

Appendix 1

Search strategy.

MEDLINE

- 1 exp Arthroplasty, Replacement, Knee/ (14936)
- 2 knee replacement arthroplasty.mp. (71)
- 3 total knee arthroplasty.mp. (10735)
- 4 total knee.mp. (15573)
- 5 tka.mp. (5375)
- 6 knee implant*.mp. (434)
- 7 knee joint replacement.mp. (297)
- 8 knee joint arthroplasty.mp. (70)
- 9 tkr.mp. (1372)
- 10 Knee Replacement Arthroplasties.mp. (4)
- 11 total knee replacement*.mp. (4390)
- 12 knee prosthes*.mp. (10181)
- 13 knee endoprosthesis*.mp. (189)
- 14 knee joint prosthesis.mp. (60)
- 15 knee replacement*.mp. (6729)
- 16 knee arthroplast*.mp. (14089)
- 17 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 (25683)
- 18 osteoart*.mp. (73837)
- 19 degenerative art*.mp. (1508)
- 20 OA.mp. (22118)
- 21 degenerative joint disease.mp. (1821)
- 22 arthros*.mp. (31153)
- 23 18 or 19 or 20 or 21 or 22 (109815)
- 24 patellofemoral art*.mp. (385)
- 25 patellofemoral arthroplast*.mp. (122)
- 26 patellofemoral resurfac*.mp. (27)
- 27 patellofemoral replacement*.mp. (42)
- 28 patellofemoral joint arthroplast*.mp. (8)
- 29 patellofemoral joint replacement*.mp. (23)
- 30 patellofemoral joint resurfac*.mp. (1)
- 31 24 or 25 or 26 or 27 or 28 or 29 or 30 (445)
- 32 medial compartment art*.mp. (59)
- 33 medial compartment arthroplast*.mp. (7)
- 34 tibiofemoral art*.mp. (80)
- 35 UKA.mp. (480)
- 36 unicompartment* knee arthroplast*.mp. (668)
- 37 unicompartment* knee joint replacement*.mp. (3)
- 38 unicompartment* knee resurfac*.mp. (2)
- 39 unicompartment* knee joint arthroplast*.mp. (1)
- 40 unicompartment* arthroplast*.mp. (209)
- 41 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 (1043)
- 42 31 and 41 (35)
- 43 bicompartament* arthroplast*.mp. (13)
- 44 bicompartament* knee arthroplast*.mp. (27)
- 45 bicompartament* knee replacement*.mp. (4)
- 46 BKA.mp. (177)
- 47 42 or 43 or 44 or 45 or 46 (235)
- 48 17 and 23 and 47 (47)

EMBASE

- 1 exp Arthroplasty, Replacement, Knee/ (27845)
- 2 knee replacement arthroplasty.mp. (91)
- 3 total knee arthroplasty.mp. (12487)
- 4 total knee.mp. (22452)
- 5 tka.mp. (6038)
- 6 knee implant*.mp. (663)
- 7 knee joint replacement.mp. (474)
- 8 knee joint arthroplasty.mp. (79)
- 9 tkr.mp. (2069)
- 10 Knee Replacement Arthroplasties.mp. (5)
- 11 total knee replacement*.mp. (18026)
- 12 knee prosthes*.mp. (8496)
- 13 knee endoprosthesis*.mp. (544)
- 14 knee joint prosthesis.mp. (71)
- 15 knee replacement*.mp. (20665)
- 16 knee arthroplast*.mp. (23222)
- 17 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 (35174)
- 18 osteoart*.mp. (104342)
- 19 degenerative art*.mp. (1717)
- 20 OA.mp. (32478)
- 21 degenerative joint disease.mp. (2244)
- 22 arthros*.mp. (40571)
- 23 18 or 19 or 20 or 21 or 22 (148316)
- 24 patellofemoral art*.mp. (456)

Appendix 1 (continued)

- 25 patellofemoral arthroplast*.mp. (156)
 - 26 patellofemoral resurfac*.mp. (31)
 - 27 patellofemoral replacement*.mp. (52)
 - 28 patellofemoral joint arthroplast*.mp. (9)
 - 29 patellofemoral joint replacement*.mp. (25)
 - 30 patellofemoral joint resurfac*.mp. (2)
 - 31 24 or 25 or 26 or 27 or 28 or 29 or 30 (520)
 - 32 medial compartment art*.mp. (77)
 - 33 medial compartment arthroplast*.mp. (7)
 - 34 tibiofemoral art*.mp. (102)
 - 35 UKA.mp. (530)
 - 36 unicompartment* knee arthroplast*.mp. (794)
 - 37 unicompartment* knee joint replacement*.mp. (2)
 - 38 unicompartment* knee resurfac*.mp. (2)
 - 39 unicompartment* knee joint arthroplast*.mp. (1)
 - 40 unicompartment* arthroplast*.mp. (265)
 - 41 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 (1228)
 - 42 31 and 41 (49)
 - 43 bicompartament* arthroplast*.mp. (13)
 - 44 bicompartament* knee arthroplast*.mp. (34)
 - 45 bicompartament* knee replacement*.mp. (6)
 - 46 BKA.mp. (232)
 - 47 42 or 43 or 44 or 45 or 46 (311)
 - 48 17 and 23 and 47 (55)
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PubMed

#1, "Search (((((((Arthroplasty, Replacement, Knee [Mesh]) OR Knee Prosthesis [Mesh]) OR total knee arthroplasty) OR tka) OR knee implant*) OR knee joint replacement*) OR knee prosthesis*) OR knee replacement*) OR knee arthroplast**"

#2, "Search (((osteart*) OR OA) OR degenerative art*) OR degenerative joint disease) OR arthros**"

#3, "Search (((((patellofemoral art*) OR patellofemoral arthroplast*) OR patellofemoral resurfac*) OR patellofemoral joint arthroplast*) OR patellofemoral joint replacement*) OR patellofemoral joint resurfac**"

#4, "Search (((((((medial compartment* art*) OR medial compartment* arthroplast*) OR tibiofemoral art*) OR UKA) OR unicompartment* knee arthroplast*) OR unicompartment* knee joint replacement*) OR unicompartment* knee resurfac*) OR unicompartment* knee joint arthroplast*) OR unicompartment* arthroplast**"

#5, "Search (((((((medial compartment* art*) OR medial compartment* arthroplast*) OR tibiofemoral art*) OR UKA) OR unicompartment* knee arthroplast*) OR unicompartment* knee joint replacement*) OR unicompartment* knee resurfac*) OR unicompartment* knee joint arthroplast*) OR unicompartment* arthroplast**) AND (((((patellofemoral art*) OR patellofemoral arthroplast*) OR patellofemoral resurfac*) OR patellofemoral joint arthroplast*) OR patellofemoral joint replacement*) OR patellofemoral joint resurfac**)"

#6, "Search (((bicompartment* arthroplast*) OR bicompartment* knee arthroplast*) OR bicompartment* knee replacement*) OR BKA**"

#7, "Search (((((bicompartment* arthroplast*) OR bicompartment* knee arthroplast*) OR bicompartment* knee replacement*) OR BKA) OR (((((((medial compartment* art*) OR medial compartment* arthroplast*) OR tibiofemoral art*) OR UKA) OR unicompartment* knee arthroplast*) OR unicompartment* knee joint replacement*) OR unicompartment* knee resurfac*) OR unicompartment* knee joint arthroplast*) OR unicompartment* arthroplast**) AND (((((patellofemoral art*) OR patellofemoral arthroplast*) OR patellofemoral resurfac*) OR patellofemoral joint arthroplast*) OR patellofemoral joint replacement*) OR patellofemoral joint resurfac**)) Schema: nomesh"

#8, "Search ((#7) AND (((osteart*) OR OA) OR degenerative art*) OR degenerative joint disease) OR arthros**) AND (((((((Arthroplasty, Replacement, Knee [Mesh]) OR Knee Prosthesis [Mesh]) OR total knee arthroplasty) OR tka) OR knee implant*) OR knee joint replacement*) OR knee prosthesis*) OR knee**"

Appendix 2

Mean and standard deviation calculation derived from Hozo et al. [11].

$$\bar{x} \approx \frac{a + 2m + b}{4} \quad SD \approx \sqrt{\frac{1}{12} \left(\frac{(a - 2m + b)^2}{4} + (b - a)^2 \right)}$$

\bar{x} = mean

SD = standard deviation

m = median

a = low and range

b = high end range

Appendix 3
Study characteristics.

ID	Methods	Participants	Technique/implant	Outcomes reported	Results/weakness
Parratte et al. 2015 [13]	Two-center prospective clinical trial TKA randomly matched patients undergoing sx within 1 mo of BKA patients	Thirty-four patients to BKA, 34 matched patients to TKA Jan 2008-2011 Inclusion: bicompartamental OA Ahlback ≥ 2 , knee flexion >100 , full extension Exclusion: 15° varus/valgus, lateral coaptation on stress radiographs, osteotomy on ligament reconstruction, revision UKA, prosthetic joint in L/E, any MSK disorder No difference between two groups preoperatively	Subvastus, no tourniquet, modular BKA BKA: Gender Solutions PFI system tibiofemoral AUK implant (Zimmer) TKA: Cemented posterior stabilized LPS-Flex prosthesis (Zimmer)	FJS-12 KOOS (total and subscale) Flexion Extension KSS (functional and clinical) UCLA scale (patient activity) 6 mo, 12 mo, yearly Outcomes on chart reported at least after 2 y	BKA significantly improved KSS functional, KSS knee, flexion, and UCLA score vs TKA BKA significantly had higher FJS-12 and KOOS (all 5) scores Forgotten knee status OR 4.06 (4× more likely in BKA) Weakness: not randomized, radiological status not matched, small f/u time
Yeo et al. 2015 [16]	Single-centered RCT	Twenty-two patients to BKA, 20 matched patients to TKA (48 total with 6 lost to f/u) October 2007-January 2009 Inclusion: bicompartamental OA Ahlback ≥ 3 Exclusion: inflammatory arthritis, ROM <90 , flexion contracture >15 , BMI >30 kg/m ² , coronal or sagittal instability, 10° varus, 15° valgus Homogenous groups	Parapatellar approach, 1 surgeon BKA: DePuy Preservation Unicompartamental Knee, Warsaw, IN and patellofemoral arthroplasty (DePuy Sigma High Performance Partial Knee, Warsaw, IN). TKA: total knee arthroplasty with a posterior-cruciate substituting prosthesis (DePuy Sigma, Fixed Bearing Knee System, Warsaw, IN). Patella resurfacing was performed in all the patients	KSS Knee KSS Functional Oxford Knee Score Bartlett Patella Score SF-36 HKA angle Blood loss LOS ROM 6 mo, 12 mo, 2 y, and 5 y F/U 88%	Improved SF-36 score in BKA, significantly less blood loss in BKA, more blood transfusions in TKA group 4 patients in BKA had lateral subluxation of patella- 1 required release 1 BKA had periprosthetic fracture Weakness: unblinded study, small sample size
Engh et al. 2014 [18]	Single-centered RCT	Twenty-five patients TKA, 25 patients BKA (4 TKA and 2 BKA lost during 2-y follow-up as they moved away) Inclusion: bicompartamental OA (unclear diagnostic criteria), age 30-65 y, BMI <35 kg/m ² , intact cruciates Exclusion: inflammatory arthritis, previous knee surgeries, previous hip arthroplasty or arthritis Homogenous groups 88% f/u rate	Parapatellar approach, 1 surgeon BKA: Journey Deuce (Smith & Nephew, Andover, MA). The tibial component is the same as that of a medial journey unicompartamental knee arthroplasty. The femoral component covers the medial femoral condyle as well as the patellofemoral groove. The patellar component is the same as a TKA patellar button. TKA: Genesis II TKA components (Smith & Nephew, Andover, MA) preserves the posterior cruciate ligament, but sacrifices the ACL.	KSS (knee) Oxford Score Functional -timed functional assessment test (speed of walking and stairclimbing) -gait width, step length, and speed Revisions Satisfaction 1 mo, 4 mo, 6 mo, 12 mo, 2 y	All BKA patients able to step over 8-inch block, 8 TKA patients not able to P = .004 (better stair climbing at 1 mo) At 1 mo, KSS score trending toward significant in BKA P = .06 (quicker rehab) 3 TKA cases required manipulation for limited ROM vs 1 BKA 1 TKA revision @ 21 mo tibial component loosening vs 3 BKA revisions (1 for patellar subluxation, and 2 for broken tibial tray later recalled @ 2.5-4.5 y) Weakness: contralateral knee arthritis, BKA prosthesis recalled BKA OR length significantly longer vs TKA Intraop blood loss significantly less in BKA vs TKA Significantly increased ROM BKA vs TKA
Tan et al. 2013 [14]	Retrospective analysis	15 BKA, 12 TKA (27 patients) March 2008-December 2010 Inclusion: bicompartamental OA, KL grade 2-4, intact ACL Exclusion: unicompartamental OA, tricompartmental OA, inflammatory arthritis. Heterogeneous groups, significantly different ages	Parapatellar approach, single surgeon BKA: Zimmer Unicompartamental High Flex Knee prosthesis in conjunction with the Zimmer Gender Solutions Patellofemoral Joint System (modular) TKA: NexGen LPS-Flex Mobile Knee System In both groups, the patella was resurfaced with the NexGen Polyethylene Patellar Button	Hgb level Blood loss OR length LOS ROM VAS KSS knee KSS function WOMAC SF-36 mental SF-36 physical 6, 12, 24 mo	

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Appendix 3 (continued)

ID	Methods	Participants	Technique/implant	Outcomes reported	Results/weakness
Shah et al. 2013 [15]	Retrospective cohort	Fifteen BKA, 12 TKA (27 patients) December 2008-November 2010 Inclusion: bicompartamental OA, primary posterior-cruciate retaining TKA for control group during same period, clinically stable in coronal and sagittal planes Exclusion: KL grade >2 in lateral compartment, inflammatory arthritis, hx of fx, hx of repair/reconstruction of ligaments Heterogeneous groups, significantly different ages and ROM at baseline	Parapatellar approach, single surgeon BKA: Zimmer Gender Solutions Patellofemoral joint (PFJ) and the Zimmer Unicompartmental knee implants for the patellofemoral and medial compartments, respectively (Zimmer Inc, Warsaw, IN), modular implant TKA: NexGen cruciate retaining (CR-TKA) implants (Zimmer), Antibiotic Simplex (Stryker Howmedica, Limerick, Ireland) bone cement. Patella resurfacing preferred, when the patella was too small patelloplasty performed	KSS Knee KSS Functional KOOS WOMAC (converted from KOOS to 100-point scale) Radiographic alignment Radiolucencies 1 mo, 4 mo, 1 y, 2 y	BKA OR length significantly longer vs TKA Significantly increased ROM BKA vs TKA at all time points Weakness: heterogeneous groups with BKA younger and increased ROM at baseline, retrospective review
Morrison et al. 2011 [17]	Prospective cohort	Twenty-one BKA, 33 TKA (53 patients) 2007-2009 Inclusion: bicompartamental OA KL >2, intact cruciates Exclusion: not mentioned Heterogenous at baseline in regard to preop ROM greater in BKA vs TKA	BKA: Deuce Journey knee arthroplasty system (Smith & Nephew Orthopaedics, Memphis, TN) with patellar resurfacing TKA: TKA with posterior-cruciate retaining knee arthroplasty system with (NexGen, Zimmer Inc, Warsaw, IN). These patients also had their patellas resurfaced	SF-12 physical SF-12 mental WOMAC pain WOMAC stiffness Flexion 3 mo, 1 y, 2 y	TKA achieved SF-12 significantly at 3 mo vs BKA which did not achieve this BKA significantly had better WOMAC pain and physical function at 3 mo, no difference at 1, 2 y When controlling for flexion heterogeneity, WOMAC stiffness in BKA significantly greater than TKA at 3 mo, no difference in WOMAC pain and physical function 3 revision in BKA for persistent pain 1 MUA + 2 patellar problems in BKA vs 1 patellar problem and 1 DVT in TKA

BMI, body mass index; MUA, manipulation under anesthesia; RCT, randomized controlled trial; UKA, unicompartmental knee arthroplasty; UCLA, University of California Los Angeles; L/E, lower extremity; MSK, musculoskeletal; f/u, follow-up; F/U, follow-up; OR, operating room; HKA, hip knee ankle; LOS, length of stay; ACL, anterior cruciate ligament; KL, Kellgren and Lawrence; DVT, deep vein thrombosis; VAS, visual analogue scale; sx, surgery; hx, history; fx, fracture.