;
52. undefined
53. Systematic review [534] mit eingeschlossenen Studien: [547], [540], Beaupre 2017, Van den Boom 2019 **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
54. **Unzureichende Präzision: keine.** Wide confidence intervals; **Publikationsbias: keine.** Mostly commercially funded studies;
55. undefined
56. Systematic review [534] mit eingeschlossenen Studien: Van den Boom 2019, [547] **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
57. **Unzureichende Präzision: sehr schwerwiegend.** Wide confidence intervals, Only data from one study; **Publikationsbias: schwerwiegend.** Mostly commercially funded studies;
58. undefined
59. Systematic review [534] mit eingeschlossenen Studien: Beaupre 2017, Van den Boom 2019, [547], [540] **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
60. **Unzureichende Präzision: keine.** Wide confidence intervals; **Publikationsbias: keine.** Mostly commercially funded studies;
61. undefined
62. Systematic review [534] mit eingeschlossenen Studien: Beaupre 2017, [540] **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
63. **Unzureichende Präzision: sehr schwerwiegend.** Wide confidence intervals, Only data from one study;
64. undefined
65. Systematic review [534] mit eingeschlossenen Studien: Chaudhary 2008, Dowsey 2020, Dowsey 2020, Van den Boom 2019, Victor 2004, [548], [547], [541], [540], [539], Beaupre 2017 **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
66. **Publikationsbias: keine.** Mostly commercially funded studies;
67. undefined
68. Systematic review [534] mit eingeschlossenen Studien: Chaudhary 2008, Dowsey 2020, Dowsey 2020, Van den Boom 2019, [548], Van den Boom 2019, [547], Victor 2004, [541], [539] **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .

69. **Inkonsistenz: keine.** Point estimates vary widely, The direction of the effect is not consistent between the included studies; **Unzureichende Präzision: keine.** Wide confidence intervals; **Publikationsbias: schwerwiegend.** Mostly commercially funded studies;
70. undefined
71. Systematic review [534] mit eingeschlossenen Studien: Beaupre 2017, Chaudhary 2008, Dowsey 2020, Dowsey 2020, Van den Boom 2019, Victor 2004, Victor 2004, Victor 2004, [548], [547], [541], [540], [539] **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
72. **Inkonsistenz: keine.** The direction of the effect is not consistent between the included studies, The magnitude of statistical heterogeneity was high, with I^2:... %.; **Publikationsbias: keine.** Mostly commercially funded studies;
73. undefined
74. Systematic review [534] mit eingeschlossenen Studien: Beaupre 2017, [540] **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
75. **Unzureichende Präzision: sehr schwerwiegend.** Wide confidence intervals, Only data from one study;
76. undefined
77. Systematic review [534] mit eingeschlossenen Studien: Ozturk 2016, Yagishita 2012, [549], [545] **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
78. **Risiko für Bias: schwerwiegend.** Inadequate/lack of blinding of participants and personnel, resulting in potential for performance bias, Inadequate/lack of blinding of outcome assessors, resulting in potential for detection bias, Missing intention-to-treat analysis; **Inkonsistenz: keine.** The direction of the effect is not consistent between the included studies, The magnitude of statistical heterogeneity was high, with I^2:... %.;
79. undefined
80. Systematic review [534] mit eingeschlossenen Studien: Ozturk 2016, [545] **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
81. **Risiko für Bias: schwerwiegend.** Inadequate/lack of blinding of participants and personnel, resulting in potential for performance bias, Inadequate/lack of blinding of outcome assessors, resulting in potential for detection bias, Missing intention-to-treat analysis; **Unzureichende Präzision: schwerwiegend.** Only data from one study;
82. undefined
83. Systematic review [534] mit eingeschlossenen Studien: Ozturk 2016, Yagishita 2012, [549], [545] **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
84. **Risiko für Bias: schwerwiegend.** Inadequate/lack of blinding of participants and personnel, resulting in potential for performance bias, Inadequate/lack of blinding of outcome assessors, resulting in potential for detection bias, Missing intention-to-treat analysis; **Inkonsistenz: schwerwiegend.** The direction of the effect is not consistent between the included studies, The magnitude of statistical heterogeneity was high, with I^2:... %.;
85. undefined
86. Systematic review [534] mit eingeschlossenen Studien: Ozturk 2016, [545] **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
87. **Risiko für Bias: schwerwiegend.** Inadequate/lack of blinding of participants and personnel, resulting in potential for performance bias, Inadequate/lack of blinding of outcome assessors, resulting in potential for detection bias, Missing intention-to-treat analysis; **Unzureichende Präzision: schwerwiegend.** Only data from one study;
88. undefined
89. Systematic review [534] mit eingeschlossenen Studien: Van den Boom 2019, [547], [542], Harato 2008 **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
90. **Risiko für Bias: keine.** Missing intention-to-treat analysis; **Publikationsbias: keine.** Mostly commercially funded studies;
91. undefined
92. Systematic review [534] mit eingeschlossenen Studien: [547], Van den Boom 2019, Van den Boom 2019 **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
93. **Unzureichende Präzision: schwerwiegend.** Only data from one study; **Publikationsbias: schwerwiegend.** Mostly commercially funded studies;
94. undefined
95. Systematic review [534] mit eingeschlossenen Studien: [547], [542], Harato 2008, Van den Boom 2019 **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
96. **Risiko für Bias: keine.** Missing intention-to-treat analysis; **Inkonsistenz: keine.** The direction of the effect is not consistent between the included studies; **Publikationsbias: keine.** Mostly commercially funded studies;
97. undefined
98. Systematic review [534] mit eingeschlossenen Studien: [542], [539], Dowsey 2020, Dowsey 2020, Harato 2008, Van den Boom 2019, [547] **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
99. **Risiko für Bias: keine.** Missing intention-to-treat analysis; **Publikationsbias: schwerwiegend.** Mostly commercially funded studies;
100. undefined
101. Systematic review [534] mit eingeschlossenen Studien: Dowsey 2020, Dowsey 2020, Van den Boom 2019, Van den Boom 2019, [547], [539] **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
102. **Unzureichende Präzision: keine.** Wide confidence intervals; **Publikationsbias: schwerwiegend.** Mostly commercially funded studies;
103. undefined
104. Systematic review [534] mit eingeschlossenen Studien: Dowsey 2020, Dowsey 2020, Harato 2008, [542], [539] **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
105. **Inkonsistenz: keine.** The direction of the effect is not consistent between the included studies; **Unzureichende Präzision: keine.** Wide confidence intervals; **Publikationsbias: keine.** Mostly commercially funded studies;
106. undefined
107. Systematic review [534] mit eingeschlossenen Studien: Victor 2004, Yagishita 2012, [549], [548] **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
108. **Risiko für Bias: schwerwiegend.** Incomplete data and/or large loss to follow up, Missing intention-to-treat analysis; **Inkonsistenz: keine.** The direction of the effect is not consistent between the included studies;
109. undefined
110. Systematic review [534] mit eingeschlossenen Studien: [548], Victor 2004 **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
111. **Risiko für Bias: schwerwiegend.** Incomplete data and/or large loss to follow up, Missing intention-to-treat analysis; **Unzureichende Präzision: schwerwiegend.** Only data from one study;
112. undefined

113. Systematic review [534] mit eingeschlossenen Studien: Yagishita 2012, [549], [548], Victor 2004, Victor 2004, Victor 2004 **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
114. **Risiko für Bias: schwerwiegend.** Incomplete data and/or large loss to follow up, Missing intention-to-treat analysis;
115. undefined
116. Systematic review [534] mit eingeschlossenen Studien: [546], [543], Lynch 2021, Lynch 2021, Van de Groes 2015 **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
117. **Inkonsistenz: keine.** The direction of the effect is not consistent between the included studies; **Unzureichende Präzision: schwerwiegend.** Wide confidence intervals;
118. undefined
119. Systematic review [534] mit eingeschlossenen Studien: [546], Lynch 2021, [543], Lynch 2021, Van de Groes 2015 **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
120. **Inkonsistenz: schwerwiegend.** The confidence interval of some of the studies do not overlap with those of most included studies/ the point estimate of some of the included studies., Point estimates vary widely, The magnitude of statistical heterogeneity was high, with I^2:... %.; **Unzureichende Präzision: keine.** Wide confidence intervals;
121. undefined
122. Systematic review [534] mit eingeschlossenen Studien: [540], [539], Beaupre 2017, Chaudhary 2008, Dowsey 2020, Dowsey 2020, Van den Boom 2019, Victor 2004, [548], [547], [541] **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
123. **Inkonsistenz: sehr schwerwiegend.** Point estimates vary widely, The confidence interval of some of the studies do not overlap with those of most included studies/ the point estimate of some of the included studies., The direction of the effect is not consistent between the included studies, The magnitude of statistical heterogeneity was high, with I^2:... %.; **Unzureichende Präzision: keine.** Wide confidence intervals; **Publikationsbias: keine.** Mostly commercially funded studies;
124. undefined
125. Systematic review [534] mit eingeschlossenen Studien: Chaudhary 2008, [548], Dowsey 2020, [547], Dowsey 2020, [541], Van den Boom 2019, [539], Van den Boom 2019, Victor 2004 **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
126. **Inkonsistenz: sehr schwerwiegend.** The confidence interval of some of the studies do not overlap with those of most included studies/ the point estimate of some of the included studies., Point estimates vary widely, The direction of the effect is not consistent between the included studies, The magnitude of statistical heterogeneity was high, with I^2:... %.; **Publikationsbias: schwerwiegend.** Mostly commercially funded studies;
127. undefined
128. Systematic review [534] mit eingeschlossenen Studien: Beaupre 2017, Chaudhary 2008, Dowsey 2020, Dowsey 2020, Van den Boom 2019, [548], Victor 2004, [547], Victor 2004, [541], Victor 2004, [540], [539] **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
129. **Inkonsistenz: schwerwiegend.** Point estimates vary widely, The direction of the effect is not consistent between the included studies, The magnitude of statistical heterogeneity was high, with I^2:... %.; **Unzureichende Präzision: keine.** Wide confidence intervals; **Publikationsbias: keine.** Mostly commercially funded studies;
130. undefined
131. Systematic review [534] mit eingeschlossenen Studien: [540], Beaupre 2017 **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
132. **Unzureichende Präzision: sehr schwerwiegend.** Wide confidence intervals, Only data from one study;

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10. Victor, J., Banks, S., Bellemans, J. Kinematics of posterior cruciate ligament-retaining and -substituting total knee arthroplasty: a prospective randomised outcome study. J Bone Joint Surg Br. 2005;87(5):646-655.

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76. Empfehlung	Neu 2024
Empfehlungsgrad ⇔	Bei Patient*innen mit Gonarthrose, welche sich der Implantation einer Knieendoprothese unterziehen, kann sowohl eine (teil-)zementierte als auch zementfreie Versorgung erfolgen, da die unterschiedlichen Fixationsarten vergleichbare Ergebnisse hinsichtlich funktionellem Outcome, Komplikationen, Reoperationen etc. aufweisen. Neuere Registerdaten und Metaanalysen scheinen alters- und geschlechtsabhängige Unterschiede zu zeigen, allerdings sind die Daten widersprüchlich.
Level of Evidence „moderate“ bis „high“	Übernahme aufbereiteter Evidenz aus: AAOS Surgical Management of Osteoarthritis of the Knee (1)
Konsensstärke	89,5 % (Konsens)

Die PICO-Frage sowie die Standard-Einschlusskriterien sind dem e-Appendix 1 der Quellleitlinie (S. 3) zu entnehmen:

https://www.aaos.org/globalassets/quality-and-practice-resources/surgical-management-knee/smoak-eappendix-1.pdf

Die Literatursuchhistorie und -strategie sind dem e-Appendix 1 der Quellleitlinie (S. 5 ff) zu entnehmen:

https://www.aaos.org/globalassets/quality-and-practice-resources/surgical-management-knee/smoak-eappendix-1.pdf

Evidenztabellen sind e-Appendix 2 der Quellleitlinie (S. 39ff) zu entnehmen:

https://www.aaos.org/globalassets/quality-and-practice-resources/surgical-management-knee/smoak-eappendix-2.pdf

Empfehlung der zugrundeliegenden Quellleitlinie:

Leitlinie (Erscheinungsjahr)	Surgical Management of Osteoarthritis of the Knee - Evidence-Based Clinical Practice Guideline (Dec 2022) (1)
Empfehlung:	All cementless components or hybrid fixation (cementless femur) in total knee arthroplasty show similar functional outcomes and rates of complications and reoperations.
Empfehlungsgrad:	„limited“
Evidenzgrad:	„moderate“ *Evidence from two or more “Moderate” quality studies with consistent findings, or evidence from a single “High” quality study for recommending for or against the intervention. Also, higher strength evidence can be downgraded to limited due to major concerns addressed in the EtD Framework.*
Referenzen:	• „Supplement to the Clinical Practice Guideline for the Surgical Management of Osteoarthritis of the Knee“- e-Appendix 1 • „Supplement to the Clinical Practice Guideline for the Surgical Management of Osteoarthritis of the Knee“- e-Appendix 2

1. (AAOS), American Academy of Orthopaedic Surgeons. Surgical Management of Osteoarthritis of the Knee Evidence-Based Clinical Practice Guideline. Rosemont, Illinois: American Academy of Orthopaedic Surgeons 2022 [First Edition].https://www.aaos.org/globalassets/quality-and-practice-resources/surgical-management-knee/smoak2cpg.pdf [Date Accessed: 02.07.2024].

77. Empfehlung	Neu 2024
Empfehlungsgrad ⇔ (herabgestuft)	Bei Patient*innen mit Gonarthrose welche sich der Implantation einer Knieendoprothese unterziehen kann die Implantation eines Retropatellarersatzes erfolgen.
Level of Evidence (GRADE) <u>Auszugsweise</u> <u>RPE vs. nRPE</u> QoL 6 Wochen: ⊕⊕ QoL 6 Wochen bis 1 Jahr: ⊕ PROMS/QoL >2 Jahre: ⊕⊕ Major Revision: ⊕⊕ Minor Revision: ⊕⊕ <u>sRPE vs. nRPE</u> Major Revision: not reported Minor Revision: ⊕⊕ <u>sRPE vs. RPE</u> Major Revision: not reported Minor Revision: ⊕⊕	Adaptation einer evidenzbasierten Empfehlung aus NICE Guideline NG157 (Punkt 1.7.2) (1)
Konsensstärke	100 % (starker Konsens)

Schlüsselfrage und PICO Format sind dem Evidence Review L der Quellleitlinie zu entnehmen hier:

https://www.nice.org.uk/guidance/ng157/evidence/l-patella-resurfacing-pdf-315756469335 (ab Seite 5)

Suchhistorie und Recherche Flowchart sind den Appendices B-C des Evidence Review L zu entnehmen hier:

https://www.nice.org.uk/guidance/ng157/evidence/l-patella-resurfacing-pdf-315756469335 (ab Seite 44)

Evidenztabellen nach GRADE sind dem Appendix F des Evidence Review L der Quellleitlinie zu entnehmen hier:

https://www.nice.org.uk/guidance/ng157/evidence/l-patella-resurfacing-pdf-315756469335 (ab Seite 120)

Empfehlung der zugrundeliegenden Quellleitlinie:

Leitlinie (Erscheinungsjahr)	NICE NG157 (2022) (1)
Empfehlung:	1.7.2 „Offer resurfacing of the patella to people having primary elective total knee replacement.“
Empfehlungsgrad:	„strong“
Evidenzgrad:	Kein Gesamtevidenzgrad angegeben. GRADE Profile siehe Appendix F des Evidence Review L ab Seite 120
Referenzen:	Siehe Evidence Review L Tabelle 2 ab Seite 7 https://www.nice.org.uk/guidance/ng157/evidence/l-patella-resurfacing-pdf-315756469335

1. (NICE), National Institute for Health and Care Excellence. Joint replacement (primary): hip, knee and shoulder (NICE Guideline NG157). London: National Institute for Health and Care Excellence; 2020 June 04.https://www.nice.org.uk/guidance/ng157 [Date Accessed: 02.07.2024].

78. Empfehlung	Neu 2024
Empfehlungsgrad ⇔	Zur Implantation einer Knietotalendoprothese können Roboter-Assistenzsysteme oder konventionelle Ausrichtungsinstrumente verwendet werden. Es zeigen sich keine Unterschiede hinsichtlich der klinischen und funktionellen Ergebnisse sowie des Auftretens von Komplikationen im Vergleich zur konventionellen Technik.
Level of Evidence (GRADE) Moderat	Adamska et al. 2023 Xu et al. 2022 Kim et al. 2020 Li et al. 2022 Xu et al 2022
Konsensstärke	100 % (starker Konsens)

1. Schlüsselfrage und PICO Format	
clinical key question	In adult patients with osteoarthritis undergoing TKA, does robotic-assistance technology improve outcomes and/or decrease complications when compared to other techniques?
population	Adults with: • symptomatic knee OA (clinically confirmed), and • K/L stage 2/3/4 (radiographically confirmed)
intervention	TKA using robotic assistance
comparison	TKA using other techniques (e.g. conventional instrumentation, Patient Spceific Instrumentation, Navigation).
outcome	• Pain (critical) • Function (critical) • Survivorship (important) • Complication rate (important)

2. Recherche Zusammenfassung

Identifier	*ID Ordinal 51*
PICO(T) question	In adult patients with osteoarthritis undergoing TKA, does robotic-assistance technology improve outcomes and/or decrease complications when compared to other techniques?
Search characteristics	
Date of search	18/05/2023
Initials of primary reader	JHM
Database(s)	*PubMed*
Keywords	*Knee* *osteoarthritis; arthritis; osteoarthros*; gonitis; gonarthritis; gonarthros** Robot
Search strings	*#1 Animals[Title] OR Cadaver[Title] OR animal*[Title] OR dog[Title] OR dogs[Title] OR canine[Title] OR cats[Title] OR feline[Title] OR horse*[Title] OR equine[Title] OR mouse[Title] OR mice[Title] OR rat[Title] OR rats[Title] OR rabbit*[Title] OR sheep[Title] OR porcine[Title] OR pig[Title] OR pigs[Title] OR rodent*[Title] OR monkey*[Title] OR cadaver*[Title/Abstract] OR "in vitro"[Title/Abstract] OR comment[Publication Type] OR editorial[Publication Type] OR letter[Publication Type] OR "historical article"[Publication Type] OR address[Publication Type] OR news[Publication Type] OR "newspaper article" [Publication Type] OR "case reports"[Publication Type] OR case report*[Title] OR abstracts[Title] OR editorial[Title] OR reply[Title] OR comment*[Title] OR commentary[Title] OR letter[Title] OR biomechanic*[Title]* *#2 "randomized-controlled-trial" OR "Randomized-Controlled-Trials" OR "random-allocation" OR random*[Title] OR RCT* *#3 (systematic* AND review*) OR meta-analys*[Title/Abstract] OR meta-analysis OR systematic-review* *#4 (Knee)*

	~~*#5 (Osteoarthritis OR arthritis OR osteoarthros* OR gonitis OR gonarthritis OR gonarthros*)*~~ #6 (TKA OR TKR OR "total knee arthroplasty" OR "total knee replacement") AND (robot OR robotic OR robot*) #7 (#4 AND ~~#5 AND~~ #6) NOT(#1) #8 (#7 AND #2) #9 (#7 AND #3)
Number of hits	
RCTs (#8)	53
SR(+MA) (#9)	49
Studies published before 2003	(53- 52) + (49-49) = 1
Articles to consider	
DOIs MAs	10.1016/j.arth.2020.03.005 10.1097/corr.0000000000001324 10.1055/s-0040-1701440 10.1002/rcs.2189 10.1007/s00167-022-07098-w 10.1007/s00167-021-06472-4 10.1007/s00167-021-06436-8 10.1016/j.surge.2017.12.003 10.1007/s00402-020-03512-5 10.1136/postgradmedj-2018-136190 10.2106/jbjs.Oa.23.00010 10.2340/17453674.2023.9411 10.1007/s00167-016-4305-9 10.1007/s00402-022-04632-w 10.1007/s00167-021-06464-4 10.1007/s00167-021-06522-x
DOIs SRs	10.1016/j.arth.2022.03.075 10.1007/s00167-020-06283-z 10.1007/s00590-021-03059-0 10.1016/j.arth.2020.10.033 10.4081/or.2020.8657 10.1016/j.jor.2022.07.016 10.1007/s00167-022-07031-1 10.1186/s40634-020-00278-y 10.2106/jbjs.Rvw.20.00091 10.1016/s0968-0160(13)70005-x 10.1302/0301-620x.102b4.Bjj-2019-1210.R1

DOIs RCTs	10.3390/medicina59020236 10.2106/jbjs.22.00167 10.1302/0301-620x.103b1.Bjj-2020-0602.R2 10.1097/corr.0000000000000916 10.1016/j.jot.2021.12.004 10.1016/j.arth.2013.12.010 10.1007/s00167-016-4076-3 10.1007/s00167-011-1400-9 10.1007/s11999-012-2407-3 10.1007/s00264-021-05179-y 10.1097/js9.0000000000000002 10.1007/s00167-020-06353-2 10.1111/os.13323 10.1093/burnst/tkac034
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10.1007/s11999-012-2407-3	Include
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10.1097/js9.0000000000000002	Not retrieved
10.1007/s00167-020-06353-2	Include
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10.1093/burnst/tkac03	Include

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#7	•••		Search: **(#4 AND #6) NOT #1**	557	05:13:52
#6	•••		Search: **(TKA OR TKR OR "total knee arthroplasty" OR "total knee replacement") AND (robot OR robotic OR robot*)**	673	05:13:37
#5	•••		Search: **(Osteoarthritis OR arthritis OR osteoarthros* OR gonitis OR gonarthritis OR gonarthros*)**	417,332	05:13:30
#4	•••		Search: **Knee**	206,608	05:13:21
#3	•••		Search: **(systematic* AND review*) OR meta-analys* [Title/Abstract] OR meta-analysis OR systematic-review**	531,598	05:13:19
#2	•••		Search: **"randomized-controlled-trial" OR "Randomized-Controlled-Trials" OR "random-allocation" OR random*[Title] OR RCT**	992,466	05:13:13
#1	•••		Search: **Animals[Title] OR Cadaver[Title] OR animal*[Title] OR dog[Title] OR dogs[Title] OR canine[Title] OR cats[Title] OR feline[Title] OR horse*[Title] OR equine[Title] OR mouse[Title] OR mice[Title] OR rat[Title] OR rats[Title] OR rabbit*[Title] OR sheep[Title] OR porcine[Title] OR pig[Title] OR pigs[Title] OR rodent*[Title] OR monkey*[Title] OR cadaver*[Title/Abstract] OR "in vitro"[Title/Abstract] OR comment[Publication Type] OR editorial[Publication Type] OR letter[Publication Type] OR "historical article"[Publication Type] OR address[Publication Type] OR news[Publication Type] OR "newspaper article"[Publication Type] OR "case reports"[Publication Type] OR case report*[Title] OR abstracts[Title] OR editorial[Title] OR reply[Title] OR comment*[Title] OR commentary[Title] OR letter[Title] OR biomechanic*[Title]**	8,471,453	05:13:06

Showing 1 to 9 of 9 entries

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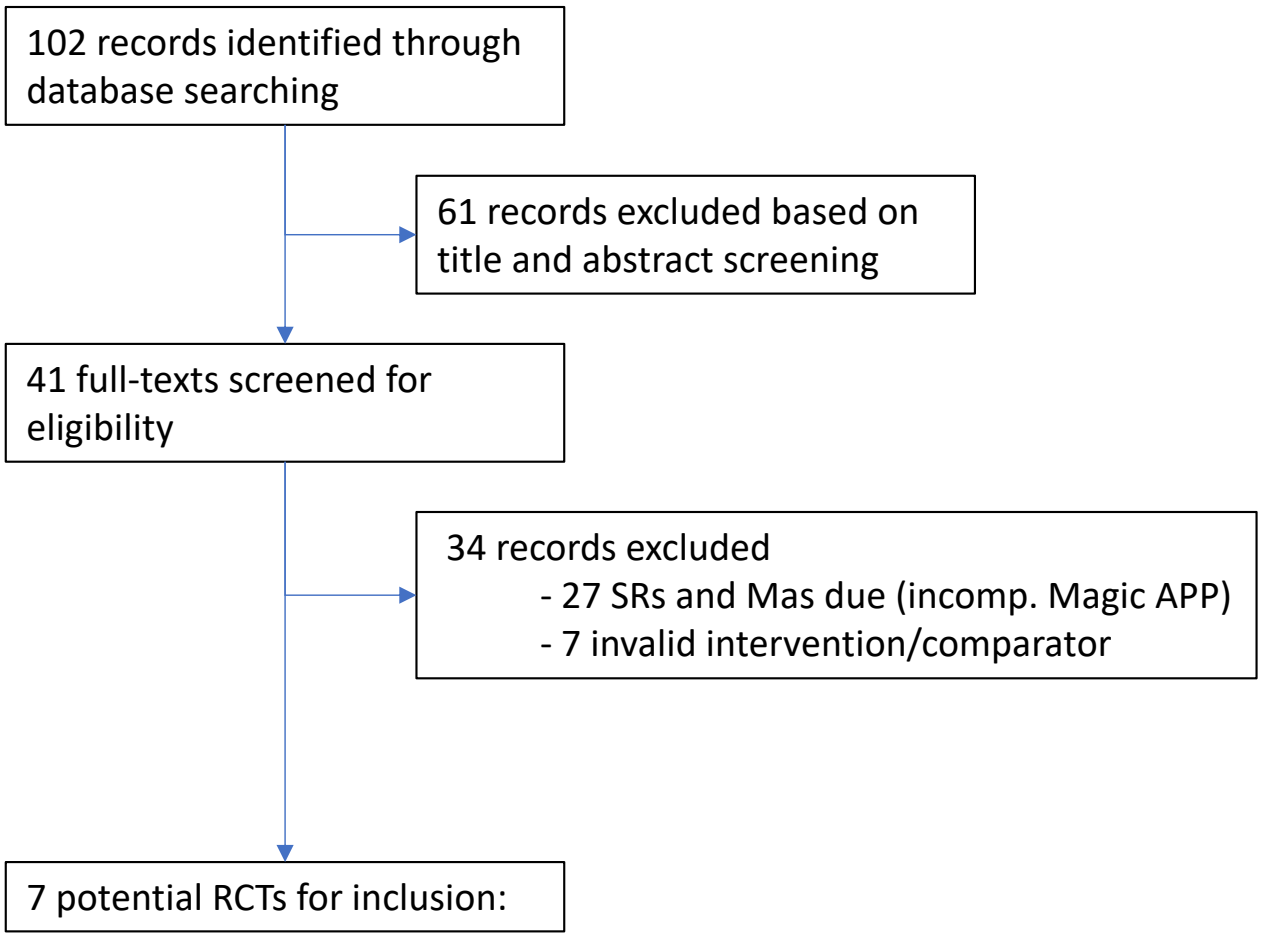
4. Studienselektion: Flowchart

PubMed Search: In adult patients with osteoarthritis undergoing TKA, does robotic-assistance technology improve outcomes and/or decrease complications when compared to other techniques? (18/05/2023)



Potential RCTs

(1-7)

1. Adamska O, Modzelewski K, Szymczak J, Świderek J, Maciąg B, Czuchaj P, et al. Robotic-Assisted Total Knee Arthroplasty Utilizing NAVIO, CORI Imageless Systems and Manual TKA Accurately Restore Femoral Rotational Alignment and Yield Satisfactory Clinical Outcomes: A Randomized Controlled Trial. Medicina (Kaunas). 2023;59(2). doi: 10.3390/medicina59020236
2. Kayani B, Tahmassebi J, Ayuob A, Konan S, Oussedik S, Haddad FS. A prospective randomized controlled trial comparing the systemic inflammatory response in conventional jig-based total knee arthroplasty versus robotic-arm assisted total knee arthroplasty. Bone Joint J. 2021;103-b(1):113-22. doi: 10.1302/0301-620x.103b1.Bjj-2020-0602.R2
3. Kim YH, Yoon SH, Park JW. Does Robotic-assisted TKA Result in Better Outcome Scores or Long-Term Survivorship Than Conventional TKA? A Randomized, Controlled Trial. Clin Orthop Relat Res. 2020;478(2):266-75. doi: 10.1097/corr.0000000000000916
4. Li Z, Chen X, Wang X, Zhang B, Wang W, Fan Y, et al. HURWA robotic-assisted total knee arthroplasty improves component positioning and alignment - A prospective randomized and multicenter study. J Orthop Translat. 2022;33:31-40. doi: 10.1016/j.jot.2021.12.004
5. Thiengwittayaporn S, Uthaitas P, Senwiruch C, Hongku N, Tunyasuwanakul R. Imageless robotic-assisted total knee arthroplasty accurately restores the radiological alignment with a short learning curve: a randomized controlled trial. Int Orthop. 2021;45(11):2851-8. doi: 10.1007/s00264-021-05179-y
6. Xu J, Li L, Fu J, Xu C, Ni M, Chai W, et al. Early Clinical and Radiographic Outcomes of Robot-Assisted Versus Conventional Manual Total Knee Arthroplasty: A Randomized Controlled Study. Orthop Surg. 2022;14(9):1972-80. doi: 10.1111/os.13323
7. Xu Z, Li H, Liu Z, Li J, Zhang J, Wang M, et al. Robot-assisted surgery in total knee arthroplasty: trauma maker or trauma savior? A prospective, randomized cohort study. Burns Trauma. 2022;10:tkac034. doi: 10.1093/burnst/tkac034

GRADE Summary of Findings table Empfehlung #78

Endpunkt Zeitrahmen	**Ergebnisse und Messwerte**	**Absolute Effektschätzer** conv. TKA	raTKA	**Gewissheit der Evidenz** (Vertrauenswürdigkeit der Evidenz)	**Zusammenfassung**
Complications[1] 1 year	Odds ratio (CI 95% -) Basierend auf Daten von 177 patienter und 2 Studien[2]	**0** pro 1000	**0** pro 1000	**Niedrig** Due to serious risk of bias, Due to serious imprecision[3]	Bezüglich des Auftretens von Komplikationen 1 Jahr postoperativ gibt es wenig bis keinen signifikanten Unterschied im Vergleich von robotisch assistiert implantierten Knietotalendoprothesen zu anderen Implantationstechniken.
		Differenz: **weniger pro 1000**			
Complications[4] < 3 months	Odds ratio: 0.81 (CI 95% 0.29 - 2.24) Basierend auf Daten von 72 patienter und 1 Studien[5]	**314** pro 1000	**270** pro 1000	**Moderat** Due to serious risk of bias[6]	Bezüglich des Auftretens von Komplikationen <3 Monaten postoperativ gibt es wenig bis keinen signifikanten Unterschied im Vergleich von robotisch assistiert implantierten Knietotalendoprothesen zu anderen Implantationstechniken.
		Differenz: **44 weniger pro 1000** (CI 95% 197 weniger - 192 mehr)			
Complications[7] 15 years	Odds ratio: 0.5 (CI 95% 0.15 - 1.66) Basierend auf Daten von 1348 patienter und 1 Studien[8]	**12** pro 1000	**6** pro 1000	**Niedrig** Due to serious risk of bias, Due to serious imprecision[9]	Bezüglich des Auftretens von Komplikationen 15 Jahre postoperativ gibt es wenig bis keinen signifikanten Unterschied im Vergleich von robotisch assistiert implantierten Knietotalendoprothesen zu anderen Implantationstechniken.
		Differenz: **6 weniger pro 1000** (CI 95% 10 weniger - 8 mehr)			
Survivorship[10] 1 year	Odds ratio (CI 95% -) Basierend auf Daten von 144 patienter und 1 Studien[11]	**1000** pro 1000	**1000** pro 1000	**Moderat** Due to serious imprecision[12]	Bezüglich des Überlebens der Prothese 1 Jahr postoperativ gibt es wenig bis keinen signifikanten Unterschied im Vergleich von robotisch assistiert implantierten Knietotalendoprothesen zu anderen Implantationstechniken.
		Differenz: **weniger pro 1000**			
Survivorship < 3 months	Odds ratio (CI 95% -) Basierend auf Daten von 33 patienter und 1 Studien[13]	**1000** pro 1000	**1000** pro 1000	**Niedrig** Due to serious risk of bias, Due to serious imprecision[14]	Bezüglich des Überlebens der Prothese <3 Monaten postoperativ gibt es wenig bis keinen signifikanten Unterschied im Vergleich von robotisch assistiert implantierten Knietotalendoprothesen zu anderen Implantationstechniken.
		Differenz: **weniger pro 1000**			
Function (Extension)[15]	Gemessen mit: Extension Skala: -	**6.2** Mittelwert	**6.5** Mittelwert	**Moderat** Due to serious imprecision[17]	

preoperative	Basierend auf Daten von 144 patienter und 1 Studien[16]	Differenz: **MD 0.30 Größer** (CI 95% 1.42 kleiner - 2.02 Größer)		preoperative data, favored direction not applicable
Function (Extension)[18] 1 year	Gemessen mit: Extension Skala: - Basierend auf Daten von 144 patienter und 1 Studien[19]	**1.5** Mittelwert **1.5** Mittelwert Differenz: **MD 0.0 kleiner** (CI 95% 0.91 kleiner - 0.91 Größer)	**Moderat** Due to serious imprecision[20]	Bezüglich des Funktions-Outcome Streckung 1 Jahr postoperativ gibt es wenig bis keinen signifikanten Unterschied im Vergleich von robotisch assistiert implantierten Knietotalendoprothesen zu anderen Implantationstechniken.
Function (ROM)[21] preoperative	Gemessen mit: ROM Skala: - Basierend auf Daten von 1491 patienter und 2 Studien[22]	**128.6** Mittelwert **127.6** Mittelwert Differenz: **MD 0.99 kleiner** (CI 95% 1.74 kleiner - 0.24 kleiner)	**Moderat** Due to serious risk of bias[23]	preoperative data, favored direction not applicable
Function (ROM)[24] < 3 months	Gemessen mit: ROM Skala: - Basierend auf Daten von 143 patienter und 1 Studien[25]	**111.6** Mittelwert **114.5** Mittelwert Differenz: **MD 2.90 Größer** (CI 95% 3.19 kleiner - 8.99 Größer)	**Niedrig** Due to serious risk of bias, Due to serious imprecision[26]	Bezüglich des Funktions-Outcome Bewegungsumfang <3 Monate postoperativ gibt es wenig bis keinen signifikanten Unterschied im Vergleich von robotisch assistiert implantierten Knietotalendoprothesen zu anderen Implantationstechniken.
Function (ROM)[27] 15 year	Gemessen mit: ROM Skala: - Basierend auf Daten von 1348 patienter und 1 Studien[28]	**128.0** Mittelwert **125.0** Mittelwert Differenz: **MD 3.0 kleiner** (CI 95% 3.70 kleiner - 2.30 kleiner)	**Niedrig** Due to serious risk of bias, Due to serious imprecision[29]	Bezüglich des Funktions-Outcome Bewegungsumfang 15 Jahre postoperativ gibt es eine leichte Unterlegenheit von von robotisch assistiert implantierten Knietotalendoprothesen im Vergleich zu anderen Implantationstechniken.
Pain (VAS Pain)[30] preoperative	Gemessen mit: VAS Pain Skala: 0 - 100 Niedriger ist besser Basierend auf Daten von 283 patienter und 1 Studien[31]	**82.3** Mittelwert **77.9** Mittelwert Differenz: **MD 4.41 kleiner** (CI 95% 7.31 kleiner - 1.5 kleiner)	**Moderat** Due to serious imprecision[32]	preoperative data, favored direction not applicable
Pain (VAS Pain)[33] 1 year	Gemessen mit: VAS Pain Skala: 0 - 100 Niedriger ist besser Basierend auf Daten von 283 patienter und 1 Studien[34]	**21.2** Mittelwert **22.2** Mittelwert Differenz: **MD 0.98 Größer** (CI 95% 1.83 kleiner - 3.79 Größer)	**Moderat** Due to serious imprecision[35]	Bezüglich des Schmerzes (VAS) 1 Jahr postoperativ gibt es wenig bis keinen signifikanten Unterschied im Vergleich von robotisch assistiert implantierten Knietotalendoprothesen zu anderen Implantationstechniken.
Function, Pain (WOMAC)[36] preoperative	Gemessen mit: WOMAC Skala: 0 - 100 Höher ist besser Basierend auf Daten von 215 patienter und 2 Studien[37]	**44.6** Mittelwert **44.9** Mittelwert Differenz: **SMD 0.02 Größer** (CI 95% 0.25 kleiner - 0.28 Größer)	**Moderat** Due to serious risk of bias[38]	preoperative data, favored direction not applicable

Function, Pain (WOMAC)[39] < 3 months	Gemessen mit: WOMAC Skala: 0 - 100 Höher ist besser Basierend auf Daten von 215 patienter und 2 Studien[40]	**77.3** Mittelwert **75.9** Mittelwert Differenz: **SMD 0.03 kleiner** (CI 95% 0.30 kleiner - 0.24 Größer)	**Moderat** Due to serious risk of bias[41]	Bezüglich des Schmerzes und der Funktion (WOMAC) < 3 Monaten postoperativ gibt es wenig bis keinen signifikanten Unterschied im Vergleich von robotisch assistiert implantierten Knietotalendoprothesen zu anderen Implantationstechniken.
Function, Pain (KOOS)[42] preoperative	Gemessen mit: KOOS Skala: 0 - 100 Höher ist besser Basierend auf Daten von 283 patienter und 1 Studien[43]	**30.3** Mittelwert **29.3** Mittelwert Differenz: **MD 0.97 kleiner** (CI 95% 3.28 kleiner - 1.35 Größer)	**Moderat** Due to serious imprecision[44]	preoperative data, favored direction not applicable
Function, Pain (KOOS)[45] 1 year	Gemessen mit: KOOS Skala: 0 - 100 Höher ist besser Basierend auf Daten von 283 patienter und 1 Studien[46]	**81.8** Mittelwert **86.3** Mittelwert Differenz: **MD 4.57 Größer** (CI 95% 2.60 Größer - 6.54 Größer)	**Moderat** Due to serious imprecision[47]	Bezüglich des Schmerzes und der Funktion (WOMAC) 1 Jahr postoperativ gibt es eine leichte Überlegenheit von von robotisch assistiert implantierten Knietotalendoprothesen im Vergleich zu anderen Implantationstechniken.

1. undefined
2. Systematic review [538] mit eingeschlossenen Studien: [554], [550], Adamska 2023, Xu 2022, Burns and Trauma **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
3. **Risiko für Bias: schwerwiegend.** Missing intention-to-treat analysis; **Unzureichende Präzision: schwerwiegend.** Only data from one study;
4. undefined
5. Systematic review [538] mit eingeschlossenen Studien: [551], Xu 2022, J. Orthop. Surg. **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
6. **Risiko für Bias: schwerwiegend.** Inadequate/lack of blinding of participants and personnel, resulting in potential for performance bias, Inadequate/lack of blinding of outcome assessors, resulting in potential for detection bias, Missing intention-to-treat analysis;
7. undefined
8. Systematic review [538] mit eingeschlossenen Studien: [552], Kim 2019 **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
9. **Risiko für Bias: schwerwiegend.** Inadequate/lack of blinding of participants and personnel, resulting in potential for performance bias, Inadequate/lack of blinding of outcome assessors, resulting in potential for detection bias, Missing intention-to-treat analysis; **Unzureichende Präzision: schwerwiegend.** Only data from one study;
10. undefined
11. Systematic review [538] mit eingeschlossenen Studien: [550], Adamska 2023 **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
12. **Risiko für Bias: keine.** Missing intention-to-treat analysis; **Unzureichende Präzision: schwerwiegend.** Only data from one study;
13. Systematic review [538] mit eingeschlossenen Studien: [554], Xu 2022, Burns and Trauma **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
14. **Risiko für Bias: schwerwiegend.** Missing intention-to-treat analysis, Inadequate/lack of blinding of participants and personnel, resulting in potential for performance bias, Inadequate/lack of blinding of outcome assessors, resulting in potential for detection bias; **Unzureichende Präzision: schwerwiegend.** Only data from one study;
15. undefined
16. Systematic review [538] mit eingeschlossenen Studien: [550], Adamska 2023 **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
17. **Risiko für Bias: keine.** Missing intention-to-treat analysis; **Unzureichende Präzision: schwerwiegend.** Only data from one study;
18. undefined
19. Systematic review [538] mit eingeschlossenen Studien: [550], Adamska 2023 **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
20. **Risiko für Bias: keine.** Missing intention-to-treat analysis; **Unzureichende Präzision: schwerwiegend.** Only data from one study;
21. undefined
22. Systematic review [538] mit eingeschlossenen Studien: [552], Li 2022, Kim 2019, [553] **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
23. **Risiko für Bias: schwerwiegend.** Inadequate/lack of blinding of participants and personnel, resulting in potential for performance bias, Inadequate/lack of blinding of outcome assessors, resulting in potential for detection bias, Missing intention-to-treat analysis;
24. undefined
25. Systematic review [538] mit eingeschlossenen Studien: Li 2022, [553] **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .

26. **Risiko für Bias: schwerwiegend.** Inadequate/lack of blinding of outcome assessors, resulting in potential for detection bias, Missing intention-to-treat analysis; **Unzureichende Präzision: schwerwiegend.** Only data from one study;
27. undefined
28. Systematic review [538] mit eingeschlossenen Studien: Kim 2019, [552] **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
29. **Risiko für Bias: schwerwiegend.** Inadequate/lack of blinding of participants and personnel, resulting in potential for performance bias, Inadequate/lack of blinding of outcome assessors, resulting in potential for detection bias, Missing intention-to-treat analysis; **Unzureichende Präzision: schwerwiegend.** Only data from one study;
30. undefined
31. Systematic review [538] mit eingeschlossenen Studien: Adamska 2023, Adamska 2023, [550] **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
32. **Risiko für Bias: keine.** Missing intention-to-treat analysis; **Inkonsistenz: keine.** Point estimates vary widely, The magnitude of statistical heterogeneity was high, with I^2:... %.; **Unzureichende Präzision: schwerwiegend.** Only data from one study;
33. undefined
34. Systematic review [538] mit eingeschlossenen Studien: Adamska 2023, Adamska 2023, [550] **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
35. **Risiko für Bias: keine.** Missing intention-to-treat analysis; **Inkonsistenz: keine.** The direction of the effect is not consistent between the included studies, The magnitude of statistical heterogeneity was high, with I^2:... %.; **Unzureichende Präzision: schwerwiegend.** Only data from one study;
36. undefined
37. Systematic review [538] mit eingeschlossenen Studien: [553], [551], Xu 2022, J. Orthop. Surg., Li 2022 **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
38. **Risiko für Bias: schwerwiegend.** Inadequate/lack of blinding of outcome assessors, resulting in potential for detection bias, Missing intention-to-treat analysis; **Inkonsistenz: keine.** The direction of the effect is not consistent between the included studies;
39. undefined
40. Systematic review [538] mit eingeschlossenen Studien: Xu 2022, J. Orthop. Surg., Li 2022, [553], [551] **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
41. **Risiko für Bias: schwerwiegend.** Inadequate/lack of blinding of outcome assessors, resulting in potential for detection bias, Missing intention-to-treat analysis; **Inkonsistenz: keine.** The direction of the effect is not consistent between the included studies, The magnitude of statistical heterogeneity was high, with I^2:... %.;
42. undefined
43. Systematic review [538] mit eingeschlossenen Studien: [550], Adamska 2023, Adamska 2023 **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
44. **Risiko für Bias: keine.** Missing intention-to-treat analysis; **Inkonsistenz: keine.** The direction of the effect is not consistent between the included studies; **Unzureichende Präzision: schwerwiegend.** Only data from one study;
45. undefined
46. Systematic review [538] mit eingeschlossenen Studien: [550], Adamska 2023, Adamska 2023 **Baseline/Vergleichsintervention** Kontrollarm aus der Referenz für Interventionsarm .
47. **Risiko für Bias: keine.** Missing intention-to-treat analysis; **Unzureichende Präzision: schwerwiegend.** Only data from one study;

Referenzen

1. Adamska, O., Modzelewski, K., Szymczak, J., et al. Robotic-Assisted Total Knee Arthroplasty Utilizing NAVIO, CORI Imageless Systems and Manual TKA Accurately Restore Femoral Rotational Alignment and Yield Satisfactory Clinical Outcomes: A Randomized Controlled Trial. Medicina (Kaunas). 2023;59(2).

2. Xu, J., Li, L., Fu, J., et al. Early Clinical and Radiographic Outcomes of Robot-Assisted Versus Conventional Manual Total Knee Arthroplasty: A Randomized Controlled Study. Orthop Surg. 2022;14(9):1972-1980.

3. Kim, Y. H., Yoon, S. H., Park, J. W. Does Robotic-assisted TKA Result in Better Outcome Scores or Long-Term Survivorship Than Conventional TKA? A Randomized, Controlled Trial. Clin Orthop Relat Res. 2020;478(2):266-275.

4. Li, Z., Chen, X., Wang, X., et al. HURWA robotic-assisted total knee arthroplasty improves component positioning and alignment - A prospective randomized and multicenter study. J Orthop Translat. 2022;33:31-40.

5. Xu, Z., Li, H., Liu, Z., et al. Robot-assisted surgery in total knee arthroplasty: trauma maker or trauma savior? A prospective, randomized cohort study. Burns Trauma. 2022;10:tkac034.

PICO 41

1. Schlüsselfrage und PICO Format	
clinical key question	In obese (BMI ≥ 30) adult patients with osteoarthritis undergoing PFA, are outcomes diminished and/or complications increased compared with non-obese patients (BMI < 30) undergoing PFA?
population	Adults with isolated medial or lateral: • symptomatic knee OA (clinically confirmed), and • K/L stage 2/3/4 (radiographically confirmed)
intervention	Patellofemoral arthroplasty

Comparison	• Surgical intervention
	  o Corrective osteotomy (HTO, DFO, and DLO)
	  o Total knee arthroplasty
	  o Arthroscopic lavage and/or debridement
	• Conservative treatment (e.g. exercises)
	• Medical treatment (e.g. analgesics)

outcome	• Progression of OA (within same/other compartments)
	• Adverse events requiring readmission, reoperation, or arthroplasty
	• Clinical and functional scores (validated PROMS):
	  o Pain
	  o Physical function
	  o Health related quality of life
	  o Satisfaction

2. Recherche Zusammenfassung

Identifier	*ID Ordinal 41*
PICO(T) question	In obese (BMI ≥ 30) adult patients with osteoarthritis undergoing PFA, are outcomes diminished and/or complications increased compared with non-obese patients (BMI < 30) undergoing PFA?
Search characteristics	
Date of search	02/05/23
Initials of primary reader	CA
Database(s)	*PubMed*
Keywords	*Knee* *osteoarthritis; arthritis; osteoarthros*; gonitis; gonarthritis; gonarthros** knee arthroplasty; knee replacement; obese; obesity; weight-loss; diet; bariatric; overweight
Search strings	*#1 Animals[Title] OR Cadaver[Title] OR animal*[Title] OR dog[Title] OR dogs[Title] OR canine[Title] OR cats[Title] OR feline[Title] OR horse*[Title] OR equine[Title] OR mouse[Title] OR mice[Title] OR rat[Title] OR rats[Title] OR rabbit*[Title] OR sheep[Title] OR porcine[Title] OR pig[Title] OR pigs[Title] OR rodent*[Title] OR monkey*[Title] OR cadaver*[Title/Abstract] OR "in vitro"[Title/Abstract] OR comment[Publication Type] OR editorial[Publication Type] OR letter[Publication Type] OR "historical article"[Publication Type] OR address[Publication Type] OR news[Publication Type] OR "newspaper article" [Publication Type] OR "case reports"[Publication Type] OR case report*[Title] OR abstracts[Title] OR editorial[Title] OR reply[Title] OR comment*[Title] OR commentary[Title] OR letter[Title] OR biomechanic*[Title]* *#2 "randomized-controlled-trial" OR "Randomized-Controlled-Trials" OR "random-allocation" OR random*[Title] OR RCT* *#3 (systematic* AND review*) OR meta-analys*[Title/Abstract] OR meta-analysis OR systematic-review* *#4 (Knee)*

	#5 (Osteoarthritis OR arthritis OR osteoarthros OR gonitis OR gonarthritis OR gonarthros*)* #6 ("knee arthroplasty" OR "knee replacement" OR KA) AND (obese OR obesity OR "weight loss" OR "weight-loss" OR diet OR bariatric OR overweight) #7 (#4 AND #6) NOT #1 #8 (#7 AND #2) #9 (#7 AND #3)
Number of hits	
RCTs (#8)	80
SR(+MA) (#9)	91
Studies published before 2003	6 RCTs
Articles to consider	
DOIs MAs	Chaudry 2019: 10.2106/JBJS.RVW.18.00184 Pavlovic 2021: 10.1111/cob.12485 Van Tilburg 2022: 10.1530/EOR-21-0090
DOIs SRs	Boyce 2019: 10.1007/s00402-019-03127-5 Gu 2019: 10.1007/s11420-019-09674-2 Courtine 2022: 10.1016/j.rehab.2022.101710
DOIs RCTs	Palanne 2023: 10.1177/14574969221139722 Dowsey 2022: 10.1001/jamanetworkopen.2022.6722 Lijensøe 2021: 10.1177/1457496919883812 Chalidis 2010: 10.1007/s11695-009-9968-6
Include/Excluded after FT screening	
Exclude: about TKA	Chaudry 2019: 10.2106/JBJS.RVW.18.00184
Exclude: Only one study about TKA	Pavlovic 2021: 10.1111/cob.12485
Exclude: about TKA	Van Tilburg 2022: 10.1530/EOR-21-0090
Exclude: about TKA	Boyce 2019: 10.1007/s00402-019-03127-5
Exclude: about TJA	Gu 2019: 10.1007/s11420-019-09674-2
Exclude: about TKA	Courtine 2022: 10.1016/j.rehab.2022.101710
Exclude: about TKA	Palanne 2023: 10.1177/14574969221139722
Exclude: about TKA	Dowsey 2022: 10.1001/jamanetworkopen.2022.6722
Exclude: about TKA	Lijensøe 2021: 10.1177/1457496919883812
Exclude: about TKA	Chalidis 2010: 10.1007/s11695-009-9968-6

Query box

Enter / edit your search query here

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History and Search Details

Download Delete

		Query	Results
#9	••• >	Search: **#7 AND #3** Sort by: **Most Recent**	91
#8	••• >	Search: **#7 AND #2** Sort by: **Most Recent**	80
#7	••• >	Search: **(#4 AND #6) NOT #1** Sort by: **Most Recent**	1,392
#6	••• >	Search: **("knee arthroplasty" ...** Sort by: **Most Recent**	3,579
#5	••• >	Search: **(Osteoarthritis OR ar...** Sort by: **Most Recent**	416,531
#4	••• >	Search: **Knee** Sort by: **Most Recent**	206,073
#3	••• >	Search: **(systematic* AND re...** Sort by: **Most Recent**	528,842
#2	••• >	Search: **"randomized-control...** Sort by: **Most Recent**	990,330
#1	••• >	Search: **Animals[Title] OR Ca...** Sort by: **Most Recent**	8,458,159
#0	••• >	Search: **Clipboard**	2

Showing 1 to 10 of 10 entries

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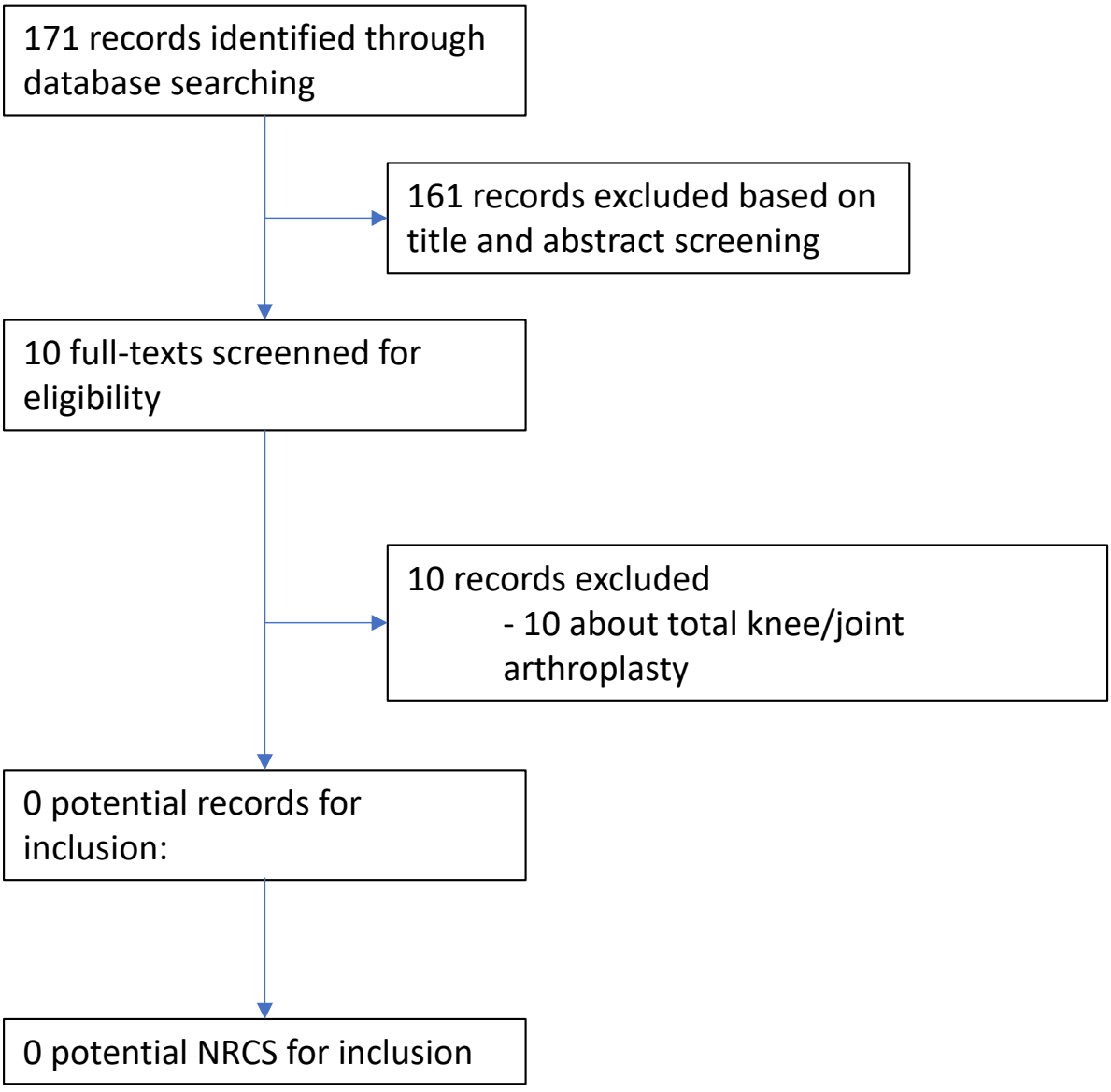
4. Studienselektion: Flowchart

PubMed Search: Does medial UKA reduce pain and improve function in knees with clinically and radiographically confirmed isolated medial OA, compared to other surgical treatments? (02/05/2023)



PICO 149

1. Schlüsselfrage und PICO Format	
Clinical key question	Does isolated or adjuvant lymphatic drainage (manual or device supported) improve outcomes in knees with clinically and/or radiographically confirmed OA?
Population	Adults with isolated medial or lateral: • symptomatic knee OA (clinically confirmed), and • K/L stage 2/3/4 (radiographically confirmed)
Intervention	Isolated or adjuvant lymphatic drainage (manual or device supported)
Comparison	NA
Outcome	• Progression of OA (within same/other compartments) • Adverse events requiring readmission, reoperation, or arthroplasty • Clinical and functional scores (validated PROMS): o Pain o Physical function o Health related quality of life o Satisfaction

2. Recherche Zusammenfassung

Identifier	*ID Ordinal 149*
PICO(T) question	Does isolated or adjuvant lymphatic drainage (manual or device supported) improve outcomes in knees with clinically and/or radiographically confirmed OA?
Search characteristics	
Date of search	19/01/24
Initials of primary reader	BG
Database(s)	*PubMed*
Keywords	*Knee* *osteoarthritis; arthritis; osteoarthros*; gonitis; gonarthritis; gonarthros** lymphatic drainage, lymph drainage, lymphatic massage, lymph massage, lymph*
Search strings	*#1 Animals[Title] OR Cadaver[Title] OR animal*[Title] OR dog[Title] OR dogs[Title] OR canine[Title] OR cats[Title] OR feline[Title] OR horse*[Title] OR equine[Title] OR mouse[Title] OR mice[Title] OR rat[Title] OR rats[Title] OR rabbit*[Title] OR sheep[Title] OR porcine[Title] OR pig[Title] OR pigs[Title] OR rodent*[Title] OR monkey*[Title] OR cadaver*[Title/Abstract] OR "in vitro"[Title/Abstract] OR comment[Publication Type] OR editorial[Publication Type] OR letter[Publication Type] OR "historical article"[Publication Type] OR address[Publication Type] OR news[Publication Type] OR "newspaper article" [Publication Type] OR "case reports"[Publication Type] OR case report*[Title] OR abstracts[Title] OR editorial[Title] OR reply[Title] OR comment*[Title] OR commentary[Title] OR letter[Title] OR biomechanic*[Title]* *#2 "randomized-controlled-trial" OR "Randomized-Controlled-Trials" OR "random-allocation" OR random*[Title] OR RCT* *#3 (systematic* AND review*) OR meta-analys*[Title/Abstract] OR meta-analysis OR systematic-review* *#4 (Knee)*

	#5 (Osteoarthritis OR arthritis OR osteoarthros OR gonitis OR gonarthritis OR gonarthros*)* #6 “lymphatic drainage” OR “lymph drainage” OR “lymphatic massage” OR “lymph massage” OR lymph* #7 (#4 AND #5 AND #6) NOT #1 #8 (#7 AND #2) #9 (#7 AND #3)
Number of hits	
RCTs (#8)	23
SR(+MA) (#9)	7
Studies published before 2003	8
Articles to consider	
DOIs MAs	0
DOIs SRs	0
DOIs RCTs	0
Include/Excluded after FT screening	

An official website of the United States government
Here's how you know

PubMed Advanced Search Builder

PubMed®

Add terms to the query box

All Fields

Enter a search term

ADD

Show Index

Query box

Enter / edit your search query here

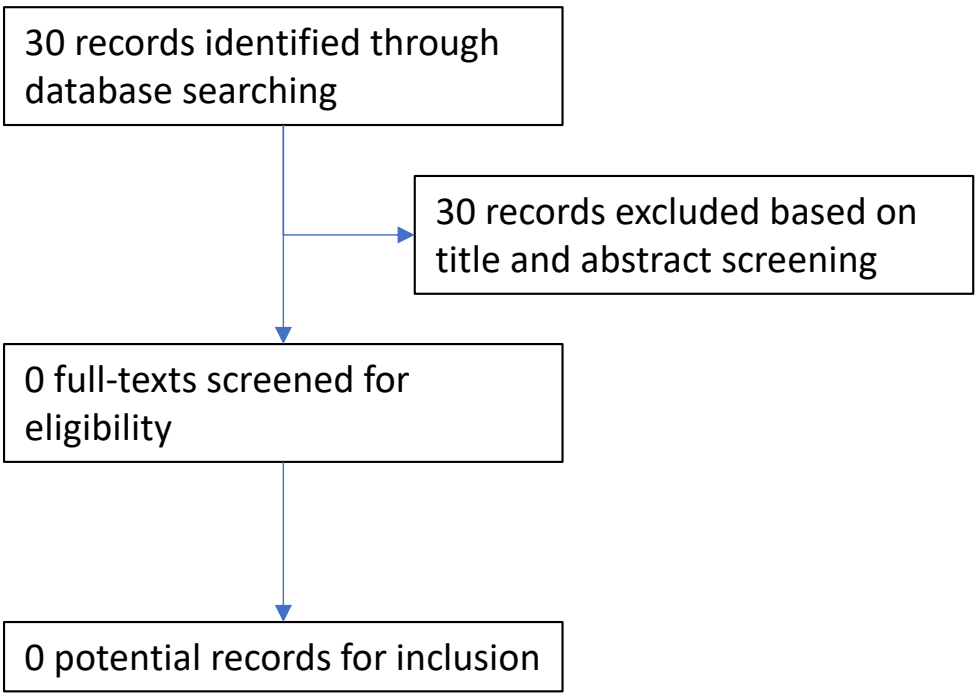
Add to History

History and Search Details

Search	Actions	Details	Query	Results	Time
#9	•••		Search: **(#7 AND #3)** Sort by: **Most Recent**	7	08:49:46
#8	•••		Search: **(#7 AND #2)** Sort by: **Most Recent**	23	08:49:37
#7	•••		Search: **(#4 AND #5 AND #6) NOT #1** Sort by: **Most Recent**	586	08:49:29
#6	•••		Search: **"lymphatic drainage" OR "lymph drainage" OR "lymphatic massage" OR "lymph massage" OR lymph*** Sort by: **Most Recent**	1,502,931	08:49:18
#5	•••		Search: **(Osteoarthritis OR arthritis OR osteoarthros* OR gonitis OR gonarthritis OR gonarthros*)** Sort by: **Most Recent**	430,783	08:49:08
#4	•••		Search: **(Knee)** Sort by: **Most Recent**	214,265	08:49:00
#3	•••		Search: **(systematic* AND review*) OR meta-analys* [Title/Abstract] OR meta-analysis OR systematic-review** Sort by: **Most Recent**	573,004	08:48:54
#2	•••		Search: **"randomized-controlled-trial" OR "Randomized-Controlled-Trials" OR "random-allocation" OR random*[Title] OR RCT** Sort by: **Most Recent**	1,025,039	08:48:41
#1	•••		Search: **Animals[Title] OR Cadaver[Title] OR animal*[Title] OR dog[Title] OR dogs[Title] OR canine[Title] OR cats[Title] OR feline[Title] OR horse*[Title] OR equine[Title] OR mouse[Title] OR mice[Title] OR rat[Title] OR rats[Title] OR rabbit*[Title] OR sheep[Title] OR porcine[Title] OR pig[Title] OR pigs[Title] OR rodent*[Title] OR monkey*[Title] OR cadaver*[Title/Abstract] OR "in vitro"[Title/Abstract] OR comment[Publication Type] OR editorial[Publication Type] OR letter[Publication Type] OR "historical article"[Publication Type] OR address[Publication Type] OR news[Publication Type] OR "newspaper article"[Publication Type] OR "case reports"[Publication Type] OR case report*[Title] OR abstracts[Title] OR editorial[Title] OR reply[Title] OR comment*[Title] OR commentary[Title] OR**	8,660,907	08:48:23

4. Studienselektion: Flowchart

PubMed Search: Does isolated or adjuvant lymphatic drainage (manual or device supported) improve outcomes in knees with clinically and/or radiographically confirmed OA? (19/01/2024)



A critical group appraisal of: Osteoarthritis in over 16s: diagnosis and management using the AGREE II Instrument

Created with the AGREE II Online Guideline Appraisal Tool.

No endorsement of the content of this document by the AGREE Research Trust should be implied.

Co-ordinator:

Date: 9 October 2023

Email: katharina.ortwig@st-marienkrankenhaus.de

URL of this appraisal: http://www.agreetrust.org/group-appraisal/19786

Guideline URL: https://www.nice.org.uk/guidance/ng226

Domain 1	Domain 2	Domain 3	Domain 4	Domain 5	Domain 6	OA 1	OA 2
87%	74%	89%	89%	50%	75%	89%	Yes - 3, Yes with modifications - 0, No - 0

Domain 1. Scope and Purpose			
	Appraiser 1	Appraiser 2	Appraiser 5
Item 1	7	5	7
Item 2	6	6	7
Item 3	7	4	7
Domain 2. Stakeholder Involvement			
	Appraiser 1	Appraiser 2	Appraiser 5
Item 4	5	6	6
Item 5	4	2	7
Item 6	7	5	7
Domain 3. Rigour of Development			
	Appraiser 1	Appraiser 2	Appraiser 5
Item 7	7	7	7
Item 8	7	7	7
Item 9	7	6	7
Item 10	3	5	7
Item 11	6	7	7
Item 12	7	6	7
Item 13	6	7	4
Item 14	7	4	7
Domain 4. Clarity of Presentation			
	Appraiser 1	Appraiser 2	Appraiser 5
Item 15	6	6	7
Item 16	6	7	7
Item 17	7	4	7
Domain 5. Applicability			
	Appraiser 1	Appraiser 2	Appraiser 5

Item 18	5	1	1
Item 19	6	1	5
Item 20	6	5	7
Item 21	5	1	5
Domain 6. Editorial Independence			
	Appraiser 1	Appraiser 2	Appraiser 5
Item 22	6	3	7
Item 23	7	3	7
Overall Assessment			
	Appraiser 1	Appraiser 2	Appraiser 5
OA1	7	5	7

Created online at www.agreetrust.org 9 October 2023

A critical group appraisal of:
Joint replacement (primary): hip, knee and shoulder
using the AGREE II Instrument

Created with the AGREE II Online Guideline Appraisal Tool.

No endorsement of the content of this document by the AGREE Research Trust should be implied.

Co-ordinator:

Date: 9 October 2023

Email: katharina.ortwig@st-marienkrankenhaus.de

URL of this appraisal: http://www.agreetrust.org/group-appraisal/19800

Guideline URL:
https://www.nice.org.uk/guidance/ng157/chapter/Finding-more-information-and-committee-details

Domain 1	Domain 2	Domain 3	Domain 4	Domain 5	Domain 6	OA 1	OA 2
89%	67%	92%	81%	53%	89%	89%	Yes - 3, Yes with modifications - 0, No - 0

Domain 1. Scope and Purpose			
	Appraiser 1	Appraiser 2	Appraiser 4
Item 1	7	5	7
Item 2	6	6	7
Item 3	7	5	7
Domain 2. Stakeholder Involvement			
	Appraiser 1	Appraiser 2	Appraiser 4
Item 4	6	6	7
Item 5	1	2	4
Item 6	7	5	7
Domain 3. Rigour of Development			
	Appraiser 1	Appraiser 2	Appraiser 4
Item 7	7	7	7
Item 8	7	7	7
Item 9	7	6	7
Item 10	6	5	7
Item 11	7	7	6
Item 12	7	6	7
Item 13	7	7	5
Item 14	7	4	7
Domain 4. Clarity of Presentation			
	Appraiser 1	Appraiser 2	Appraiser 4
Item 15	7	6	4
Item 16	7	7	6
Item 17	7	4	5
Domain 5. Applicability			
	Appraiser 1	Appraiser 2	Appraiser 4

Item 18	5	1	1
Item 19	7	1	5
Item 20	7	5	7
Item 21	7	1	3
Domain 6. Editorial Independence			
	Appraiser 1	Appraiser 2	Appraiser 4
Item 22	7	3	7
Item 23	7	7	7
Overall Assessment			
	Appraiser 1	Appraiser 2	Appraiser 4
OA1	7	5	7

Created online at www.agreetrust.org 9 October 2023

A critical group appraisal of: Management of Osteoarthritis of the Knee (Non-Arthroplasty) using the AGREE II Instrument

Created with the AGREE II Online Guideline Appraisal Tool.

No endorsement of the content of this document by the AGREE Research Trust should be implied.

Co-ordinator:

Date: 9 October 2023

Email: katharina.ortwig@st-marienkrankenhaus.de

URL of this appraisal: http://www.agreetrust.org/group-appraisal/19832

Guideline URL: https://www.orthoguidelines.org/topic?id=1035&tab=all_guidelines

Domain 1	Domain 2	Domain 3	Domain 4	Domain 5	Domain 6	OA 1	OA 2
91%	65%	84%	74%	33%	75%	72%	Yes - 3, Yes with modifications - 0, No - 0

Domain 1. Scope and Purpose			
	Appraiser 1	Appraiser 2	Appraiser 4
Item 1	7	5	7
Item 2	7	6	6
Item 3	7	6	7
Domain 2. Stakeholder Involvement			
	Appraiser 1	Appraiser 2	Appraiser 4
Item 4	6	5	5
Item 5	1	1	5
Item 6	7	7	7
Domain 3. Rigour of Development			
	Appraiser 1	Appraiser 2	Appraiser 4
Item 7	7	6	7
Item 8	7	1	7
Item 9	7	1	7
Item 10	7	7	7
Item 11	7	7	7
Item 12	7	2	7
Item 13	7	3	7
Item 14	6	7	7
Domain 4. Clarity of Presentation			
	Appraiser 1	Appraiser 2	Appraiser 4
Item 15	6	6	6
Item 16	6	6	1
Item 17	7	4	7
Domain 5. Applicability			
	Appraiser 1	Appraiser 2	Appraiser 4

Item 18	1	5	4
Item 19	4	2	5
Item 20	5	1	6
Item 21	1	1	1
Domain 6. Editorial Independence			
	Appraiser 1	Appraiser 2	Appraiser 4
Item 22	1	6	7
Item 23	5	7	7
Overall Assessment			
	Appraiser 1	Appraiser 2	Appraiser 4
OA1	6	4	6

Created online at www.agreetrust.org 9 October 2023

A critical group appraisal of: Surgical Management of Osteoarthritis of the Knee using the AGREE II Instrument

Created with the AGREE II Online Guideline Appraisal Tool.

No endorsement of the content of this document by the AGREE Research Trust should be implied.

Co-ordinator:

Date: 9 October 2023

Email: katharina.ortwig@st-marienkrankenhaus.de

URL of this appraisal: http://www.agreetrust.org/group-appraisal/19833

Guideline URL: https://www.orthoguidelines.org/topic?id=1041&tab=all_guidelines

Domain 1	Domain 2	Domain 3	Domain 4	Domain 5	Domain 6	OA 1	OA 2
93%	61%	95%	78%	32%	92%	78%	Yes - 3, Yes with modifications - 0, No - 0

Domain 1. Scope and Purpose			
	Appraiser 1	Appraiser 2	Appraiser 4
Item 1	7	5	7
Item 2	7	6	6
Item 3	7	7	7
Domain 2. Stakeholder Involvement			
	Appraiser 1	Appraiser 2	Appraiser 4
Item 4	5	5	5
Item 5	1	1	4
Item 6	7	7	7
Domain 3. Rigour of Development			
	Appraiser 1	Appraiser 2	Appraiser 4
Item 7	7	7	7
Item 8	7	7	7
Item 9	7	7	7
Item 10	7	7	7
Item 11	7	7	7
Item 12	7	5	7
Item 13	7	3	7
Item 14	6	7	7
Domain 4. Clarity of Presentation			
	Appraiser 1	Appraiser 2	Appraiser 4
Item 15	7	7	6
Item 16	6	4	3
Item 17	7	4	7
Domain 5. Applicability			
	Appraiser 1	Appraiser 2	Appraiser 4

Item 18	1	5	2
Item 19	4	2	5
Item 20	5	1	6
Item 21	1	1	2
Domain 6. Editorial Independence			
	Appraiser 1	Appraiser 2	Appraiser 4
Item 22	7	6	7
Item 23	5	7	7
Overall Assessment			
	Appraiser 1	Appraiser 2	Appraiser 4
OA1	6	5	6

Created online at www.agreetrust.org 9 October 2023

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