

Total Knee Replacement

Overview

- Revision of well-fixed, mechanically aligned total knee arthroplasty using kinematic alignment to restore joint line obliquity is not a universally accepted indication for revision surgery [1].
- Further data must be collected regarding long-term outcomes for revision of well-fixed, mechanically aligned total knee arthroplasty using kinematic alignment [1].
- Prosthetic knee instability remains difficult to manage despite intuitive and appropriate indications for polyethylene exchange only [2].
- An Asia-Pacific expert panel reached consensus on 18 critical clinical questions spanning general principles, total hip arthroplasty, and total knee arthroplasty [3].
- Total knee arthroplasty performed in patients younger than 65 years has excellent survivorship [4].
- Vitamin E-infused highly cross-linked polyethylene did not reduce the number of in vivo wear particles in total knee arthroplasty [5].
- Further careful follow-up of newly introduced Vitamin E-infused highly cross-linked polyethylene for total knee arthroplasty should be carried out [5].
- A specific design of uncemented knee replacement is recommended not to be used unless further survivorship studies show better results [6].
- Conversion from unicompartmental to total knee replacement does not yet yield equivalent outcomes to simple primary total knee arthroplasty [8].
- Current evidence has not demonstrated a definitive increase in implant-related complications associated with return to sport after total knee arthroplasty [15].
- The selection of appropriate patients is critical to the success of cementless fixation techniques in total knee arthroplasty [18].
- Optimized multisurface osteochondral allograft transplantation yielded the greatest benefits relative to total knee arthroplasty with respect to cumulative quality-adjusted life year differences in a 30-year economic analysis model of active middle-aged patients [21].
- For patients with loose implants associated with a supracondylar fracture, revision is typically considered [28].

- Bony defects, areas of osteolysis, osteopenia, and short periarticular fragments pose challenges to a successful revision arthroplasty in the setting of a supracondylar fracture [28].
- Distal femoral replacement megaprotheses are often required to reconstruct massive bony defects in elderly patients with loose implants and supracondylar fractures [28].
- The surgeon undertaking revision arthroplasty for periprosthetic distal femur fractures should be experienced in both arthroplasty and fracture management techniques [28].
- Routine preoperative evaluation for patients with a loose implant or a history of prefracture knee pain should include a complete blood count with manual differential, sedimentation rate, C-reactive protein serologies, and a knee aspiration to exclude occult infection [28].
- The operative note from the original arthroplasty should be obtained, especially if isolated component revision is contemplated [28].
- Older implant designs may not offer varying degrees of constraint, augmentations, or polyethylene insert sizes, which may necessitate complete arthroplasty revision due to compatibility issues [28].
- Previous incisions and the status of the soft tissues should be circumferentially evaluated, and the neurovascular status of the limb should be carefully documented [28].
- The probability of flap necrosis and wound problems is much higher around the knee than the hip [28].
- Great care should be taken to prevent narrow, acutely angled skin bridges between connecting incisions and to develop full-thickness flaps during dissection [28].
- Prior incisions should be used as best as possible, and if a distinct incision is needed, appropriate separation should be maintained to provide a suitable skin bridge [28].
- The status of the extensor mechanism is very important for treatment and prognosis and should be determined during evaluation [28].
- The need for revision total knee arthroplasty secondary to periprosthetic fracture has become less common with the advent of improved internal fixation devices such as locked plates [28].
- Revision arthroplasty is typically reserved for fractures around a loose prosthesis, fractures with inadequate bone stock to allow for stable internal fixation, or recalcitrant supracondylar nonunions that require resection and megaprosthesis implantation [28].
- Surgeons who treat periprosthetic fractures around a total knee arthroplasty must have the expertise and technical support to perform either long-stemmed revision total knee arthroplasty or revision to a megaprosthesis [28].
- Bony defects secondary to comminution, multiple previous procedures, broken hardware, and deformity may present technical challenges to a successful outcome [28].
- Revision total knee arthroplasty with intramedullary femoral stems that engage the diaphysis can be used to simultaneously stabilize the fracture [28].
- Cemented stems may be used in revision total knee arthroplasty, but care must be taken to prevent extrusion of cement into the fracture site [28].
- Allograft struts with cerclage wiring can be used to reinforce the stability provided by a long-stem prosthesis [28].

- It is very unusual to have distal femoral bone stock that is inadequate for internal fixation yet adequate for formal revision [28].
- The ideal indication for long stem revision total knee arthroplasty is the presence of adequate bone stock in the face of a supracondylar fracture with a grossly loose femoral component [28].
- Revision arthroplasty is typically chosen for fractures around loose implants and fractures of the distal femur with distal fragments that offer no reasonable opportunity for internal fixation [28].
- Revision of femoral components typically requires metal augmentation because of the inevitable bone deficiency associated with component removal [28].
- Stems should be used routinely in revision arthroplasty, and it is recommended that the stem engage the femoral diaphysis for alignment and fixation reasons [28].
- Commercially available metaphyseal sleeves and trabecular metal cones can be useful for managing capacious metaphyseal defects [28].
- Implants with increased varus–valgus constraint and hinged implants should be available for revision arthroplasty because ligamentous insufficiency is common in this setting [28].
- A modular megaprosthesis (distal femoral replacement) is performed when there is not enough bone to support a traditional revision, even with the use of diaphyseal engaging stems [28].
- Careful dissection of the residual distal femoral bone is performed to avoid vascular injury during distal femoral replacement [28].
- Various modular segments are available to manage metaphyseal bone loss because of fracture comminution while allowing restoration of appropriate leg length, limb alignment, and knee stability [28].
- Cement fixation is typically used in the setting of distal femoral replacement [28].
- Patients in all age cohorts who underwent high tibial osteotomy had a decreased rate of total knee arthroplasty conversion at one and two years postoperatively compared to unicompartmental knee arthroplasty [65].

Anatomy & Pathophysiology

BONY ANATOMY & KINEMATICS

- The knee is a hinge joint that incorporates both gliding and rolling motions essential to its kinematics [40].
- The “screw-home” mechanism involves the tibia externally rotating 5 degrees during the final 15 degrees of extension [40].
- Anterior femoral notching (FN) during total knee arthroplasty has historically been viewed primarily as a risk factor for postoperative supracondylar periprosthetic fracture [14].
- Biomechanical studies demonstrate that notches deeper than 3 mm can reduce distal femoral strength by approximately 18 to 31%, particularly when cortical integrity is compromised or bone quality is reduced [14].

- Recent clinical data suggest that not all notches correlate with higher fracture incidence, indicating that risk is modulated by notch depth, cortical involvement, and patient factors rather than by the mere presence of a notch [14].
- Computational finite element analyses and gait simulations demonstrate that notch depth alters distal femoral stress distribution during the gait cycle [14].
- The incidence of periprosthetic fracture of the distal femur in total knee arthroplasty is 0.3% to 2.5% [53].
- The incidence of periprosthetic tibial fracture in primary TKA is 0.7% or less [53].
- The incidence of periprosthetic tibial fracture in revision TKA is 0.9% or less [53].

LIGAMENTOUS ANATOMY & FUNCTION

- The anterior cruciate ligament (ACL) has two bundles named according to their tibial insertions: the anteromedial bundle and the posterolateral bundle [40].
- The ACL anteromedial bundle originates proximal to the bifurcate ridge, is tight in flexion, and primarily acts as an anterior restraint [40].
- The ACL posterolateral bundle originates distal to the bifurcate ridge, is tight in extension, and primarily acts as a rotatory restraint [40].
- The ACL has a length of 30 mm and a diameter of 11 mm [40].
- The ACL composition is 90% type I collagen and 10% type III collagen [40].
- The posterior cruciate ligament (PCL) resists posterior tibial translation at all degrees of knee flexion [40].
- The superficial medial collateral ligament (sMCL) proximal division resists valgus tibial translation and tibial external rotation [40].
- The deep medial collateral ligament resists valgus translation and tibial internal and external rotation [40].
- The lateral collateral ligament resists varus tibial translation and tibial external rotation, especially at 30 degrees of knee flexion [40].
- The popliteus tendon resists tibial external rotation, especially in knee flexion, and varus tibial translation [40].
- The popliteofibular ligament resists tibial external rotation, especially in knee flexion, and posterior tibial displacement [40].
- The oblique popliteal ligament resists knee hyperextension and varus tibial translation [40].

MENISCAL ANATOMY

- The meniscus contains random, circumferential, and radial collagen fiber bundles [40].
- The meniscus blood supply is categorized into red-red (RR), red-white (RW), and white-white (WW) zones [40].

PATHOPHYSIOLOGY OF INSTABILITY & DEFORMITY

- Varus thrust indicates ligament stretch-out on the convex side of the thrust, overloads the medial compartment, accelerates cartilage degeneration in the medial compartment, and increases the adductor moment of force [26].
- Valgus thrust indicates ligament stretch-out on the convex side of the thrust, overloads the lateral compartment, accelerates cartilage degeneration in the lateral compartment, and increases the abductor moment of force [26].
- Patellar instability exists on a spectrum from frank dislocation to subtle subluxation [42].
- The recurrence rate following a first-time patellar dislocation is between 15% and 60% [42].
- Younger age, female sex, patella alta, and trochlear dysplasia increase the risk for patellar dislocation recurrence [42].
- Articular cartilage on the medial facet of the patella is most commonly injured during reduction of the patella [42].
- The tibial tubercle–trochlear groove (TT–TG) distance normal values are between 9 and 13 mm [42].
- A TT–TG distance of 15 to 20 mm is questionably abnormal [42].
- A TT–TG distance over 20 mm is highly associated with patellar instability [42].
- In complete patellar dislocation, a bone bruise pattern involving the lateral femoral condyle and medial patella is often observed on MRI [42].
- The medial patellofemoral ligament (MPFL) is often disrupted in complete dislocation, most frequently at its patellar insertion [42].

PATHOPHYSIOLOGY OF IMPLANT FAILURE & WEAR

- Osteolysis in total knee arthroplasty occurs late in the lifecycle of the implant at 13 to 15 years [50].
- The initial cause of osteolysis is the submicron shedding of microparticulate polyethylene (PE) debris, which invades bone surrounding the knee [50].
- Macrophages are stimulated by phagocytosis of submicron-sized PE wear particles and release $\text{TNF}\alpha$, $\text{IL-1}\beta$, and IL-6 [50].
- Subsequent up-regulation of RANKL production by osteophytes leads to RANK on osteoclast progenitors mediating osteoclast differentiation and an increase in number [50].
- The net effect of the osteolytic pathomechanism is bone resorption in areas containing PE microparticles [50].
- Femoral osteolysis can be more difficult to detect on an AP radiograph because the lesions are typically located in the posterior condyles and are obscured by the femoral implant [48].
- Limb malalignment causes asymmetric loading of the knee, which can result in early loosening [48].
- Loosening appears to occur more frequently with varus malalignment than with valgus malalignment [48].

- Both posterior cruciate–retaining (CR) and posterior cruciate–substituting (PS) total knee arthroplasties require sacrifice of the anterior cruciate ligament, which can result in flexion instability despite intact collateral ligaments [48].
- Patients with symptomatic flexion instability usually report vague pain and swelling after activity and have laxity to varus and valgus stress in flexion [48].
- Radiographs of patients with symptomatic flexion instability typically demonstrate “paradoxical motion,” or anterior subluxation of the femur on the tibia in flexion, rather than roll back [48].
- Arthrofibrosis may develop in patients who have normal intraoperative range of motion, with passive flexion, extension, or both becoming restricted and painful sometimes several weeks after surgery [48].
- Arthrofibrotic scar contains dense fibrous tissue with abundant fibroblasts [48].
- Heterotopic bone is frequently found in patients with arthrofibrosis [48].
- Genetic factors may play a role in arthrofibrosis, although it is difficult to predict which patients are at increased risk [48].
- Surgical technique factors that can contribute to arthrofibrosis include oversizing the femoral implant, overstuffing the patella, or rotational malalignment [48].
- Rheumatoid arthritis (RA) is characterized by proliferative synovitis that forms invasive pannus, which destroys cartilage and bone and erodes soft tissues such as ligaments and tendons [80].
- In RA, chronic inflammatory erosion can lead to functional failure of the ACL, which may subsequently induce dislocation of a mobile bearing in unicompartmental knee arthroplasty [80].
- The ACL in mobile-bearing unicompartmental knee arthroplasty bears higher physiological and mechanical demands than in normal knee joints, rendering the ligament more susceptible to enzymatic degradation and inflammatory attacks from RA synovitis [80].

ALIGNMENT & GAP BALANCING PATHOPHYSIOLOGY

- Mechanical alignment aims to create a neutral mechanical limb line (Mikulicz) to provide the best chance for symmetrical implant loading and minimize implant overload conditions [44].
- Kinematic alignment aims to maintain native limb alignment because knee ligaments and capsule have developed to function in current limb alignment and should not be adjusted [44].
- Unbalanced gaps in total knee arthroplasty cause pain from tightness or instability [41].
- The flexion gap is controlled by the posterior cut of the femur, the tibial cut, and the posterior cruciate ligament [41].
- The extension gap is controlled by the distal cut of the femur, the tibial cut, and the posterior capsule [41].
- Posterior osteophytes and capsule recession are performed with the knee flexed at 90 degrees or more because the popliteal artery relaxes posteriorly in flexion, making it safer to work posteriorly [41].
- Internal rotation of the femoral implant is a known cause of flexion gap imbalance [51].
- A tibial implant axis lying medial to the tibial tubercle indicates malalignment, representing a relative increase of tibial tubercle external rotation [51].

Classification

- Anterior femoral notching during total knee arthroplasty has historically been viewed primarily as a risk factor for postoperative supracondylar periprosthetic fracture [14].
- Biomechanical studies demonstrate that anterior femoral notches deeper than 3 mm can reduce distal femoral strength by approximately 18 to 31% [14].
- Clinical data suggest that not all anterior femoral notches correlate with higher fracture incidence, indicating that risk is modulated by notch depth, cortical involvement, and patient factors rather than by the mere presence of a notch [14].
- The absence of a single, standardized classification system precludes the comparison of heterotopic ossification severity between studies following primary total knee arthroplasty [12].

Clinical Presentation

PAIN AND INFECTION

- The source of pain after total knee arthroplasty (TKA) may be difficult to determine, requiring a workup that includes evaluation for infection, neurogenic pain, referred pain from the hip or back, and mechanical sources of pain [61].
- A history of pain that develops immediately after surgery and persists without a pain-free interval, along with pain during rest and weight-bearing, suggests an inflammatory and/or neurogenic source of pain [61].
- Pain during weight-bearing activity or knee motion is consistent with a mechanical source of pain [61].
- Infection is a common source of pain after TKA and must be ruled out first in all patients [61].
- Infection is usually associated with an elevated erythrocyte sedimentation rate and C-reactive protein level and can be detected by aspiration for cell count with differential and culture [61].
- False-negative and false-positive results can occur in the diagnosis of infection, potentially necessitating additional imaging studies [61].
- Pain associated with localized warmth and swelling that occurs more after activity and is relieved with rest is less consistent with infection and more typical of soft-tissue inflammation resulting from postsurgical rehabilitation [61].
- Pain described as burning or numbness that is nonfocal on examination or improves with analgesic medications, neuropathic pain medications, local trigger point injections, or epidural injections supports the diagnosis of neurogenic pain [61].
- Brucella periprosthetic joint infections in a TKA typically present late with nonspecific symptoms, often mimicking aseptic loosening or culture-negative periprosthetic joint infections [34].

MECHANICAL CAUSES

- Mechanical causes of early pain after TKA include patellar maltracking, patellar clunk or crepitus, tibiofemoral instability, periprosthetic fracture, or occult implant loosening [61].

- Patellar problems are usually evident on physical examination because the location of pain is restricted to the patellofemoral joint [61].
- Patients with patellar problems may present with reduced knee range of motion and flexion [61].
- Patellar clunk is a complication of posterior-stabilized (PS) TKA that occurs when a fibrous nodule at the inferior pole of the patella catches in the trochlear groove during knee extension [61].
- Patellar clunk was a problem with older implant designs but is rarely described with newer ones [61].
- Patellar crepitus is more common with current PS designs and may cause anterior knee pain [61].
- Symptoms of patellar clunk or crepitus are relieved by open or arthroscopic excision of the fibrous nodules and synovium [61].
- Patellar maltracking and subluxation may result from dehiscence of the medial retinacular arthrotomy, femoral or tibial component internal rotation, or patellar component malpositioning [61].
- Rotational orientation of the femoral implant may be assessed on an axial view of the patella but is better quantitated using CT with metal artifact reduction [61].
- Symptomatic patellar subluxation or maltracking resulting from internal rotation of the femoral or tibial components requires revision of the malaligned components [61].
- A history of pain and effusion that occurs after activity and is relieved with rest is consistent with flexion instability [61].
- Flexion instability caused by intact but attenuated soft-tissue constraints can be detected on physical examination by varus and valgus stress testing [61].
- Laxity in flexion instability is typically more evident in flexion than full extension as the posterior capsule and hamstrings contribute to stability in extension [61].
- Flexion instability is more common with cruciate-retaining (CR) TKAs than with PS TKAs [61].
- Flexion instability is associated with paradoxical motion or rolling forward of the femoral implant, which can be seen on flexion lateral radiographs as anterior subluxation of the distal femur on the tibia [61].
- Complete dislocation of a PS knee presents with gross instability in flexion on physical examination and posterior displacement of the tibia on the femur [61].
- Complete dislocation of a PS knee is more common when excessive posterior slope occurs with the tibial cut and with some PS-designed TKAs [61].
- Pain that develops late after TKA is more often associated with loosening or ultra-high-molecular-weight polyethylene (UHMWPE) wear, although late hematogenous infection should be included in the differential diagnosis [61].
- Wear can be seen radiographically as asymmetric height of the tibial plateaus, although rotation and flexion of the knee can alter the projected height of the joint space, making radiographic measurements of wear inaccurate [61].
- Loosening occurs when subsidence or displacement of the component or a complete or progressive radiolucency at the implant and bone interface occurs [61].

FUNCTIONAL RECOVERY AND ACTIVITY

- For end-stage osteoarthritis in the elderly, TKA is a highly effective intervention, but functional recovery is not uniformly successful and is influenced by factors beyond pain relief [33].
- The relationship between radiographic severity measured by the Kellgren-Lawrence grading system and post-operative functional outcomes remains controversial [33].
- More severe Kellgren-Lawrence grades were only partially associated with better patient-reported outcome measures after TKA [33].
- Patients who had Kellgren-Lawrence grades III or IV osteoarthritis benefit equally from TKA at all time points up to two years [33].
- Emerging evidence suggests that muscle strength may be a more important determinant of post-operative functional gait recovery than radiographic severity [33].
- Quadriceps muscle weakness in TKA is known to persist post-operatively, markedly impacting gait patterns and quality of life [33].
- Traditionally, recovery assessment has relied on patient-reported outcome measures, which are subjective and often fail to correlate with objective functional performance [33].
- Wearable sensor technology offers an accessible method for objective gait analysis, but a comprehensive understanding of recovery requires integrating this data with other key clinical measures [33].
- Current evidence has not demonstrated a definitive increase in implant-related complications associated with return to sport after TKA [15].

SLEEP AND POSTOPERATIVE COMPLICATIONS

- Objective wearable monitoring identifies reproducible sleep disruption after total knee arthroplasty that is incompletely captured by patient-reported measures [20].
- Although studies reported a relatively low overall rate of heterotopic ossification after a primary TKA, the absence of a single, standardized classification system precludes the comparisons of heterotopic ossification severity between studies [12].
- The coexistence of periprosthetic joint infection and periprosthetic fracture is a rare but likely underestimated complication, as no large registry studies can easily address this scenario with two concomitant reasons for failures and case series are limited due to small numbers [29].
- The lack of a universally accepted definition may contribute to the underdiagnosis of combined periprosthetic joint infection and periprosthetic fracture [29].
- Combined periprosthetic joint infection and periprosthetic fracture represent one of the most challenging conditions in orthopaedics and traumatology, as infection eradication, fracture stabilisation, and implant stability must be achieved simultaneously [29].
- Treatment failure for combined periprosthetic joint infection and periprosthetic fracture can result in high mortality and severe joint dysfunction [29].
- Periprosthetic fractures and periprosthetic joint infections may occur together during surgery [29].
- Removal of infected implants may cause iatrogenic fractures [29].

- Revision procedures for periprosthetic fracture are associated with an increased risk of periprosthetic joint infection, with rates ranging from 7 to 11% [29].
- Patients with Vancouver type A fractures or those on dialysis are particularly at risk for combined periprosthetic joint infection and periprosthetic fracture [29].
- For Vancouver type B2/B3 fractures associated with loose stems and high suspicion of infection, routine evaluation for periprosthetic joint infection is recommended [29].

DIAGNOSTIC AND PREOPERATIVE CONSIDERATIONS

- The increasing number of joint arthroplasties performed in recent years has been accompanied by a growing incidence of periprosthetic joint infection and periprosthetic fracture, which now represent the leading causes of revision surgery after total knee arthroplasty [29].
- The incidence of periprosthetic joint infection is expected to rise, particularly among younger patients [29].
- Periprosthetic fractures predominantly affect individuals over 70 years old [29].
- Preoperative pneumonia etiology and timing may be relevant in preoperative risk assessment for total joint arthroplasty [37].
- Artificial intelligence is increasingly integrated across the total knee arthroplasty care continuum, including preoperative risk stratification and templating, intraoperative computer-vision guidance and robotic assistance, and postoperative complication detection and outcome prediction [36].

Investigations

RADIOGRAPHIC EVALUATION

- Weight-bearing AP and lateral radiographs are the standard for initial evaluation of knee arthritis [26].
- A weight-bearing knee flexed at 45-degree angle, imaged posterior to anterior, is included in standard radiographic evaluation [26].
- The 45-degree posteroanterior view can demonstrate complete loss of lateral compartment joint spaces even when the standing AP radiograph shows relatively preserved joint spaces [26].
- A standing full-length AP radiograph from hip joint to ankle joint is used to evaluate limb alignment and knee deformity [26].
- A standing full-length AP radiograph is used to identify femoral and/or tibial bone deformity of developmental or traumatic origin [26].
- The Kellgren-Lawrence (KL) rating grades the extent of osteoarthritis based on review of the AP knee radiograph [26].
- KL grading features include osteophytes, joint space narrowing, subchondral sclerosis with or without subchondral cysts, and altered shape of periarticular bones [26].
- KL Grade 0 indicates normal knee features with no osteoarthritis [26].
- KL Grade 1 indicates osteoarthritis possibly present [26].

- KL Grade 2 indicates minimal severity osteoarthritis [26].
- KL Grade 3 indicates moderate severity osteoarthritis [26].
- KL Grade 4 indicates severe osteoarthritis [26].
- Knee arthroplasty is recommended when KL Grade 4 findings are present [26].
- The modern Knee Society methodology has formalized recording of alignment and bone status on routine anteroposterior and lateral radiographs [14].

ADVANCED IMAGING

- MRI is grossly overused in the arthritic patient population [26].
- MRI is not indicated if the joint space is significantly narrowed on radiograph [26].
- MRI is used when osteonecrosis is suspected [26].
- Three-dimensional CT with remodeling is used for preoperative planning for reconstruction associated with dysplasia, post-trauma planning, and complex total knee arthroplasty planning [26].

PREOPERATIVE ASSESSMENT AND ALIGNMENT

- Patient assessment of knee pain includes a physical examination and diagnostic radiographic modalities [26].
- Varus thrust indicates ligament stretch-out on the convex side of the thrust and overloads the medial compartment [26].
- Valgus thrust indicates ligament stretch-out on the convex side of the thrust and overloads the lateral compartment [26].
- Digital pressure sensors in trial tibial implants relay relative compartment pressures to a computer display for balancing in the coronal and sagittal planes [17].
- Patient-specific instrumentation uses a preoperative CT scan to create a digital model for templating limb alignment, implant position, and implant size [17].
- Digital navigation registers knee landmarks with hip and ankle positions to create a digitized model of the knee and limb at the time of surgery [17].
- Robotic systems generate a computer-generated model of the knee and limb, with a robotic arm assisting the surgeon in performing bone cuts [17].
- There is no difference in aseptic loosening or revision rates at midterm follow-up comparing standard TKA instrumentation with patient-specific instrumentation, digitally navigated TKA, or robotic-assisted TKA [17].

DIAGNOSTIC CHALLENGES AND MIMICS

- Brucella periprosthetic joint infections in total knee arthroplasty typically present late with nonspecific symptoms, often mimicking aseptic loosening or culture-negative periprosthetic joint infections [34].
- Pigmented villonodular synovitis can present exceptionally delayed, more than two decades after primary total knee arthroplasty, and may be incidentally identified during revision for aseptic loosening [35].

Treatment

PERIOPERATIVE MANAGEMENT AND PHARMACOLOGY

- With no known contraindications, treatment with tranexamic acid decreases postoperative blood loss and reduces the need for postoperative transfusions [17].
- Tranexamic acid is a lysine analog that reversibly binds to four to five lysine receptors on plasminogen, blocking conversion to plasmin [17].
- Tranexamic acid has a half-life of approximately 3 hours and is excreted renally, with 95% excreted as the original molecule [17].
- Intravenous and topical administration of tranexamic acid are both effective [17].
- Tranexamic acid use in arthroplasty procedures does not increase the risk of venous thromboembolic events in patients with a history of thromboembolic disease [17].
- Tranexamic acid use in arthroplasty procedures does not increase cardiovascular events, including myocardial infarction, ischemic stroke, and death [17].
- Tranexamic acid is safe in high-risk populations, including those with a history of myocardial infarction or stroke, presence of coronary artery bypass graft or stent, and prothrombotic states such as factor V Leiden, protein C deficiency, protein S deficiency, and antiphospholipid antibody syndrome [17].
- Known contraindications for tranexamic acid include known anaphylaxis, seizure disorder, and known defective color vision [17].
- Use of periarticular local anesthetic infiltration in total knee arthroplasty decreases pain and opioid use [17].
- Peripheral nerve blockade for total knee arthroplasty decreases postoperative pain and opioid requirements [17].
- Use of a tourniquet increases short-term postoperative pain [17].
- Administration of intravenous or oral acetaminophen does not increase the risk of complications following primary total joint arthroplasty [17].
- An oral nonsteroidal anti-inflammatory drug administered preoperatively and/or in the early postoperative period reduces pain and opioid consumption following primary total joint arthroplasty [17].
- Administration of intravenous ketorolac preoperatively, intraoperatively, or within 24 hours postoperatively reduces pain and opioid consumption within the first 48 hours following primary total joint arthroplasty [17].
- Implementing a standardized reduced opioid prescription protocol significantly decreases postoperative opioid consumption in patients undergoing total joint arthroplasty [72].
- Obese patients have less improvement in outcomes with total knee arthroplasty [17].

SURGICAL TECHNIQUE AND ALIGNMENT

- Evidence supports not using intraoperative navigation because there is no difference in pain or complications compared to conventional instrumentation [17].
- Evidence supports not using patient-specific instrumentation compared to conventional instrumentation for total knee arthroplasty because there is no difference in pain or functional outcomes [17].
- Evidence supports not using a drain with total knee arthroplasty because there is no difference in complications or outcomes [17].
- There is no difference in aseptic loosening or revision rates at midterm follow-up when comparing standard total knee arthroplasty instrumentation with patient-specific instrumentation, digitally navigated total knee arthroplasty, or robotic-assisted total knee arthroplasty [17].
- Both measured resection and balanced gap techniques can achieve good stability at 90 degrees of knee flexion in total knee arthroplasty [19].
- A recent randomized controlled trial showed no significant difference in functional outcomes at 2 years when comparing mechanical and kinematic alignment techniques [31].
- Cruciate retaining and posterior stabilized total knee arthroplasty techniques provide good results with no difference in surgical complications, range of motion, patient-reported outcome scores, or implant survivorship [31].
- Bicruciate retaining knee arthroplasty has been proposed to preserve intra-articular proprioception and native joint kinematics, but adoption has been limited due to high early failure rates in some studies [31].
- Mobile bearing total knee arthroplasty implants have not demonstrated improved survivorship compared to fixed-bearing implants [31].
- There are no significant differences in pain, function, quality of life, complication, or revision rates between mobile bearing and fixed-bearing total knee arthroplasty implant designs [31].
- All-polyethylene or metal-backed monoblock tibial components have shown good long-term outcomes and are reasonable options for implant choice [31].
- Outcome studies of modern noncemented total knee arthroplasty implants show survivorship and functional outcomes equivalent to cemented prostheses [31].
- Femoral component should never be internally rotated during total knee arthroplasty [54].
- Internal rotation of the femoral component results in relative lateral tilt of the patella and causes the patellar groove to face inward [54].
- The goal of femoral component rotation technique is slight external rotation to center the patellar groove under the patella and create a rectangular flexion gap [54].
- The native proximal tibia is often in slight varus, with an average medial proximal tibial angle of 3 degrees [54].
- Cutting the proximal tibia perpendicular to the mechanical axis during total knee arthroplasty results in a trapezoidal and unbalanced flexion gap [54].
- A trapezoidal flexion gap results in relative lateral tilt of the patella, a loose lateral compartment, or a tight medial compartment [54].

- A rectangular flexion gap results in central patella tracking, a balanced flexion gap, and stability without stiffness [54].
- The femoral component is externally rotated to compensate for the native tibial varus and obtain a rectangular flexion gap [54].
- Five established techniques to determine proper femoral component rotation are the AP axis method, epicondylar axis method, posterior condylar axis method, tibial alignment axis method, and gap balance axis method [54].
- The AP axis is defined as a line from the intercondylar notch to the center of the trochlear groove, and a line drawn perpendicular to this axis is used to set femoral rotation [54].
- The epicondylar axis is a line drawn from the center of the medial epicondyle to the center of the lateral epicondyle, and femoral rotation is set along this line [54].
- The posterior condylar axis is a line connecting the apex of the medial and lateral femoral condyles at 90 degrees of flexion, and femoral rotation is set 3 degrees externally rotated to this line [54].
- The tibial alignment axis method uses a cutting jig set 90 degrees to the mechanical axis of the tibia to set femoral component rotation at 90 degrees of flexion [54].
- Anterior femoral notches deeper than 3 mm can reduce distal femoral strength by approximately 18 to 31% [14].
- Not all anterior femoral notches correlate with higher fracture incidence, as risk is modulated by notch depth, cortical involvement, and patient factors [14].
- Femoral notching has implications for implant fit, patellofemoral balance, joint stability, and overall biomechanics [14].
- Notch depth alters distal femoral stress distribution during the gait cycle [14].

IMPLANT DESIGN AND WEAR

- There is no difference in outcomes or complications between posterior stabilized and posterior cruciate retaining designs [17].
- There is no difference in outcomes with use of all polyethylene or modular tibial components in knee arthroplasty [17].
- There is no difference in pain or function with or without patellar resurfacing [17].
- Similar functional outcomes and complication rates are observed in tibial component fixation that is cemented or cementless [17].
- To keep knee bearing contact stress below the yield strength of ultra-high molecular weight polyethylene, the polyethylene must be at least 6 to 8 mm thick for traditional non-highly cross-linked materials [56].
- Many second-generation knee systems had polyethylene inserts with a thickness of 4 to 5 mm in the thinnest region [56].
- Current knee prosthetic designs ensure that polyethylene thickness in the thinnest areas of the insert is at least 6 mm [56].

- Flat polyethylene bearings should be avoided because knee loads exceed the yield strength of ultra-high molecular weight polyethylene in a flat design [56].
- Flat polyethylene inserts result in a thin line of joint contact during loading, which creates high contact loads on the polyethylene [56].
- Current tibial articular designs aim to maximize contact area and minimize contact loads [56].
- Sliding movements are least pronounced in a posterior stabilized or asymmetric knee design with a congruent polyethylene insert [56].
- Laboratory testing has shown that sliding wear across the tibia creates surface and subsurface cracking with high wear [56].
- Femoro-tibial size mismatch does not increase polyethylene wear in fixed-bearing total knee arthroplasty [71].
- Further careful follow-up of newly introduced Vitamin E-infused polyethylene for total knee arthroplasty should be carried out [5].

OUTPATIENT AND REHABILITATION PROTOCOLS

- Continuous passive motion after knee arthroplasty does not improve outcomes [17].
- Rehabilitation started on the day of total knee arthroplasty reduces the length of hospital stay [17].
- A well-defined, standardized protocol for outpatient total joint arthroplasty creates consistency in care delivery that minimizes complication rates [23].
- The observed adverse event rate for total knee arthroplasty performed in an ambulatory surgical center was 1.9% [23].
- The observed hospital admission rate for total knee arthroplasty patients discharged same-day was 1.5% [23].
- Surgery-related risk factors for orthostatic intolerance following total joint arthroplasty include spinal anaesthesia versus general anaesthesia and postoperative opioid use [57].

REVISION AND CONVERSION PROCEDURES

- Revision of well-fixed mechanically aligned total knee arthroplasty using kinematic alignment is not a universally accepted indication for revision total knee surgery [1].
- Conversion of unicompartmental to total knee replacement likely does not yield equivalent outcomes to simple primary total knee arthroplasties [8].
- The literature shows inconsistent outcomes regarding equivalence of conversion from unicompartmental to total knee replacement compared to primary total knee arthroplasty [8].
- Conversion of patellofemoral arthroplasty to total knee arthroplasty occurred at a median of seven years after the initial patellofemoral arthroplasty [10].
- The five-year survivorship free of revision and free of reoperation after conversion of patellofemoral arthroplasty to total knee arthroplasty was modest [10].
- Clinical function improved after conversion of patellofemoral arthroplasty to total knee arthroplasty [10].

- A pre-conversion lateral patellar tilt of 10 degrees or greater was strongly associated with patellar component revision at the time of conversion to total knee arthroplasty [10].
- The five-year cumulative percent revision for patellofemoral arthroplasty exceeded 8% in all countries surveyed in eight international registries [10].
- The risk of revision for patellofemoral arthroplasty was more than three times that of primary total knee arthroplasty over the same period [10].
- The risk of subsequent re-revision after conversion of patellofemoral arthroplasty to total knee arthroplasty was nearly 2.4 times that of primary total knee arthroplasty [10].
- In elderly patients with massive bony defects, distal femoral replacement megaprotheses are often required to reconstruct the defect [28].
- Routine preoperative evaluation for patients with a loose implant or history of prefracture knee pain should include a complete blood count with manual differential, sedimentation rate, C-reactive protein serologies, and a knee aspiration to exclude occult infection [28].
- Older implant designs may not offer varying degrees of constraint, augmentations, or polyethylene insert sizes, which may necessitate complete arthroplasty revision [28].
- Revision total knee arthroplasty secondary to periprosthetic fracture has become less common with the advent of improved internal fixation devices such as locked plates [28].
- Revision arthroplasty is typically reserved for fractures around a loose prosthesis, fractures with inadequate bone stock for stable internal fixation, or recalcitrant supracondylar nonunions requiring resection and megaprosthesis implantation [28].
- Stems should be used routinely in revision total knee arthroplasty and are recommended to engage the femoral diaphysis for alignment and fixation reasons [28].
- Commercially available metaphyseal sleeves and trabecular metal cones can be useful for managing capacious metaphyseal defects in revision total knee arthroplasty [28].
- Implants with increased varus-valgus constraint and hinged implants should be available for revision total knee arthroplasty because ligamentous insufficiency is common in this setting [28].
- Cement fixation is typically used in the setting of modular megaprosthesis distal femoral replacement [28].

PATIENT SELECTION AND OUTCOMES

- Total knee arthroplasty done in young and presumed active patients less than 65 years have excellent survivorship [4].
- Total knee arthroplasty consistently provides substantial improvements in pain, function, and patient satisfaction with excellent survivorship [31].
- Total knee arthroplasty is a highly cost-effective surgical treatment and is the mainstay of surgical approaches for addressing advanced arthritis [31].
- No studies have convincingly shown that minimally invasive techniques or newer technologies, such as patient-specific instrumentation, can lead to improved outcomes or decreased complications [31].

- The surgical duration of total knee arthroplasty is an independent risk factor for wound complications and several other important postoperative complications [79].
- The third and fourth quartiles of total knee arthroplasty surgical times were markedly associated with higher incidences of wound complications, particularly infection and dehiscence [79].
- A lack of data demonstrating significant improvements over existing non-biologic therapies and high out-of-pocket costs preclude an endorsement of the routine use of biologics for the treatment of advanced knee osteoarthritis [73].

Complications

PERIPROSTHETIC JOINT INFECTION (PJI)

- Periprosthetic joint infection (PJI) and periprosthetic fracture represent the leading causes of revision surgery after total knee arthroplasty [29].
- The incidence of PJI is expected to rise, particularly among younger patients [29].
- The coexistence of PJI and periprosthetic fracture is a rare but likely underestimated complication due to the lack of large registry studies and a universally accepted definition [29].
- Revision procedures for periprosthetic fracture are associated with an increased risk of PJI, with rates ranging from 7 to 11% [29].
- Patients with Vancouver type A fractures or those on dialysis are particularly at risk for PJI in the context of periprosthetic fracture [29].
- Routine evaluation for PJI is recommended for Vancouver type B2/B3 fractures associated with loose stems and high suspicion of infection [29].
- Single-stage revision total knee arthroplasty for PJI demonstrated overall high rates of survivorship, low mortality, and revision surgeries secondary to infection and aseptic loosening to be equivalent [64].
- Approximately two thirds of patients who undergo conversion from modular knee arthrodesis to reimplantation have infection-free survival at the midterm follow-up [70].
- A very high-dose antibiotic cement spacer protocol is safe and effective for managing PJI following TKA [89].
- The use of a silver dressing significantly reduced the incidence of superficial and deep PJI following total joint replacement ($P = 0.010$) [43].
- There were no associations observed between irritable bowel syndrome and increased PJI and reoperation rates after total knee arthroplasty [84].

ASEPTIC LOOSENING AND REVISION OUTCOMES

- Aseptic loosening following TKA remains a contemporary issue with substantial associated treatment costs [85].

- Isolated component revision is associated with a higher hazard of all-cause revision failure compared with full component revision (HR 1.51, 95% CI 1.28-1.78) [69].
- Isolated and full component revision total knee arthroplasty demonstrated comparable rates of re-revision for all indications (odds ratio: 1.36, 95% confidence interval: 0.96 to 1.95, P = 0.094) [83].
- Isolated and full component revision total knee arthroplasty demonstrated comparable rates of re-revision for aseptic loosening (odds ratio: 0.76, 95% confidence interval: 0.40 to 1.47, P = 0.42) [83].
- Isolated and full component revision total knee arthroplasty demonstrated comparable rates of re-revision for periprosthetic joint infection (odds ratio: 1.23, 95% confidence interval: 0.52 to 2.92, P = 0.64) [83].
- No differences were detected between cemented and noncemented TKAs in patient-reported outcomes, revision rates, or radiolucent line development [13].
- The literature shows inconsistent outcomes regarding equivalence to primary TKA for conversion of unicompartmental to total knee replacement, and these surgeries likely do not yield equivalent outcomes to simple primary TKAs yet [8].
- Conversion of patello-femoral arthroplasty to total knee arthroplasty occurred at a median of seven years after PFA, with subsequent five-year survivorship free of revision and reoperation being modest [10].
- A pre-conversion lateral patellar tilt $\geq 10^\circ$ was strongly associated with patellar component revision at conversion from patello-femoral arthroplasty to total knee arthroplasty [10].
- The five-year cumulative percent revision for patello-femoral arthroplasty exceeded 8% in all countries surveyed across eight international registries [10].
- The risk of subsequent re-revision after conversion from patello-femoral arthroplasty to total knee arthroplasty was nearly 2.4 times that of primary TKA [10].
- Metal-backed tibial components in medial fixed-bearing unicompartmental knee arthroplasty are associated with significantly lower all-cause revision rates compared with all-polyethylene tibial components (OR, 0.49; 95% CI, 0.31-0.79; $p \leq 0.003$) [86].
- Metal-backed tibial components in medial fixed-bearing unicompartmental knee arthroplasty are associated with significantly lower aseptic tibial loosening rates compared with all-polyethylene tibial components (OR, 0.29; 95% CI, 0.09-0.99; $p \leq 0.048$) [86].
- Revision of well-fixed mechanically-aligned total knee arthroplasty using kinematic alignment for the restoration of joint line obliquity is not a universally accepted indication for revision total knee surgery [1].

VENOUS THROMBOEMBOLISM AND HEMOSTASIS

- Antiplatelet agents are as effective as anticoagulants in preventing VTE, DVT, and PE after joint arthroplasty and may offer a better safety profile with fewer bleeding complications [87].
- Treatment with tranexamic acid decreases postoperative blood loss and reduces the need for postoperative transfusions [17].
- Tranexamic acid has no increased risk in rate of venous thromboembolic events in patients with a history of thromboembolic disease [17].

- Tranexamic acid has no increase in cardiovascular events, including myocardial infarction, ischemic stroke, and death [17].
- Although the prevalence of DVT was significantly higher in the group without suction drainage when intra-articular tranexamic acid was used, no cases were symptomatic [88].

HETEROTOPIC OSSIFICATION

- Studies reported a relatively low overall rate of heterotopic ossification after a primary TKA [12].
- The absence of a single, standardized classification system precludes the comparisons of heterotopic ossification severity between studies [12].

ACTIVITY AND RETURN TO SPORT

OUTPATIENT AND SAME-DAY SURGERY COMPLICATIONS

- Complication rates for outpatient total joint arthroplasties have been reported between 5.1% and 13.3% [23].
- The observed adverse event rate for total knee arthroplasty in a same-day surgery center using a rapid-recovery protocol was 1.9% [23].
- Readmission/revision surgery rates for same-day discharge patients have ranged from 0.6% to 3.6% [23].
- The observed hospital admission rate for TKA in a same-day surgery center using a rapid-recovery protocol was 1.5% [23].

IMPLANT DESIGN AND TECHNOLOGY

- No difference in outcomes or complications exists between posterior stabilized and posterior cruciate retaining designs [17].
- No difference in outcomes exists with use of all polyethylene or modular tibial components in knee arthroplasty [17].
- No difference in pain or function exists with or without patellar resurfacing [17].
- No difference in aseptic loosening or revision rates at midterm follow-up exists comparing standard TKA instrumentation with patient-specific instrumentation, digitally navigated TKA, or robotic-assisted TKA [17].
- Evidence supports not using intraoperative navigation because there is no difference in pain or complications [17].
- Evidence supports not using patient specific instrumentation compared to conventional instrumentation for TKA because there is no difference in pain or functional outcomes [17].
- Evidence supports not using a drain with TKA because there is no difference in complications or outcomes [17].
- A specific design of uncemented knee replacement should not be used unless further survivorship studies show better results [6].

- Mobile bearing TKA implants have not demonstrated improved survivorship compared to fixed-bearing implants [31].
- Bearing spin-out can occur in the presence of a loose flexion gap when using mobile bearing implants [31].
- No significant differences in pain, function, quality of life, complication, or revision rates exist between fixed-bearing and mobile-bearing implant designs [31].
- Bicruciate retaining knee arthroplasty has shown high early failure rates in some studies, leading to limited adoption [31].

PATIENT DEMOGRAPHICS AND COMORBIDITIES

Recovery

FUNCTIONAL OUTCOMES AND GAIT

- The Knee Society Function score improved from a median of 59 (range, 30 to 70) preoperatively to a median of 80 (range, 60 to 100; $P = 0.04$) at two years following conversion of patello-femoral arthroplasty to total knee arthroplasty [10].
- The median range of motion was 120.7° preoperatively and 120.3° postoperatively ($P = 0.95$) in a cohort of patients undergoing conversion of patello-femoral arthroplasty to total knee arthroplasty [10].
- In a cohort of patients undergoing conversion of patello-femoral arthroplasty to total knee arthroplasty, 15 patients had a net gain in motion (median, 10° ; range, 2 to 30°) and 14 had a net loss (median, -12.5° ; range, -35° to -2°) [10].
- Quadriceps muscle weakness in total knee arthroplasty is known to persist post-operatively, markedly impacting gait patterns and quality of life [33].
- Traditionally, recovery assessment has relied on patient-reported outcome measures (PROMs), which are subjective and often fail to correlate with objective functional performance [33].
- PROMs are feasible for benchmarking short-term rehabilitation outcomes after knee arthroplasty across 23 German facilities [75].

COMPLICATIONS AND ADVERSE EVENTS

- In a series of total joint arthroplasties performed in an ambulatory surgical center, the observed adverse event rate for total knee arthroplasty was 1.9% [23].
- In a series of total joint arthroplasties performed in an ambulatory surgical center, the observed hospital admission rate for total knee arthroplasty was 1.5% [23].
- Although studies reported a relatively low overall rate of heterotopic ossification after a primary total knee arthroplasty, the absence of a single, standardized classification system precludes the comparisons of HO severity between studies [12].

SURVIVORSHIP AND LONG-TERM OUTCOMES

- In a cohort of patients undergoing conversion of patello-femoral arthroplasty to total knee arthroplasty, the subsequent five-year survivorship free of revision and free of reoperation was modest [10].
- No differences were detected between the cemented and noncemented total knee arthroplasties in patient-reported outcomes, revision rates, or radiolucent line development [13].
- The literature shows inconsistent outcomes regarding equivalence to primary total knee arthroplasty for conversion of unicompartmental to total knee replacement, and these surgeries likely do not yield equivalent outcomes to simple primary TKAs yet [8].
- Twenty months after treatment for a periprosthetic giant cell tumor of bone of the proximal tibia, the patient was recurrence free with a stable prosthesis and had return to functional activity [76].

Key Evidence

- [L5] The authors acknowledge that this diagnosis is not a universally accepted indication for revision total knee surgery and that further data must be collected regarding long-term outcomes. [1] ([10.5435/jaaosglobal-d-24-00399](#))
- [L4] Prosthetic knee instability remains difficult to manage despite intuitive and appropriate indications for PE only. [2] ([10.5435/jaaosglobal-d-19-00031](#))
- [L5] The panel reached consensus on 18 critical clinical questions spanning general principles, total hip arthroplasty, and total knee arthroplasty. [3] ([10.1186/s42836-026-00427-1](#))
- [L4] Total knee arthroplasty done in young and presumed active patients less than 65 years have excellent survivorship. [4] ([10.5435/jaaosglobal-d-22-00116](#))
- [L2] Further careful follow-up of newly introduced E1 for total knee arthroplasty should be carried out. [5] ([10.1302/0301-620x.102b11.bjj-2020-0413.r1](#))
- [L4] However, the literature shows inconsistent outcomes regarding equivalence to primary TKA, and these surgeries likely do not yield equivalent outcomes to simple primary TKAs yet. [8] ([10.2106/jbjs.rvw.25.00075](#))
- [L4] [10] ([10.1016/j.arth.2026.07.046](#))
- [L1] Although studies reported a relatively low overall rate of HO after a primary TKA, the absence of a single, standardized classification system precludes the comparisons of HO severity between studies. [12] ([10.5435/jaaosglobal-d-21-00096](#))
- [L1] No differences were detected between the cemented and noncemented TKAs in patient-reported outcomes, revision rates, or radiolucent line development. [13] ([10.5435/jaaosglobal-d-22-00219](#))
- [L4] [14] ([10.1186/s42836-026-00424-4](#))
- [Paper] Importantly, current evidence has not demonstrated a definitive increase in implant-related complications associated with RTS after TKA. [15] ([10.1002/ksa.70586](#))
- [L5] The selection of appropriate patients is critical to the success of cementless fixation techniques in TKA. [18] ([10.2106/jbjs.rvw.24.00064](#))

- [L2] Both measured resection and balanced gap techniques can achieve good stability at 90 degrees of knee flexion in TKA. [19] ([10.1016/j.arthro.2013.07.238](#))
- [L4] Objective wearable monitoring identifies reproducible sleep disruption after total hip arthroplasty and total knee arthroplasty that is incompletely captured by patient-reported measures. [20] ([10.1016/j.artd.2026.102013](#))
- [L4] Optimized mOCAT yielded the greatest benefits relative to TKA with respect to cumulative quality-adjusted life year differences throughout the study period modeled, indicating a sustained and clinically meaningful benefit. [21] ([10.1002/arj.70495](#))
- [L4] [23] ([10.5435/jaaosglobal-d-19-00022](#))
- [L4] [29] ([10.1530/eor-2025-0278](#))
- [L2] [33] ([10.1016/j.arth.2026.05.038](#))
- [L3] Brucella PJIs in a TKA typically present late with nonspecific symptoms, often mimicking aseptic loosening or culture-negative PJIs. [34] ([10.2106/jbjs.rvw.25.00079](#))
- [L5] This case highlights an exceptionally delayed presentation of pigmented villonodular synovitis more than two decades after primary total knee arthroplasty. [35] ([10.1186/s12891-026-09853-3](#))
- [Paper] Artificial intelligence (AI) is increasingly integrated across the total hip and knee arthroplasty care continuum, including preoperative risk stratification and templating, intraoperative computer-vision guidance and robotic assistance, and postoperative complication detection and outcome prediction. [36] ([10.2106/jbjs.rvw.26.00059](#))
- [L3] These findings suggest that pneumonia etiology and timing may be relevant in preoperative risk assessment for total joint arthroplasty. [37] ([10.1016/j.arth.2026.06.082](#))
- [L3] The use of a silver dressing significantly reduced the incidence of superficial and deep PJI following total joint replacement (P = 0.010). [43] ([10.5435/jaaosglobal-d-17-00034](#))
- [L5] Surgery-related risk factors identified were spinal anaesthesia versus general anaesthesia, hip replacement versus knee replacement, and postoperative opioid use. [57] ([10.1530/eor-2025-0223](#))
- [L1] Single-stage revision THA and TKA for PJI demonstrated overall high rates of survivorship, low mortality, and revision surgeries secondary to infection and aseptic loosening to be equivalent. [64] ([10.5435/jaaosglobal-d-22-00218](#))
- [L3] Patients in all age cohorts who underwent HTO had decreased rate of TKA conversion at one and two years postoperatively. [65] ([10.1177/2325967126s00403](#))
- [L3] [69] ([10.2106/jbjs.rvw.26.00060](#))
- [L4] Approximately two thirds of patients who undergo conversion from MKU to REI have infection-free survival at the midterm follow-up. [70] ([10.5435/jaaosglobal-d-22-00082](#))
- [L4] The study concluded that femoro-tibial size mismatch does not increase polyethylene wear in fixed-bearing total knee arthroplasty. [71] ([10.1016/j.arth.2026.07.053](#))
- [L3] The study demonstrated that implementing a standardized reduced opioid prescription protocol significantly decreased postoperative opioid consumption in patients undergoing total joint arthroplasty. [72] ([10.5435/jaaosglobal-d-19-00163](#))

- [Paper] A lack of data demonstrating significant improvements over existing non-biologic therapies and high out-of-pocket costs for patients preclude an endorsement of the routine use of biologics for the treatment of advanced hip and knee OA. [73] ([10.1016/j.arth.2026.07.014](https://doi.org/10.1016/j.arth.2026.07.014))
- [L3] The study demonstrates that PROMs are feasible for benchmarking short-term rehabilitation outcomes after hip and knee arthroplasty across 23 German facilities. [75] ([10.1186/s42836-026-00401-x](https://doi.org/10.1186/s42836-026-00401-x))
- [L5] Twenty months after treatment, the patient was recurrence free with a stable prosthesis and had return to functional activity. [76] ([10.5435/jaaosglobal-d-18-00012](https://doi.org/10.5435/jaaosglobal-d-18-00012))
- [L3] [79] ([10.5435/jaaosglobal-d-20-00043](https://doi.org/10.5435/jaaosglobal-d-20-00043))
- [L5] [80] ([10.1186/s12891-026-09840-8](https://doi.org/10.1186/s12891-026-09840-8))
- [L1] Isolated and full component rTKA demonstrated comparable rates of re-revision for all indications (odds ratio (OR): 1.36, 95% confidence interval (CI) 0.96 to 1.95, P = 0.094, I² = 23.5%), including aseptic loosening (OR: 0.76, 95% CI 0.40 to 1.47, P = 0.42, I² = 7.0%) and periprosthetic joint infection (OR: 1.23, 95% CI 0.52 to 2.92, P = 0.64, I² = 7.5%). [83] ([10.1016/j.arth.2026.08.004](https://doi.org/10.1016/j.arth.2026.08.004))
- [L3] There were no associations observed between IBS and increased PJI and reoperation rates after THA or TKA. [84] ([10.1016/j.arth.2026.07.045](https://doi.org/10.1016/j.arth.2026.07.045))
- [L4] Aseptic loosening following TKA remains a contemporary issue with substantial associated treatment costs. [85] ([10.1016/j.arth.2026.07.032](https://doi.org/10.1016/j.arth.2026.07.032))
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- [L1] Antiplatelet agents are as effective as anticoagulants in preventing VTE, DVT, and PE after joint arthroplasty and may offer a better safety profile with fewer bleeding complications. [87] ([10.1530/eor-2025-0120](https://doi.org/10.1530/eor-2025-0120))
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