

HK-2b – Does prior knee arthroscopy increase the risk of a subsequent surgical site infection/prosthetic joint infection (SSI/PJI) in patients undergoing elective arthroplasty?

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Response/Recommendation:

Based on available data, there is a clinically meaningful increased risk of postoperative infection following total knee arthroplasty (TKA) in patients who have a history of ipsilateral knee arthroscopy within six months.

Level of Evidence: Limited

Delegate Vote:

Rationale:

Knee arthroscopy (KA) is one of the most common orthopaedic surgeries, with an estimated one million procedures performed per year [1]. Well-established indications include removal of loose bodies, partial meniscectomies, arthroscopic irrigation and debridement for infection, ligament reconstructions, and more [2, 3]. Other, more controversial, indications include pain control in elderly patients who do not want arthroplasty and in patients who want to delay total knee arthroplasty (TKA) [4-6]. Furthermore, it has historically been used as a diagnostic tool in patients who have presumed unicompartmental arthritis to confirm the diagnosis before UKA [7]. A KA is very common before TKA; it has been estimated that 10% of patients who undergo KA will receive a TKA within one year and 33% in nine years [8, 9]. Nevertheless, whether KA before TKA increases the risk of postoperative infection remains debated.

There were three groups that have evaluated this patient population using single-institution retrospective cohort studies. Piedade et al. conducted a retrospective review of patients undergoing TKA and compared patients who had a history of KA ($n = 60$) to those who did not ($n = 1,119$) [10]. The authors demonstrated that there was a nonsignificant trend toward increased infections (1.25 versus 3%; $P = \text{non-significant}$). However, the 10-year survival of TKA implants in those who had a history of KA was 86.8%, compared with 98.1% for those without. Barton et al. conducted a retrospective cohort study using a prospectively collected database at a large academic institution [11]. When comparing patients who had ipsilateral KA within 12 months of primary TKA ($n = 187$) to those who did not have a history of KA ($n = 1,708$), multivariate regression analysis demonstrated that KA within six months of TKA increased the risk of needing a revision (odds ratio (OR) 3.85; $P = 0.004$). While indications for revision included infection, there were not enough patients to conduct a separate analysis for infections alone. Also, a retrospective analysis of 87 patients who had a history of KA before TKA and 174 controls was conducted to evaluate for risk of postoperative complications [12]. The authors demonstrated a significantly higher rate of infection in the KA (4 versus 0%; $P < 0.001$).

Single institution studies tended to have small sample sizes and provide limited insight into this question; however, multiple large national databases have more recently been evaluated. There are two studies that have used the PearlDiver Patient Records Database. Werner et al. conducted a study that evaluated patients who had received a KA in three different timeframes before TKA and compared them to age-matched controls who had not received a KA [13]. The authors

demonstrated that the cohort who received a KA within six months had a significantly increased risk of postoperative infection (OR 2.0; $P = 0.004$). Gu et al. conducted a similar study comparing patients who had a history of KA within two years of TKA to age and comorbidity-matched controls [14]. They found that the experimental cohort had a higher rate of PJI than controls (2.65 versus 1.83%; $P = 0.022$). The same group conducted a similar study, comparing patients who received KA prior to TKA to matched controls at time points 0 to 15 weeks, 16 to 35 weeks, 36 to 43 weeks and 44 to 52 weeks [15]. Multivariate analyses demonstrated that patients had an increased risk of PJI in the zero to 15-week (OR 1.79; $P < 0.001$) and 16- to 35-week (OR 1.20; $P = 0.035$) cohorts. Additionally, an investigation using the IBM Watson Health MarketScan database evaluated the incidence and risk of postoperative complications in patients who had undergone ipsilateral KA within one year of TKA [16]. They demonstrate there was no increased risk of postoperative PJI compared to controls (OR 1.08; $P = 0.739$). Moreover, Tayton et al. evaluated the New Zealand Joint Registry database to determine risk factors for PJI within 12 months following TKA [17]. They demonstrated that a history of a ligament reconstruction was an independent risk factor for PJI (OR 1.84; $P = 0.28$), but did not provide specifics on what ligament reconstructions were included. Interestingly, a history of meniscectomy trended toward being protective against PJI.

There were three studies that evaluated this question and found no difference in postoperative infection between groups. Issa et al. compared patients who had a history of at least two prior KAs ($n = 62$) to those who did not have any history of KA ($n = 438$) with a minimum of two years follow-up [18]. The authors demonstrated that there was no difference in implant survival or postoperative complications between cohorts. Sax et al. conducted a retrospective time-based analysis, evaluating patients who underwent KA at different intervals before TKA (<12, 12 to 16, 16 to 20, and 20 to 24 months) [19]. There was no difference in septic revisions at six months, one year, and two years following TKA ($P > 0.476$). Furthermore, Viste et al. conducted a retrospective review of a prospectively collected database and compared patients who had a history of KA ($n = 160$) to matched controls ($n = 320$) [8]. The prior KA cohort had two PJIs, and the control had three, but the difference was not statistically significant. Furthermore, they demonstrated that the 10-year event-free rate of infection was statistically similar when comparing cohorts who had a history of arthroscopy < one year before TKA and those > one year.

There were two recent systematic reviews and meta-analyses that have demonstrated an increased risk of infection in patients who have a history of arthroscopy following lower extremity arthroplasty. The first one evaluated arthroscopy and arthroplasty of both hip and knee, of which nine of the 23 studies reported on TKA only [20]. There were ten studies ($n = 6,771$) that reported the risk of infection at an average follow-up of one to six years following surgery and demonstrated a statistically significant increase in the risk of infection in the arthroscopy group compared with controls (OR 1.83; $P < 0.001$) with low heterogeneity. The second meta-analysis evaluated patients who received TKA who did and did not have a history of KA [21]. They demonstrated a greater than 50% increased odds of postoperative infection in the KA before the TKA group ($Z = 3.54$; $P = 0.0004$).

Conclusion:

Most studies reviewed (eight out of 11 individual studies, two out of two systematic reviews, and meta-analyses) demonstrate a statistically and clinically meaningful increase in the risk of postoperative SSI/PJI following TKA in patients who had a history of KA. However, all studies used retrospective analyses, including both single institution databases with prospectively

collected data and national databases. It is important to note that three studies demonstrated no increased risk, but those tended to have small sample sizes in the KA cohorts. Furthermore, the data suggests that there may be a greater risk of postoperative infection in patients as the time interval between the two procedures decreases. Based on available data, orthopaedic surgeons who are considering a TKA for a patient who has a history of a KA should consider waiting at least six months to minimize the risk of infection.

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