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## Lateral unicompartmental knee arthroplasty: A review

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### Abstract

Isolated lateral compartment osteoarthritis of the knee is a rare condition affecting approximately 1% of the population, which is ten times less common than osteoarthritis affecting only the medial compartment. Unicompartmental knee arthroplasty (UKA) has many potential advantages over total knee arthroplasty. The benefits of UKA include a smaller incision, preservation of more native tissue (including cruciate ligaments and bone), decreased blood loss, and better overall proprioception. When UKA was first introduced in the 1970s, the outcomes of medial UKA (MUKA) were poor, but the few cases of lateral UKA (LUKA) showed promise. Since that time, there has been a relative paucity of literature focused specifically on LUKA given it is a rare procedure. Refinements in patient selection criteria, implant design, and surgical technique have been made leading to increased popularity. A review of the recent literature reveals that LUKA is associated with excellent long-term clinical outcomes and implant survivorship when performed in properly selected patients. Implant design options include fixed *vs* mobile bearing as well as metal backed *vs* all polyethylene tibial component, with improved outcomes noted with fixed bearing designs. Three reasons cited for revision (*i.e.*, fracture of the femoral component, fracture of the tibial component, and valgus malalignment) had been reported in past literature but not recently. Presently, while rare, the most common cause of failure and need for revision are osteoarthritis progression and aseptic loosening. Despite the need for an occasional revision procedure, the survivorship of LUKA is comparable to MUKA, although it should be noted that outcomes of MUKA have been notably varied. Continued pursuit of improved techniques and implant designs will continue to show LUKA to be an excellent procedure for appropriately indicated

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**Core Tip:** Lateral unicompartmental knee arthroplasty (LUKA) is an uncommon procedure, that when indicated appropriately, shows promising results for patients with isolated lateral compartment osteoarthritis. Recent literature has shown good long-term outcomes for LUKA. Continued pursuit of improved techniques and implant designs will continue to show LUKA to be an excellent procedure for appropriately indicated patients. This paper reviews patient selection, surgical techniques, and outcomes for LUKA.

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## INTRODUCTION

Isolated lateral compartment osteoarthritis of the knee is a rare condition affecting approximately 1% of the population, which is ten times less common than osteoarthritis affecting only the medial compartment<sup>[1]</sup>. The clinical outcome of unicompartmental knee arthroplasty (UKA) has been a topic of renewed interest in the orthopaedic literature. Initial studies indicated poor outcomes following UKA; however, patient selection, surgical technique, and implant design changes have changed over the years<sup>[2-6]</sup>. This has led to many potential advantages over its total knee arthroplasty (TKA) counterpart. Performing a UKA allows for a smaller incision, less bone and soft tissue resection, less blood loss, and improved proprioception<sup>[7-11]</sup>. In addition, patients show decreased rates of post-operative infection and thromboembolic disease, decreased pain, and improved range of motion<sup>[9,11]</sup>. Furthermore, improvements have been seen in the form of shorter hospital stays as well as quicker rehabilitation<sup>[9,12,13]</sup>. Registry studies have indicated higher revision rates after primary UKA when compared with TKA. In contrast to the registry data, multiple studies have shown UKA implant survivorship to be comparable TKA<sup>[9,12,14,15]</sup>. Other studies have also indicated improved patient satisfaction likely a result of perceived normal knee function<sup>[16,17]</sup>. Biomechanical studies have confirmed that tibial axial rotation and femoral rollback following UKA more closely recapitulate normal knee kinematics than that following TKA<sup>[18]</sup>.

Even though multiple studies have documented the success of lateral UKA (LUKA), it is not commonly performed. In fact, medial UKAs (MUKAs) are performed ten times more often than LUKAs. Overall, LUKA accounts for less than 1% all of knee arthroplasty procedures<sup>[19]</sup>.

The small number of LUKAs performed since the development of the procedure many years ago is surprising. The original reports from that era implied that MUKA was not a great long-term option for treatment of unicompartmental osteoarthritis, while LUKA appeared to be much more promising<sup>[3-6]</sup>. Following refinements in patient selection criteria, surgical technique, and implant design, improved results for both medial and LUKA were seen in the 1980s<sup>[2]</sup>. Improved survivorship was noted at ten years and reported to be only slightly less than that seen for TKA at the time<sup>[20-22]</sup>. Studies on long-term outcomes following LUKA are hard to come by. However, more recent studies on LUKA show 100% survivorship at mid-term and long-term follow up<sup>[23,24]</sup>. These reports suggest that outcomes of LUKA are at least comparable to, if not superior to, those of MUKA. Recently, a meta-analysis of survival between medial and LUKAs showed no difference in short, mid-term, and long-term survival. In addition, there was no difference in pain relief or functional improvement between the two procedures<sup>[25]</sup>.

## BIOMECHANICS OF THE LATERAL KNEE

The lateral compartment of the knee is significantly different than the medial compartment in regard to the anatomy and biomechanics. Implants and surgical techniques must be specific to the lateral compartment, thus accounting for its unique characteristics.

Anatomic differences between the medial and lateral compartments include differences in posterior tibial slopes and anteroposterior (AP) dimensions in tibial plateaus<sup>[26,27]</sup>. In addition, the lateral plateau is convex and sits slightly more proximal than the medial plateau. Furthermore, the C-shaped lateral meniscus is more mobile allowing for more movement within the lateral compartment compared with the medial during normal knee kinematics. In normal knees, the femur rotates externally with flexion when the foot is left in neutral. At 40° of flexion, the flexion facet centers of the femur displace 4-5 mm in the AP plane such that there is anterior translation on the medial femoral condyle and posterior translation of the lateral femoral condyle<sup>[28]</sup>. Furthermore, the degree of femoral rollback is greater in the lateral knee than the medial knee<sup>[29]</sup>.

As a result of these differences in anatomy and biomechanics, contact stresses develop in different regions as arthritis develops in the medial and lateral compartments. Weidow *et al*<sup>[29]</sup> localized regions of cartilage wear for cases of medial and lateral compartment arthritis. In medial osteoarthritis, tibial cartilage wear is located anteriorly, while in lateral osteoarthritis, wear is greater in central and posterior regions.

## INDICATIONS

Over the years, different criteria have been included to pin point the perfect candidate for LUKA in order to improve outcomes. Most authors tend to refer to similar parameters, however they often disagree on specific cutoffs and values. Indications and contraindications proposed by Scott<sup>[19]</sup> are listed in Table 1.

Isolated lateral compartment osteoarthritis with axial deviation less than 10°-20° from neutral mechanical axis is a primary indication for LUKA. Radiographic evaluation should confirm the absence of advanced osteoarthritis in the medial and patellofemoral compartments. If joint space is preserved in the medial compartment, chondrocalcinosis or osteophytes are not an absolute contraindication. Provided the patient is not symptomatic for patellofemoral symptoms, radiographic evidence of patellofemoral osteoarthritis is also in itself not a contraindication. Burger *et al*<sup>[30]</sup> demonstrated that mild to moderate preoperative radiological degenerative changes and malalignment of the patellofemoral joint are not associated with poor patient reported outcomes at midterm follow up after lateral fixed bearing UKA.

Other commonly reported prerequisites are pre-operative range of knee flexion greater than 90°-100°, full knee extension, and tibiofemoral angles between physiological valgus and 10° varus without subluxation<sup>[31]</sup>. Some of the other indications have been adopted from literature based on MUKA. Ideal patient characteristics include an intact anterior cruciate ligament (ACL), weight less than 82 kg, and absence of significant inflammatory synovitis<sup>[32]</sup>. A fixed flexion deformity greater than 10° that cannot be corrected by ligamentous release nor removal of osteophytes is also considered a relative contraindication<sup>[24,33]</sup>, especially given that a UKA relies heavily on normal knee biomechanics in order to maintain function and stability. Motion and stability are based on balance between static and dynamic support around the knee. If the release of soft tissue and osteophytes does not correct the deformity, larger bone cuts would need to be made in order to gain full extension, thus altering the normal kinematics of the knee.

## EXPANDING INDICATIONS

While well-established guidelines have improved overall outcomes, expansion of traditional criteria has been favorable with no obvious decline in quality. Age and body mass index of patients at time of surgery have been expanded. While there is not any specific study looking at survivorship based on age as their primary outcome, there are some studies that indicate age is not a factor in outcomes. Lustig *et al*<sup>[34]</sup> showed excellent pain relief, improved function, and survivorship of 100% at 5 years and 10 years in patients with an average age of 50 years old (range 25-67). In a



**Table 1 Traditional indications and contraindications**

Indications
Predominantly isolated lateral compartment osteoarthritis
Angular deformity < 10°
Body weight < 80 kg
Contraindications
Flexion contracture > 15°
ACL and/or MCL insufficiency
Inflammatory synovitis

ACL: Anterior cruciate ligament; MCL: Medial collateral ligament.

retrospective review that included 31 LUKA, Xing *et al*<sup>[35]</sup> showed that the outcome was not influenced by the patients age.

Body mass index continues to be a topic of discussion in regard to success of knee arthroplasty. Multiple authors have shown based on long-term survivorship of LUKA that obesity alone should not be a contraindication<sup>[16,33]</sup>. In a study that included a cohort of obese patients, Swienckowski and Pennington<sup>[23]</sup> showed LUKA survivorship to be 100% at 12.4 years. In addition, Xing *et al*<sup>[35]</sup>, found no correlation with obesity and LUKA outcomes. In a study that included 55 patients that underwent LUKA, Cavaignac *et al*<sup>[36]</sup> showed that weight and body mass index did not influence the outcome or survival. In fact, their results trended in the direction that weight plays a part in reducing the risk of revision, although their results were not significant.

Traditionally, the lack of a functional ACL was a contraindication for LUKA. This is a result of greater translation between the tibia and femur in the lateral compartment when the ACL is deficient. Therefore, this leads to abnormal kinematics and increased contact stresses, thus creating a higher implant failure rate<sup>[37]</sup>. However, Volpi *et al*<sup>[38]</sup> proposes that ACL insufficiency in patients over 70 years of age is not a reason to avoid LUKA. In his study, he reported on 3 patients with deficient ACLs that underwent LUKA, and they had excellent Hospital for Special Surgery scores at mid-term follow-up (range 2-5 years). While this study does show promising results of a LUKA in an ACL deficient knee, 3 patients is not enough to offer strong conclusions regarding its efficacy, and has only been found in a specific patient population of patients over age 70. Future research may offer more insight into the benefits of LUKA in ACL deficient knees; however, no formal conclusions can be made at this time. As technology improves, implants are moving toward restoring more native kinematics of the knee, thus offering a more stable implant even in the setting of an ACL deficient knee.

In addition to osteoarthritis as a diagnostic indication, the presence of primary osteonecrosis and post-traumatic arthritis are also indications for LUKA. Multiple studies have indicated excellent long-term survivorship in the setting of osteonecrosis and post traumatic arthritis<sup>[16,33,34]</sup>. Secondary osteonecrosis and inflammatory arthritis have been reported as contraindications to LUKA due to the fact they are likely going to involve the other knee compartments leading to early failure<sup>[39]</sup>.

## PRE-OPERATIVE ASSESSMENT

The pre-operative evaluation of a patient should be focused and intent on elucidating key pieces of information in the patients' history that would help the physician indicate the patient for a LUKA. A detailed history and physical exam should focus on location of the pain, timing and length of symptoms, and previous knee injuries/surgeries. Pain localization to the lateral joint line is imperative and indicates lateral joint pathology. Pain that is general or localized to other parts of the knee should be examined closer, as the patient may have pathology in other compartments and would therefore not be indicated for a LUKA. According to Bert<sup>[40]</sup>'s "one finger test", the patient points with one finger to the lateral compartment of the knee. In addition, the patient should be questioned about knee stiffness, mechanical instability, progression of functional limitations, and daily functional demands. On physical

exam, evaluation should consist of overall limb alignment with comparisons made with the opposite knee. Range of motion, gait analysis, and presence or absence of effusion should also be evaluated during the initial exam.

Four different radiographic views are recommended as part of the initial evaluation: weight-bearing anteroposterior, lateral, patellofemoral skyline, and a 45°-flexed knee tunnel view. In addition, stress radiographs can assist in making an accurate diagnosis and development of an appropriate preoperative plan. Gibson and Goodfellow<sup>[41]</sup> noted that if a stressed knee retains a width of 5 mm or more in the compressed compartment, the cartilage within that compartment is normal. Stress radiographs will also provide additional information on the reducibility of any deformity that may assist in determining if a LUKA is the correct procedure for the patient. Magnetic resonance imaging is typically not needed; however can be useful to further identify soft-tissue injuries.

Following a thorough examination and review of radiographic images, the decision to perform a LUKA *vs* perform a TKA should be determined prior to surgery, however being ready to convert to a TKA is imperative as plans may change after direct visual inspection of other compartments intra-operatively.

## APPROACHES

Medial and lateral parapatellar approaches have been described for LUKA and offer good results. A lateral parapatellar approach provides direct visualization into the lateral compartment, thus allowing for a potentially smaller incision and less technically demanding than a medial approach. A main drawback on the lateral approach is that many orthopaedic surgeons are less familiar with this approach, which may lead to increased surgical time. In addition, there may be a concern for devascularization of the patella if a future medial parapatellar incision is needed. Despite all this, a lateral parapatellar approach has shown to be successful in LUKA. Swienckowski and Pennington<sup>[23]</sup> showed excellent long-term results using a lateral approach to the knee. In addition, Lustig *et al*<sup>[34]</sup> had a 100% survivorship at 10 years using a lateral parapatellar approach.

A medial parapatellar approach is another option for performing a LUKA. It is much more widely familiar to most orthopaedic surgeons and thus provides a level of comfort when performing the procedure. Sah and Scott<sup>[24]</sup> utilized a medial parapatellar approach and showed excellent outcomes at 5.2 years postoperatively. They showed that while a lateral parapatellar arthrotomy is more common to enter the lateral compartment, performing a LUKA through a medial approach provides a safe, effective, extensible and viable alternative.

When medial and lateral approaches were compared, Edmiston *et al*<sup>[42]</sup> showed improved postoperative flexion and greater improvement in flexion from preoperative measurements in the lateral approach group. Despite these findings, they also showed no difference between medial and lateral approaches in regard to revision rates or clinical outcome<sup>[42]</sup>. Both medial and lateral approaches offer excellent results. The approach used should be based on surgeon preference taking into consideration patient specific factors that may be present at the time of surgery.

## OUTCOMES

Table 2<sup>[6,16,23,24,33,34,43-50]</sup> indicates the literature available for the survivorship of LUKA and the need for revision procedures. Of note, over the years there has been many different implant designs which is reflected in the literature laid out in Table 2. These studies include tibial components that are fixed *vs* mobile bearing as well as metal backed or all-polyethylene. Prior studies comparing these two tibial designs have focused on MUKAs with much more limited research on LUKA. Studies based on MUKAs show a superiority of metal back tibial designs over an all poly designs<sup>[51,52]</sup>. van der List *et al*<sup>[51]</sup> reported improved functional outcomes when using metal back implants and Koh *et al*<sup>[52]</sup> showed an increased failure rate within 2 years of all poly implants. While these studies show better results with metal backed implants, it is important to note these studied on MUKA and not LUKA. As discussed, the lateral compartment has different anatomy and biomechanics and therefore these benefits may or may not be seen in LUKA. There is very little literature comparing metal backed *vs* all poly tibial designs. Based on the few studies reported to date, no significant differences can be observed between metal backed or all-polyethylene tibial components<sup>[23,24,43]</sup>. However, it is



**Table 2 Survivorship of lateral unicompartmental knee arthroplasty**

Ref.	Number of UKA	Type of implant	Mean follow-up (yr)	Survivorship (number of revisions)
Scott and Santore <sup>[6]</sup> (1981)	12	Cemented, all poly tibia	3.5 (2-6)	83% at 3.5 yr (2)
Marmor <sup>[47]</sup> (1984)	14	Cemented, all poly tibia	7.4 (2.5-9.83)	NA (2)
Gunther <i>et al</i> <sup>[48]</sup> (1996)	53	Cemented, metal-backed, mobile-bearing	5 (2.5-9.83)	82% at 5 yr (11)
Ohdera <i>et al</i> <sup>[49]</sup> (2001)	18	Four different designs	8.25 (5-15.75)	NA (2)
Ashraf <i>et al</i> <sup>[33]</sup> (2002)	83	Cemented all poly tibia	9 (2-21)	74% at 15 yr (15)
O'Rourke <i>et al</i> <sup>[50]</sup> (2005)	14	Cemented all poly tibia	24 (17-28)	72% at 25 yr (2)
Swienckowski and Pennington <sup>[23]</sup> (2004)	29	Cemented, metal-backed (75%); all poly tibia (25%)	12.4 (3.1-15.6)	100% at 12.4 yr (0)
Sah and Scott <sup>[24]</sup> (2007)	49	Three different designs	5.2 (2-14)	100% at 5.4 yr (0)
Argenson <i>et al</i> <sup>[16]</sup> (2008)	38	Four different designs	12.6 (3-23)	84% at 16 yr (5)
Lustig <i>et al</i> <sup>[43]</sup> (2011)	54	Cemented, all poly tibia	8.4 (5-16)	98% at 10 yr (1)
Lustig <i>et al</i> <sup>[34]</sup> (2012)	13	Three different designs	10.2 (3-22.1)	100% at 5 yr; 80% at 15 yr (3)
Heyse <i>et al</i> <sup>[44]</sup> (2012)	50	Full poly, metal-backed cemented, metal-backed uncemented	10.8 (5-16)	91.8% at 10 and 15 yr
Fornell <i>et al</i> <sup>[45]</sup> (2018)	41	Cemented, metal-backed, mobile bearing design	4.1 (2-7)	97.5% at 5 yr
Zambianchi <i>et al</i> <sup>[46]</sup> (2020)	67	Fixed bearing metal backed design	3	100% at 3 yr (0)

UKA: Unicompartmental knee arthroplasty; NA: Not available.

reported that there is an increase in polyethylene dislocations associated with mobile bearing designs which has an effect on outcomes. When using a mobile bearing designed implant, Gunther *et al*<sup>[48]</sup> showed a 10% rate of inlay dislocations. This is likely due to greater translation of the lateral femoral condyle on the lateral tibial plateau during knee range of motion<sup>[18]</sup>. More recently, domed shaped mobile bearing implants were designed to imitate the native convexity of the lateral tibial plateau however more data is needed on this type of design to make a judgement on its effectiveness. A recent systematic review noted mobile bearing LUKAs had a higher rate of revision compared to fixed bearing designs with regard to short to mid-term survivorship, however clinical outcomes were similar<sup>[53]</sup>. At present, fixed bearing implant design is preferable given the survivorship and low failure rate.

Table 2 also shows three more recent publications that are important to highlight<sup>[23,24,34]</sup>. Swienckowski and Pennington<sup>[23]</sup> and Sah and Scott<sup>[24]</sup> showed 100% survivorship of LUKA at long-term (12.4 years) and mid-term intervals (5.2 years), respectively. Lustig *et al*<sup>[34]</sup> also had similar results and showed survivorship to be 100% at mid-term follow up and 80% at long-term follow-up after undergoing LUKA for post-traumatic arthritis secondary to lateral tibial plateau fractures. Heyse *et al*<sup>[44]</sup> showed a survivorship of LUKA to be 91.8% at 10 years and 15 years in patients less than 60 years old at the time of the index operation. They also found revision rates to be comparable to those in which UKA was performed in the elderly population. In addition, Fornell *et al*<sup>[45]</sup> showed 97.5% survival at 5 years. Overall survivorship of LUKA has improved since it was first attempted. Literature shows excellent survivorship at the 5- and 10-year time intervals with only minor drops at long term intervals.

More recently, the literature has investigated robot assisted LUKA to improve the quality of the procedure. Zambianchi *et al*<sup>[46]</sup> found 100% survival rate in 67 patients receiving LUKA when a robotic arm assisted procedure was performed. In a retrospective study comparing robotic assisted LUKA with a conventional technique, Canetti *et al*<sup>[54]</sup> showed that a robotic assisted surgical technique provide a quicker return to sports at an average of 4.2 mo *vs* 10.5 mo for the conventional technique (*i.e.*, hiking, cycling, swimming, skiing). While this was a small cohort of 28 patients who underwent LUKA, both groups were comparable preoperatively. Decisions about while whether to use robot assisted technique *vs* conventional were determined by robot availability as opposed to patient specific differences. The overall return to

sports was high and comparable between both groups.

Argenson *et al*<sup>[16]</sup> reported a survivorship of 84% at 16 years after undergoing LUKA for osteoarthritis. While these results are disappointing, it is important to note that this retrospective review included cases from February 1982 and December 2004. As discussed above, there have been many changes to surgical technique, implant design, indications, and contraindications. In this study, 4/5 revision surgeries were completed prior to 1989, when patient selection criteria were not nearly as strict as it is today. In addition, previously surgical instrumentation was not as refined and therefore much of the procedure relied on handmade cuts for proper placement of the implants. Implant choice may have also contributed to implant failure. Gunther *et al*<sup>[48]</sup> reported a 21% failure rate in the lateral compartment with a 10% rate of bearing dislocation with the use of a mobile-bearing Oxford unicompartmental prosthesis. While this is cause for concern, this high failure rate in mobile bearing components has not been reproduced in more recent studies<sup>[45]</sup>.

## FAILURE AND REVISION SURGERY

Following LUKA, revision surgery is occasionally needed. In a recent systematic review by Ernstbrunner, they cited the most common cause of failure in LUKA was osteoarthritis progression and aseptic loosening noted in 30% and 22% respectively. Other causes of failure included instability, unexplained pain, infection, polyethylene wear, and bearing dislocation. In addition, they noted that bearing dislocation was the most common cause of early failure and the most common cause of failure when mobile bearing implants were used. Late failures were most commonly caused by osteoarthritis progression<sup>[55]</sup>. In a different systematic review investigating both cohort and registry data, van der List *et al*<sup>[56]</sup> noted the most common modes of failure to be osteoarthritis (29%), aseptic loosening (23%), and bearing dislocation (10%). In an evaluation of a Dutch arthroplasty register Burger *et al*<sup>[57]</sup> found a 12.9% 5 year revision rate for LUKA, citing progression of osteoarthritis as the main reason for revision. In addition, in a cohort that included 32 patients, Walton reported progression of osteoarthritis in 18%-34% of LUKAs<sup>[58]</sup>. While some authors admit to progression of osteoarthritis to other compartments, they tend to believe it remains clinically asymptomatic and therefore revision is not needed<sup>[31]</sup>. Two studies highlighted the need for revision surgery due to progression of osteoarthritis. Ashraf *et al*<sup>[33]</sup> revised 9/15 LUKAs and Argenson *et al*<sup>[16]</sup> revised 4/5 for osteoarthritis progression to other compartments.

Other reasons for revision that have been cited are fracture of the femoral or tibial component and valgus malalignment. These complications have not been found in recent literature and are therefore likely the result of past poor patient selection, surgical technique, and implant design. For example, Ashraf *et al*<sup>[33]</sup> completed 4 revisions prior to 1988 for a fractured femoral component. Subsequent design alterations have made the femoral component stronger making this complication rare. Argenson *et al*<sup>[16]</sup> revised 1 implant for a tibial plateau fracture that was likely caused by a technical error at the time of surgery. Valgus malalignment was another common cause for poor results following LUKA during its early days of development. Cameron *et al*<sup>[59]</sup> reported difficulty correcting valgus malalignment as a cause for poor results in 9/20 LUKA. Improvements in patient selection have since been modified to include fixed valgus deformity as a contraindication due to previous poor results.

Despite increasing literature regarding revision surgery from a LUKA, it remains controversial. Ease of revision often favors performing a UKA<sup>[60]</sup>. In a study of 54 patients undergoing revision to TKA after a UKA (9 lateral, 45 medial), Châtain *et al*<sup>[60]</sup> found better results with revision from a UKA to a TKA *vs* patients who underwent a tibial valgus osteotomy. In turn they also found less satisfactory results when a UKA was converted to a TKA than a primary TKA initially<sup>[60]</sup>. Lewold *et al*<sup>[61]</sup> found that the risk of having a second revision was greater than 3 times higher for failed UKAs revised to a new UKA than for those that were originally revised to a TKA. The re-revision rate was reduced to 7% after converting the initial UKA to a TKA<sup>[61]</sup>. Robertsson and W-Dahl<sup>[62]</sup> indicated a significantly higher risk of revision after a TKA in patients that previously underwent a UKA or closed wedge HTO. While it has been well documented that TKA's are more reliable in terms of survivorship and less complications overall, there is still a lot of debate on whether undergoing a UKA is advised over a TKA at the index procedure. It should be noted that a revision of a UKA can often be done with primary TKA implant without then need for revision stems, whereas a revision of a primary TKA would require a more involved and

invasive procedure. In many cases, a LUKA offers a great option for patients that meet the indications; however, they do need to be advised on the comparison between that and undergoing a TKA.

## CONCLUSION

Although LUKA is sparingly utilized, the procedure does lead to excellent clinical outcomes and high long-term implant survivorship rates. The increase in survivorship and decrease in revision rates of LUKA can be attributed to better-defined patient selection criteria, improvements in surgical technique and instrumentation, and modifications of implant design to better accommodate the lateral compartment. Currently the literature supports improved outcomes when using fixed bearing designs. Given the paucity of literature on the topic, the superiority of metal backed *vs* all polyethylene tibial components has not been borne out despite the superiority of metal backed implants for MUKA. The breadth of research into LUKA has flourished within the last 10 years and will likely continue along that path as the procedure is becoming more frequent. LUKA now has similar survival rates and functional outcomes to MUKA within the literature. Continued pursuit of improved techniques and implant designs will continue to show LUKA to be an excellent procedure for appropriately indicated patients.

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