HK4: Is the rate of periprosthetic joint infection (PJI) higher in patients who have prior unicondylar knee arthroplasty (UKA) and are undergoing conversion total knee arthroplasty (TKA)?

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Response/Recommendation: While conversion TKA surgery may be associated with increased PJI rates, it is inconclusive based on limited evidence that conversion from UKA to TKA has higher PJI rates. The increased need for the use of augments and stems at the time of surgery make the conversion of UKA to TKA a more complex procedure and potentially at risk of higher complications, including infection.

Level of Evidence: Limited

Delegate Vote:

Rationale:

Unicompartmental knee arthroplasty (UKA) is a viable alternative to total knee arthroplasty (TKA) in patients who have end-stage, symptomatic osteoarthritis affecting a single compartment. Potential advantages of UKA over TKA include faster recovery, improved proprioception, reduced pain, better function, improved range of motion, and reduced infection and manipulation rates [1-4]. However, some registry data shows a higher revision rate of UKA compared to TKA [5]. To date, it remains unclear if the surgical site infection (SSI) or periprosthetic joint infection (PJI) rates are higher in patients who have a prior UKA undergoing conversion to TKA with a primary or revision TKA.

Overall, 1,088 studies were identified using the search terms supplied across EMBASE, SCOPUS, and Pubmed. After the title and abstract review, 61 full-text reviews were performed, reducing the full data extraction to 18 studies. There were 17 practice registry studies and one database study, eight level 3 evidence studies, and the remainder were level 4 evidence studies. There were two studies that looked at patello-femoral arthroplasty (PFA) conversions; 11 looked at medial conversion, while the remainder included all UKAs or did not list the type of UKA. There were seven studies with a comparison group of primary TKA, with one also comparing to revision TKA, and one comparing HTO to TKA, totaling 1,172 in the practice registry and 13,257 including the database study.

The studies consisted of 1,377 patients undergoing conversion TKA from UKA. The average age was 65.7 years [95% confidence interval (CI) 63.7-67.7]; the women rate 65.3% [95% CI 57.9-72.7]; the BMI 28 to 33, with an average weighted follow-up of 57.1 months [95% CI 43.9-70.3] (Table 1). The average time from UKA to conversion TKA ranged from 28 to 108 months with an average of 63 months.

Of the 1,377 patients undergoing conversion TKA, 28 (2.0%) developed SSI/PJI during the follow-up period. There were four studies that included a comparator group of 159 primary TKAs that had 15 (3.0%) SSI/PJI [6-9]. When performing a meta-analysis for the difference in proportions of SSI/PJI in UKA to TKA conversions versus their comparators, there was no significant difference between the groups OR 0.353 [95% CI -0.769-1.48]. While there was no difference in the odds ratio of infection between UKA conversion to TKA and primary TKA, more UKA conversions required additional fixation. There were 230 (16.7%) patients who required augments, 404 (29.3%) patients required stems during the time of surgery, and 96 (7.7%) required another reoperation for reasons other than SSI/PJI. Although the overall reoperation rate was higher, a meta-analysis of 3 studies comparing reoperation rates found no significant difference between the UKA conversion group (7.7%) and the comparator group (3.6%), with an odds ratio of OR 1.42 [95% CI 0.548-2.29], p=0.68 [7-9].

The rate of SSI/PJI for patients undergoing UKA conversion to TKA was not elevated compared to their TKA comparator group, and the SSI/PJI rate appears to be in accordance with previous studies on primary TKA and historical controls [10]. This may be explained by the low SSI/PJI absolute number reported in the studies. Additionally, nearly all of the studies are practice registries, which may suggest a high expertise level bias from high-volume centers and technical skill [11]. Database studies, which may be more generalizable and may include lower-volume centers, may have findings different than ours.

Although infection episodes were overall low, the use of revision components, stems, and augments was much higher. Nearly all studies reported the use of stems and augments to improve fixation and replace lost bone. Studies have reported the use of increased thickness of the polyethylene bearing, usually a surrogate for tibia bony resection, resulting in a higher likelihood of stems and augment use [12]. For patello-femoral arthroplasty conversion, the use of stems and augments would be expected to be much lower due to the location of the bone loss, and this is what was seen in the review. Anatone et al. reported on a combined 82 PFAs undergoing conversion to TKA, with only 3 (3.6%) patients requiring stemmed implants and zero patients requiring any augments [9, 13]. Importantly, the orthopaedic surgeon should strongly consider the use of additional reconstruction options if deemed appropriate intraoperatively. Lewis et al. reported that the use of tibial stems during UKA to TKA conversion had a lower revision risk than conversions without the use of stems, suggesting that the use of these modes of fixation may be beneficial [14].

Although not statistically different, the reoperation rates were higher in UKA to TKA conversions compared to historical controls. Besides infection, the main causes for reoperation included aseptic loosening, instability, extensor mechanism failure, hematoma, and arthrofibrosis. Both studies investigating patello-femoral arthroplasty conversion to TKA reported arthrofibrosis required manipulation under anesthesia and lysis of adhesions in some patients as a complication [9,13]. This potential complication is something the surgeon should be aware of when revising these.

There are several potential limitations of this systematic review and meta-analysis. English-only articles can limit the number of reports in European and Asian countries. Since the studies were primarily practice registries and not large database studies, centers that specialize in UKA may have expertise bias and therefore lower rates of infection and complications than a more generalizable population of surgeon experience. Additionally, underreporting or low numbers of UKA to TKA SSI/PJI and failures can skew the data, and capturing this specific patient population in database studies can be challenging due to a lack of TKA conversion coding. Also, masking of other adjunctive procedures was not considered a failure and could also underreport the reoperation rate and skew data. We were also unable to determine differences in SSI/PJI between types of UKAs such as fixed bearing versus mobile bearing or patello-femoral arthroplasty due to low numbers available.

In conclusion, conversion TKA following UKA failure is associated with a relatively low SSI/PJI rate, but a higher need for revision components and a higher reoperation rate compared to primary TKA. Further database research is warranted to confirm these findings and explore strategies to minimize complications and improve long-term outcomes.

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