Regence

Medical Policy Manual Surgery, Policy No. 229

Knee Surgeries

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IMPORTANT REMINDER

Medical Policies are developed to provide guidance for members and providers regarding coverage in accordance with contract terms. Benefit determinations are based in all cases on the applicable contract language. To the extent there may be any conflict between the Medical Policy and contract language, the contract language takes precedence.

PLEASE NOTE: Contracts exclude from coverage, among other things, services or procedures that are considered investigational or cosmetic. Providers may bill members for services or procedures that are considered investigational or cosmetic. Providers are encouraged to inform members before rendering such services that the members are likely to be financially responsible for the cost of these services.

DESCRIPTION

Knee pathology is a common indication and can be treated through surgical and non-surgical methods. Depending on the severity and location of the pathology, a variety of surgical methods may be indicated.

MEDICAL POLICY CRITERIA

Notes: This policy only applies to certain member contracts. Please check the preauthorization website for the member contract to confirm requirements.

I. Partial knee arthroplasty (medial, lateral, or patellofemoral) may be considered **medically necessary** when all of the following Criteria are met (A.-F.):

   A. Function-limiting pain at short distances for at least three months duration; and

   B. Loss of knee function which interferes with the ability to carry out activities of daily living or demands of employment; and

   C. Radiographic or arthroscopic findings of either of the following clinical indications:

      1. Degenerative arthritis as indicated by Kellgren-Lawrence Grade classification Grade III or greater or exposed subchondral bone (Outerbridge Classification

Grade IV); or

2. Avascular necrosis of the femoral condyles and/or proximal tibia; and

D. Intact, stable knee ligaments including the anterior cruciate ligament; and

E. Knee arc of motion (full extension to full flexion) greater than 90 degrees; and

F. Failure of at least three months of non-surgical management including but not limited to a trial of physical therapy unless contraindicated.

II. Removal of knee arthroplasty prosthesis (with or without the use of a spacer) may be considered **medically necessary**.

III. Knee arthrodesis may be considered **medically necessary** in the presence of irreparable damage to the knee joint due to one or more of the following (A.-C.):

A. Infection of a total knee arthroplasty; or

B. Trauma; or

C. Tumor.

IV. Soft tissue and bony surgical procedures (e.g., tibial tubercleplasty and lateral retinacular release,) for knee pain with or without recurrent patellar instability may be considered **medically necessary** when all of the following Criteria are met (A.- E.):

A. The knee pain is patellofemoral; and

B. Function-limiting knee pain or recurrent patellar instability that interferes with the ability to carry out activities of daily living or demands of employment; and

C. Failure of at least three months of non-surgical management including but not limited to a trial of physical therapy unless contraindicated or when there is acute patellar dislocation with loose body or fracture (patellar or femur) or history of a prior patellar dislocation; and

D. One or more of the following physical examination findings:

1. Positive J Sign; or

2. Positive moving patellar apprehension test; or

3. Lateral patellar translation greater than one-half of the patellar width; or

4. Tenderness of the medial or lateral facets; or

5. Patellar grind test (Clarke's sign); and

E. Radiographic or other (e.g., arthroscopic, physical examination) findings for one or more of the following indications:

1. For medial patellofemoral ligament (MPFL) repair or reconstruction, evidence of a ligament tear with any of the following findings:

a. Imaging (CT, MRI, or ultrasound) or arthroscopy; consistent with MPFL tear or insufficiency; or

b. Either of the following physical examination findings:

i. MPFL palpation testing with knee in full extension and the patella laterally subluxated noting tenderness of the origin of the MPFL; or

ii. Patella glide test findings of 75 percent lateral subluxation of the patella width at 30 degrees of knee flexion; or

2. For indications other than MPFL repair or reconstruction, one or more of the following radiographic findings must be documented:
    a. Patellar tilt greater than 20 degrees; or
    b. Patella alta (e.g., Insall-Salvati, Blackburne-Peel, Caton-Deschamps ratios); or
    c. Sulcus angle greater than 145 degrees; or
    d. Increased tibial tubercle-posterior cruciate distance of greater than 24 millimeters; or
    e. Increased tibial tubercle-trochlear groove distance of greater than 20 millimeters; or
    f. Concordant osteochondral defect of the patellofemoral joint; or
    g. Acute patellar dislocation with associated intra-articular fracture.

V. Quadricepsplasty may be considered **medically necessary** when all of the following Criteria are met:
    A. Documentation of limited knee function secondary to post-traumatic, post-operative, or congenital quadriceps stiffness or fibrosis; and
    B. Knee flexion limited to less than 45 degrees; and
    C. Failure of at least three months of non-surgical management including but not limited to a trial of physical therapy and manipulation unless contraindicated.

VI. Partial knee arthroplasty (medial, lateral, or patellofemoral) is considered **not medically necessary** for any of the following:
    A. Criterion I. is not met; or
    B. Medial or lateral unicompartmental arthroplasty in patients with Grade III or greater (Kellgren-Lawrence or Outerbridge Classifications) patellofemoral joint arthritis involving the lateral patella facet and/or lateral trochlea.
    C. Patellofemoral unicompartmental arthroplasty in patients with Grade III or greater (Kellgren-Lawrence or Outerbridge Classifications) medial or lateral compartment degenerative changes.
    D. Any of the following clinical signs or indications:
        1. For any partial knee arthroplasty tibial or femoral shaft deformity; or
        2. Radiographic evidence of medical or lateral subluxation; or
        3. Flexion contracture greater than 15 degrees; or
        4. Varus deformity greater than 15 degrees; or
        5. Valgus deformity greater than 20 degrees; or
        6. Inflammatory arthropathy; or
        7. Active local or systemic infection; or

8. Knee varus deformity of 10 degrees or more and coronal tibiofemoral subluxation of 6 mm or more (e.g., consistent with ACL deficient osteoarthritic knee); or
9. Ligament insufficiency as documented by one or more of the following:
    a. Lack of collateral ligament integrity leading to joint instability; or
    b. Lack of ACL integrity as documented by one or more of the following;
        i. Positive anterior drawer test; or
        ii. Lachman's sign; or
        iii. Pivot shift signs; or
10. Charcot joint; or
11. Vascular insufficiency, significant muscular atrophy of the leg, or severe neuromuscular disease to compromise implant stability or recovery; or
12. Severely immunocompromised state.

VII. Multicompartmental, bicompartmental or bi-unicompartmental knee arthroplasty is considered **not medically necessary** for any indication.

VIII. Knee arthrodesis is considered **not medically necessary** when Criterion III. is not met.

IX. Soft tissue and bony surgical procedures (e.g., tibial tubercleplasty or lateral retinacular release) for knee pain with or without recurrent patellar instability is considered **not medically necessary** when Criterion IV. is not met.

X. Quadricepsplasty is considered **not medically necessary** when Criterion V. is not met or for any other indications.

NOTE: A summary of the supporting rationale for the policy criteria is at the end of the policy.

LIST OF INFORMATION NEEDED FOR REVIEW

REQUIRED DOCUMENTATION:

Required documentation would be entered here similar to:

The information below **must** be submitted for review to determine whether policy criteria are met. If any of these items are not submitted, it could impact our review and decision outcome.

- History and physical/chart notes
- Non-surgical management provided
- Diagnostic imaging reports
- Documentation of function-limiting pain and loss of knee function
- Applicable physical examination findings including but not limited to orthopedic tests performed, pain scale(s), range of motion, and/or loss of strength.

CROSS REFERENCES

None

BACKGROUND

Osteoarthritis (OA) is the most common form of arthritis affecting 58.5 million US adults according to the CDC.[1] Knee osteoarthritis is one of the the most common sites of arthritis diagnosed.

A partial or unicompartmental knee arthroplasty (PKA or UKA) is an orthopedic procedure during which the bone and or cartilage of the knee joint is resurfaced. Partial unicompartment knee arthroplasty (PKA) is a treatment option for individuals with symptomatic osteoarthritis localized to one compartment of the knee and who have failed conservative treatment. The primary goal of PKA is durable pain relief with the improvement of functional status. Partial knee arthroplasty is a less invasive alternative to total knee arthroplasty or replacement (TKA).

The knee is divided into three major compartments: medial, lateral and patellofemoral. Most unicompartmental arthroplasties involve the medial compartment, although lateral and patellofemoral arthroplasties also may be performed. Bicompartmental (BKA) and Bi-unicompartmental arthroplasties are also used as an alternative to TKA. Most BKA procedures are performed in the medial patellofemoral compartments. In these cases, the lateral compartment, anterior cruciate ligament and posterior cruciate ligament are likely preserved. The bi-unicompartmental procedures include the medial and lateral tibiofemoral compartments.

Knee arthrodesis or knee fusion is considered one of the last options available to obtain a stable, painless knee joint that is damaged, infected or otherwise not amenable to reconstructive measures.

EVIDENCE SUMMARY

Systematic reviews (SRs) have evaluated the accumulated evidence for the knee procedures addressed in this policy. Therefore, this evidence review primarily focuses on the most recent systematic reviews and randomized controlled trials.

PARTIAL KNEE ARTHROPLASTY (UNICOMPARTMENT)

Systematic Reviews

Migliorini (2024) published a systematic review (SR) investigating the causes of revision in unicompartmental knee arthroplasty (UKA), a surgical procedure for managing osteoarthritis of one joint compartment.[2] The review analyzed data from 56 studies involving 13,540 patients, with a minimum of 10 years of follow-up. A total of 8.8% (2641 of 30,140) of UKAs were revised at a mean time of 6.5 years, with a range of 2.5 to 13.0 years. The study population consisted of mostly women (65.6%), with a mean age of 65.6 years and a mean BMI of 28.5 kg/m2. Limitations include variability in follow-up times and patient populations across the included studies.

Xia 2024 published a systematic review and meta-analysis comparing the clinical outcomes of unicompartmental knee arthroplasty (UKA) and total knee arthroplasty (TKA) in the treatment of unicompartmental knee osteoarthritis (KOA).[3] The review analyzed data from 13 randomized controlled trials involving 683 UKAs and 683 TKAs, with follow-up periods ranging from one to 15 years, although most outcomes were reported within five years. The UKA patients had better knee recovery (mean difference: 1.23, 95% CI: 1.01-1.45, P <0.00001), greater knee function (mean difference: 1.78, 95% CI: 0.34-3.22, P = 0.02), less pain (mean

difference: 0.75, 95% CI: 0.43-1.06, P <0.00001), and better health status (mean difference: 3.75, 95% CI: 0.81-6.69, P = 0.01) compared to TKA patients. The authors indicted that these differences were not clinically significant when considering the minimal clinically important difference values. UKA patients also had fewer complications (relative risk: 0.59, 95% CI: 0.45-0.78, P = 0.0002) and shorter hospital stays (mean difference: -0.89, 95% CI: -1.57 to -0.22, P = 0.009) compared to TKA patients. There were no statistically significant differences in terms of postoperative range of movement, revision, failure, operation time, and patient satisfaction.

Bunyoz (2024) published a SR evaluating the indications and contraindications for lateral unicompartmental knee arthroplasty (UKA).[4] Data from 38 cohort studies were evaluated. The most commonly reported indications for lateral UKA were moderate to severe lateral osteoarthritis, with full-thickness cartilage in the medial compartment, intact ligaments, a correctable valgus deformity, and a flexion contracture of less than 10-15 degrees. The most commonly reported contraindications were inflammatory arthritis and severe patellofemoral involvement. There was no strong consensus on the indications for lateral UKA, and the authors report that well-defined and consensus-based indications for the procedure do not yet exist. The outcomes after lateral UKA were better for primary lateral osteoarthritis, and that the state of the patellofemoral joint had no significant impact on outcomes, and that there were conflicting results regarding the impact of age and weight.

Hu (2024) published a SR to evaluate the long-term outcomes of unicompartmental knee arthroplasty (UKA) and total knee arthroplasty (TKA) in patients with knee osteoarthritis.[4] The review analyzed data from 29 studies, including five randomized controlled trials, 11 registries and database studies, and 13 cohort studies, with a minimum follow-up period of five years. Neither UKA nor TKA definitively outperformed the other in terms of pain (standardized mean difference (SMD): -0.06, 95% CI: -0.41 to 0.28) and Knee Society Scores (KSS) (SMD: -0.07, 95% CI: -0.23 to 0.008) over a period of five years. However, UKA had better outcomes in terms of Knee Society Function Scores (KSFS) (SMD: -0.30, 95% CI: -0.43 to -0.17) and range of motion (ROM) (SMD: -0.78, 95% CI: -1.11 to -0.46), while TKA had a more favorable survival rate at five or over 5-year follow-up periods.

Wang evaluated the survivorship results of lateral UKA at different follow-up intervals (3-, 5-, 10-, 15-, and 20 years) in a SR published in 2023.[5] A total of 26 studies involving 5470 lateral UKAs were included. Survivorships of lateral UKA at 3-, 5-, 10-, 15-, and 20-year follow-ups were 96% (95% CI: 95-98%, I2 : 77.5%), 94% (95% CI: 93-96%, I2 : 70.8%), 88% (95% CI: 84-91%, I2 : 70.8%), 85% (95% CI: 79-91%, I2 : 70.8%), and 78% (95% CI: 71-85%, I2 : 54.2%), respectively. Subgroup analyses found that bearing type, the number of surgeons, and year of publication might be associated with implant survival outcomes. The authors concluded that the results suggest a single-surgeon lateral UKA using fixed-bearing is recommended. Additional well-designed studies are needed to confirm the findings.

Kyriakidis (2023) published a SR evaluating the clinical and functional outcomes following medial unicompartmental knee arthroplasty (UKA) in patients under the age of 60 years old.[6]

Seventeen articles comprising 2083 unicompartmental arthroplasties were included. The follow-up range was between 1 and 15 years. In eligible studies, all reported outcomes were improved following UKA. The mean Knee Society Score (KSS) clinical was significantly improved from 45.5 (standard deviation [SD]: 9.6) pre-operatively to 89.4 (SD: 4.4) post-operatively (p = 0.0001). Mean implant survival ranged 86-96.5% at 10 years follow-up. There was no significant difference between mobile and fixed bearing in terms of range of motion

(ROM) and KSS clinical. In total, 92 revisions and seven re-operations with implant retention were reported.

Levy (2023) published a meta-analysis comparing outcomes of UKA revised to TKA versus primary TKA, to assess if UKA is an effective treatment option, despite its potential need for revision.[7] Ten studies were included with 1,070 patients: 410 UKA to TKA and 660 primary TKA. At an average follow-up of 5.6 years in the UKA to TKA cohort and 5.7 years in the primary TKA cohort, there were no significant difference in risk of revision ($p = 0.81$), total complications ($p = 0.54$), range of motion ($p = 0.09$), or length of stay ($p = 0.31$). Both objective and functional Knee Society Score were significantly higher in patients with primary TKA ($p < 0.01$). However, there was no difference in Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) or pain scores ($p = 0.13$ and $p = 0.21$, respectively). The authors concluded that UKA may be an effective treatment option in unicompartmental arthritis that would allow for improved functionality and satisfaction without the concern of outcomes deteriorating in patients where a revision becomes necessary.

Salman (2023) published a SR and to evaluate the effect of age on UKA outcomes. Age thresholds were set at 60 and 55 years.[8] A total of 11 observational studies with 6130 knees were included. There was no significant difference in revision rate, incident or PROMs between young and old patients in the analysis for each age threshold. Further sub-analysis adjusting for implant type in mobile- and fixed-bearing prostheses also showed similar results between those above and under 60 and 55 years. Young age was not associated with a higher revision rate or lower functional scores.

Salaman (2022) published a SR with meta-analysis evaluating the effect of age on the outcomes of UKA.[9] A total of 11 observational studies (6130 knees) were included. There was no significant difference in revision rate, incident, or patient-reported outcome measures (PROMs) between young (age thresholds of 60 and 55 years) and older patients. Further sub-analysis adjusting for implant type in mobile- and fixed-bearing prostheses also showed similar results between those above and under 60 and 55 years. The authors conclude that young age was not associated with a higher revision rate, or lower functional scores and that age alone is not a contraindication to UKA. This finding should be applied in context, given the binary division and heterogeneity of patients used in this review.

Deng (2021) published a SR comparing the effectiveness of UKA with TKA for simple medial knee OA.[10] A total of 13 studies were used included (four RCTs and nine cohort or case–control studies). The authors reported that UKA improved knee general function ($p < 0.00001$) and health ($p = 0.02$), moreover, reduced post-operative pain ($P = 0.01$) and complications ($p < 0.05$) more than TKA. There were no significant differences in postoperative revision ($p = 0.252$), high-activity arthroplasty score (HAAS) ($p = 0.307$) and Oxford knee score (OKS) ($p = 0.15$) between the two techniques.

Campi (2021) published a SR evaluating the impact of obesity on functional outcomes and revision rates of UKA.[11] A total of 22 studies were identified and 13 studies were included in the meta-analysis. Obesity was defined as a BMI ≥ 30 kg/m^2. Patients with a BMI > 30 had a significantly higher likelihood for revision ($p = 0.02$), while the risk of septic revision was similar ($p = 0.79$). The clinical outcome measures showed a significant difference in favor of patients with a BMI < 30 ($p < 0.0001$). The authors conclude that BMI is not a contraindication for UKA and that obese patients have a higher risk for aseptic failure. The studies included were low quality, small cohort and largely retrospective. Timing to revision was not clear. More long-term

quality studies are needed to determine the outcomes of UKA in obese individuals.

Ng (2021) completed a SR with meta-analysis to compare clinical and functional outcomes of UKA in patients with obesity to non-obese patients.[12] A total of 12 studies were included in the final analysis. Patients with obesity (BMI ≥ 30 kg/m^2) 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. Patients with obesity also scored lower on the functional outcomes scores. The studies used were of moderate quality and the authors conclude that higher quality studies are needed to corroborate these findings.

Wilson (2019) published a SR comparing clinical and patient outcomes of UKA and TKA.[13] A total of 60 studies were included in the analysis (7 RCTs ,17 national joint registries and 36 cohort studies). The authors report significantly shorter hospital stays after UKA than after TKA (−1.20 days (95% confidence interval −1.67 to −0.73), −1.43 (−1.53 to −1.33), and −1.73 (−2.30 to −1.16), respectively). There was no significant difference in pain, based on patient reported outcome measures (PROMs), but significantly better functional PROM scores for UKA than for TKA in both non-trial groups (standard mean difference −0.58 (−0.88 to −0.27) and −0.29 (−0.46 to −0.11), respectively). Mortality after TKA was significantly higher in registry and large database studies (risk ratio 0.27 (0.16 to 0.45)), as were venous thromboembolic events (0.39 (0.27 to 0.57)) and major cardiac events (0.22 (0.06 to 0.86)). Early reoperation for any reason was higher after TKA than after UKA, but revision rates at five years remained higher for UKA in all three study groups (risk ratio 5.95 (1.29 to 27.59), 2.50 (1.77 to 3.54), and 3.13 (1.89 to 5.17), respectively). The authors confirm a lack of good quality data from randomized controlled trials comparing outcomes of TKA with UKA.

Randomized Controlled Trials

Sershon (2022) reported the early outcomes of a randomized controlled trial comparing UKA with TKA.[14] Patients (n=107) were randomized to TKA (n=50) or UKA (n=57) at two surgical centers. There were no demographic or baseline patient reported outcome (PRO) differences (p > .05). UKA demonstrated shorter operative times (UKA = 65 minutes, TKA = 74 minutes; p < .001) and length of stay (UKA = 0.7 nights, TKA = 1.2 nights; p < .01). There were three surgical complications within 90 days in each group. The duration of opioid consumption (UKA = 33.8 days, TKA = 28.5 days; p = .290) and return to work (UKA = 57.1 days, TKA = 47.3 days; p = .346) did not differ between groups. There were no differences between UKA and TKA in the early postoperative period in regard to patient-reported outcome measures, duration of opioid use, or return to work. The authors conclude that patients undergoing UKA may experience a shorter length of stay and greater early range of motion. All-cause short-term complications may be more prevalent with TKA. Long-term data is not yet available.

Knifsund (2021) published a prospective, randomized, two years, assessor-blind, multicentre, superiority trial to assess the clinical effectiveness of medial UKA versus TKA in patients (n=143) with isolated medial osteoarthritis of the knee.[15] Only patients with isolated medial osteoarthritis who met the original indications for medial unicompartmental arthroplasty with the Oxford knee (Zimmer-Biomet, Warsow, Indiana, USA) were considered for the trial. All procedures were completed through a similar midline skin incision and patients were blinded to the type of arthroplasty for the whole 2 years of follow-up. The authors report that the postoperative recovery after UKA was faster but UKA did not provide a better patient-reported outcome at 2 years. There was no difference in the number of revisions between the study

groups.

Beard (2020) published a randomized multicenter pragmatic comparative effectiveness trial to assess the clinical effectiveness and cost-effectiveness of PKA compared with TKA in patients (n=528) with medial compartment knee osteoarthritis.[16] There was no significant difference between groups in mean Oxford Knee Score at 5 years (difference 1.04, 95% confidence interval -0.42 to 2.50). The frequency of reoperation (including revision) was similar for both groups (PKA: 22 out of 245 and TKA: 28 out of 269). Revision rates at 5 years were 10 out of 245 for PKA and 8 out of 269 for TKA. There were 28 'failures' of partial knee replacement and 38 'failures' of total knee replacement (as defined by composite outcome). The authors conclude that both TKA and PKA are effective, offer similar clinical outcomes and have similar reoperation and complication rates. Partial knee replacement was more cost-effective (more effective and cost saving) than TKA at five years. The patients in this study were not blinded and there was some reported non-compliance with treatment allocations.

Section Summary

Unicompartment or partial knee arthroplasty is effective and offers similar clinical outcomes, reoperation, and complication rates as TKA. Unicompartment knee arthroplasty is well tolerated and may offer shorter postoperative recovery. Most UKA procedures are completed in the medial compartment. Unicompartment KA maybe associated with increased revision rates, particularly in patients with obesity. However, there is a lack of randomized controlled trials and limited long term follow-up data.

PARTIAL KNEE ARTHROPLASTY (BI-COMPARTMENT or BI-UNICOMPARTMENT)

Systematic Reviews

Akkawi (2023) published a SR assessing simultaneous Bi-UKA as an option for treating medial and lateral tibiofemoral OA.[17] Seven studies were included in the review. Fractures occurred eight times and there were 22 revisions of the prosthetic components for any reason with a survival rate that ranged from 83 to 100%. Of these, 16 revisions were for the aseptic loosening of the prosthetic components. Out of 302 surgeries, three were revised due to symptomatic OA progression in the patello-femoral joint. All clinical scores improved at the latest follow-up compared to preoperative values. Moreover, there were no differences in clinical scores of Bi-UKA compared to unicompartmental knee arthroplasty (UKA), or medial UKA plus patello-femoral prosthesis. Whereas, compared to TKA, Bi-UKA patients had comparable or superior scores. Finally, the Bi-UKA group had a significantly shorter hospital stay compared to the TKA group.

Elbardesy (2021) published a SR with meta-analysis to compare patient and clinical outcomes of BKA with TKA in patients with bicompartmental OA (medial patellofemoral: MPFOA).[18] A total of 11 studies were included (six RCT and five retrospective cohort studies). The authors report TKA had better short-term results and was associated with shorter operative time and lower revision rates. The BKA implant resulted in less intraoperative blood loss and better post-operative ROM. The authors concluded that BKA was not an equivalent alternative to TKA in MPFOA. Limitations include methodological heterogeneity and lack of long-term follow-up.

Amit (2020) published a SR to assess the functional outcomes of modular BKA compared to TKA for MPFOA.[19] They included nine studies (one RCT, one prospective cohort, three

retrospective cohort and four case series). The narrative synthesis included 341 knees (331 participants) with 239 knees in the BKA group and 102 knees in the TKA group. The authors concluded that BKA resulted in longer operative time and less intraoperative blood loss. Long-term series showed 95.1% survivorship of BKA at 5 years and 58% at 17 years. Patients with BKA surgery had greater improvement in ROM and forgotten knee status than TKA and poor long-term survivorship. The quality of studies ranged from moderate to very low with low to high risk of bias. Limitations include the use of narrative synthesis due to clinical, methodological, and statistical heterogeneity among the included studies.

Ma (2017) published a meta-analysis comparing the safety and efficacy of BKA and TKA for patients with bicompartmental knee OA.[20] Five studies (261 patients) were included in the analysis. Knee Society score (KSS)-Knee Score, KSS-Function Score, and flexion range of the knee in BKA group is greater than those in TKA group ($p=0.03$, $p<0.0001$, $p=0.0008$ respectively); Hip-Knee-Ankle (HKA) angle in BKA group is smaller than TKA group ($p<0.00001$); more postoperative complications are observed in BKA group ($p=0.007$); no significant difference was found in proportion of revision between the two groups ($p=0.11$). The authors conclude that BKA may bring better postoperative knee function and QOL and may have increased postoperative complications when compared to TKA.

Randomized Controlled Trials

Schrednitzki (2020) reported 5-year followup results of a prospective, randomized study comparing BKA to TKA in patients (n=80) with MPFOA.[21] Patients were randomly assigned to BKA or TKA. Follow-up (FU) assessments were completed at 3, 6 and 12 months and 2- and 5-years post procedure. Functional scores included the KSS, Oxford Knee Score, and the University of California, Los Angeles activity scores at each time point and the forgotten knee score at five years. Both groups had improvements in functional scores but there was no difference between groups at any (FU) time point or for the forgotten knee score. ROM was significantly greater in the BKA group from the 1-year FU onward. The authors conclude that lack of difference in the functional outcomes may not justify the complexity of BKA and the high risk of failure. They recommend further long-term studies to explore the benefits of BKA.

The five-year and 10-year FU outcomes of a randomized prospective study comparing clinical outcomes with BKA to TKA in patients (n=48) with MPFOA were published.[22, 23] Twenty-six knees were treated with BKA and 22 underwent TKA. The main outcome measures were ROM, KSS-Score, KSS-Score, Oxford Knee Score, Physical Component Score, Mental Component Score of SF-36 and results of radiographs pre-operatively and post-operatively up to 10 years. Yeo (2015) reported that there was less blood loss in the BKA group (397 ml for the BKA group and 647 ml for the TKA; $p=.001$).[22] Goh (2020) reports at ten years, that the median Hip-Knee-Ankle (HKA) angle was 183.38 (175.17-187.94) in the BKA group and 180.73 (174.96-185.65) in the TKA group.[23] One patient from the BKA group had a peri-prosthetic fracture necessitating revision surgery to a TKA. Improvement was seen in both groups compared to pre-operatively, however there were no significant differences in the main outcome measures detected between the groups at 5 and 10 years. The authors conclude BKA is an alternative arthroplasty option in selected patients.

Engh (2014) completed a RCT comparing functional outcomes of BKA with TKA in patients (n=50) with MPFOA.[24] Patients were between 30 and 65 years old, with a BMI under 35 kg/m^2. Outcomes included the KSS, Oxford questionnaires, radiographs, and functional tests performed preoperatively, and at 1, 4, 12, and 24 months postoperatively. Functional testing

included gait analysis, stair climbing, lunging, and sit-to-stand analysis. Both groups achieved equivalent KSS (2 year mean 93.6 vs. 92.6, p=0.43) and Oxford scores (2-year mean 43 vs. 41, p=0.35). Functional testing showed significant improvement.

Section Summary

Most bicompartmental arthroplasties procedures reported in the literature are for medial and patellofemoral OA. Two small RCTs reported no differences in outcomes for MPF bicompartmental procedures, one with a 10-year follow-up. In another RCT the authors conclude that lack of difference in the functional outcomes may not justify the complexity of BKA and the high risk of failure. Systematic reviews report heterogeneity among studies and lack of long-term follow-up. There is not enough evidence to support bicompartmental or bi-unicompartmental arthroplasty procedures.

KNEE ARTHRODESIS

Systematic Reviews

Maden (2021) published a SR reporting on the outcomes of the surgical management of failure of Surgical management of failure of two-stage revision arthroplasty.[25] They included nine papers (273 patients). They reported all surgical techniques had mixed results in term of clinical and functional outcomes, and the rate of complications was high in all studies. The authors report that they were unable to identify any consistent superiority of any different surgical technique included in the review. Knee arthrodesis (KA) had the lower risk of failure than repeat 2 stage revision. Poor patient immunological status and limb status were weakly associated with increased risk of failure. They concluded that KA had the best result for improving QOL and reducing infection recurrence, and the complication rate is high and functional outcomes are worse. Limitations included mostly retrospective, single center studies with small patient numbers and inconsistency of outcome measures.

Makhdom (2019) published a review of current indications, principles, techniques and outcome data for knee arthrodesis after failure of TKA due to infection.[26] They report the most common indication for fusion after failure of TKA is recurrent periprosthetic joint infection (PJI). They list the following contraindications to knee arthrodesis: prior contralateral knee arthrodesis or transfemoral amputation or an ipsilateral hip arthrodesis. As well as degenerative lumbar spine disease as a relative contraindication. They recommend that knee arthrodesis after failure of an infected TKA may provide superior functional outcome and ambulatory status than above the knee amputation (grade C). The also recommend that knee arthrodesis be considered after 1 attempt at 2 stage revision (grade C).

Section Summary

Despite the limited research, KA may have improved QOL and reduced infection recurrence above more aggressive treatment periprosthetic joint infection after failed TKA. However, KA is associated with high complication rates and inconsistent functional outcomes.

SOFT TISSUE OR BONY SURGICAL PROCEDURES AND QUADRICEPSPLASTY

Despite the limited comparative research, soft tissue or bony surgical procedures (e.g., tibial tubercleplasty, lateral retinacular release, extra-articular ligamentous construction or augmentation) and quadripcepsplasty appear to be standard treatment options for certain patients and may improve health outcomes.[27-35] When the procedures are not clinically

indicated or the etiology of the knee pain is elsewhere, these procedures should not be performed.

PRACTICE GUIDELINE SUMMARY

The American Academy of Orthopaedic Surgeons

The American Academy of Orthopaedic Surgeons (AAOS) in their 2023 guidelines for surgical management of osteoarthritis of the knee indicate that the practitioner can use UKA vs TKA for patients with predominantly medial compartment osteoarthritis, as evidence reports improved patient reported and functional outcomes in the short term; however, long-term rates of revision in unicompartmental knee arthroplasty may be higher than TKA (Moderate recommendation).[36]

SUMMARY

The current research for partial knee (unicompartmental) arthroplasty has shown improvement in health outcomes resulting in reduced pain and improved function in select patients. Therefore, partial knee (unicompartmental) arthroplasty is considered medically necessary in patients who meet the policy criteria.

For patients that do not meet the policy criteria, partial knee (unicompartmental) is considered not medically necessary because the procedure is not considered clinically effective or appropriate for these individuals.

Removal of knee arthroplasty prosthesis (with or without the use of a spacer) appears to be standard of care and therefore is considered medically necessary.

The current research for knee arthrodesis is limited but has shown improvement in health outcomes resulting in reduced pain and improved quality of life in select patients. Therefore, knee arthrodesis is considered medically necessary in patients who meet the policy criteria.

For patients that do not meet the policy criteria, knee arthrodesis is considered not medically necessary because the procedure is not considered clinically effective or appropriate for these individuals.

The current research for soft tissue and bony surgical procedures (e.g., tibial tubercleplasty and lateral retinacular release) for patellofemoral knee pain with or without recurrent patellar instability is limited however many of these treatment options appear to be standard of care and improve health outcomes in certain patients. Therefore, soft tissue and bony surgical procedures (e.g., tibial tubercleplasty and lateral retinacular release) for patellofemoral knee pain with or without recurrent patellar instability may be considered medically necessary when policy criteria are met.

For patients that do not meet the policy criteria, soft tissue and bony surgical procedures (e.g., tibial tubercleplasty and lateral retinacular release) for knee pain with or without recurrent patellar instability is considered not medically necessary because the procedure is not considered clinically effective or appropriate for these individuals.

The current research for quadricepsplasty is limited but has shown improvement in health outcomes resulting in reduced pain and improved quality of life in select patients. Therefore, quadricepsplasty is considered medically necessary in patients who meet the policy criteria.

For patients that do not meet the policy criteria, quadricepsplasty is considered not medically necessary because the procedure is not considered clinically effective or appropriate for these individuals.

There is not enough high-quality evidence to show that multicompartmental, bicompartmental or bi-unicompartmental arthroplasty results in improved health outcomes in multicompartmental knee pathology. Therefore, multicompartmental, bicompartmental or bi-unicompartmental arthroplasty is considered not medically necessary.

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CODES

Codes	Number	Description
CPT	27418	Anterior tibial tubercleplasty (eg, Maquet type procedure)
	27425	Lateral retinacular release, open
	27430	Quadricepsplasty (eg, Bennett or Thompson type)
	27437	Arthroplasty, patella; without prosthesis
	27438	Arthroplasty, patella; with prosthesis
	27440	Arthroplasty, knee, tibial plateau
	27441	Arthroplasty, knee, tibial plateau; with debridement and partial synovectomy
	27442	Arthroplasty, femoral condyles or tibial plateau(s), knee;
	27443	Arthroplasty, femoral condyles or tibial plateau(s), knee; with debridement and partial synovectomy
	27446	Arthroplasty, knee, condyle and plateau; medial OR lateral compartment

Codes	Number	Description
	27488	Removal of prosthesis, including total knee prosthesis, methylmethacrylate with or without insertion of spacer, knee
	27580	Arthrodesis, knee, any technique
HCPCS	None	

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