HK 65: **What is the optimal management of patients with prior septic arthritis in a joint that requires arthroplasty?**

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Response/Recommendation:

All patients with prior septic arthritis, should be investigated for the presence of active infection in the affected joint. If active infection is not found to be present, then one or two stage surgery can be carried out. For patients with active septic arthritis, we recommend two-stage arthroplasty. One-stage surgery may be considered for patients infected with *Mycobacterium tuberculosis* where anti-tuberculosis medications have been commenced.

Level of Evidence: Limited

Delegate Vote:

Rationale:

The management of patients with prior septic arthritis in a joint that requires arthroplasty is traditionally performed in one or two stages. Single stage arthroplasty has the advantage of lower surgical morbidity and decreased hospital expenses. Two-stage arthroplasty may reduce the risk of periprosthetic joint infection (PJI) through two surgical debridements and additional antibiotic therapy between procedures.

Septic arthritis in a native joint may cause extensive damage to the articular cartilage and lead to arthritis.[1] While arthroplasty for patients with septic arthritis can improve pain and enhance function, there is an elevated risk of subsequent PJI.[2,3] In a meta-analysis of 1,300 total joint arthroplasties (TJAs) performed on joints with a history of septic arthritis, the reported rate of PJI was 5.96% (95% confidence interval [CI], 4.24% to 7.94%), significantly higher than the PJI rate for primary TJA in patients with osteoarthritis, at around 1%.[4,5]

There is an ongoing debate regarding the optimal treatment of patients with prior septic arthritis. Some surgeons advocate for performing the arthroplasty in a two-stage fashion while others feel that performing the arthroplasty in one sitting is acceptable. To answer the question posed above, we performed a systematic review of the literature. Using MeSH terms developed by the librarians, we ran a search of the PubMed and Embase databases. A total of 1,682 studies were identified in the initial search. After screening the abstracts and full text, a total of 62 studies met the inclusion criteria for full review and data extraction.

In 2021, Tan et al.[6] investigated whether total joint arthroplasty after septic arthritis can be safely performed. A total of 207 TJAs, in patients with a prior septic arthritis undergoing arthroplasty from 2000 to 2017 at five institutions were included. Important data on these patients, including laboratory test results, prior treatment, time from the initial infection, and patient characteristics were recorded. The overall PJI rate was 12.1%. Increasing time from septic arthritis treatment to TJA was not associated with a reduction of PJI risk, whether considering time as a continuous or categorical variable ($p > 0.05$). Although the ROC curve analysis found that the optimal threshold for timing of TJA from the initial treatment was 5.9 months, there was no difference in the PJI rate when the overall cohort was dichotomized by this threshold or stratified by single or two stage TJA. There was no significant difference in erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP) level prior to TJA between patients who subsequently developed PJI and those who did not. Aspiration was performed in a small proportion of patients (16.9%) and an no conclusions could be drawn on its value.

In 2022, Bettencourt et al.[8] described the outcomes of primary total hip arthroplasty following septic arthritis of the native hip. They retrospectively identified 256 THAs in 244 patients following septic arthritis performed between 1969 and 2016 at a single institution. Each case was matched 1:1, based on age, sex, BMI, and year of surgery, to a primary THA performed for OA. The mean age and BMI were 58 years (35 to 84) and 31 kg/m^2 (18 to 48), respectively, and 100 (39%) were female. The mean follow-up was 11 years (2 to 39). The ten-year survival free of any infection was 91% and 99% in the septic arthritis and OA groups, respectively (hazard ratio (HR) = 13; $p < 0.001$). The survival free of PJI at ten years was 93% and 99% in the septic arthritis and OA groups, respectively (HR = 10; $p = 0.002$). There was a significantly higher rate of any infection at ten years when THA was undertaken within five years of the diagnosis of septic arthritis compared with those in whom THA was undertaken greater than five years after this diagnosis (14% vs 5%, respectively; HR = 3.1; $p = 0.009$). The mean Harris Hip Scores at two and five years postoperatively were significantly lower in the septic arthritis group compared with the OA group ($p = 0.001$ for both). The risk of any infection had a strong downward trend as the time interval between the diagnosis of septic arthritis and THA increased, highlighted by a 3.1-fold higher risk when THAs were performed within five years of the SA diagnosis

Luo et al.[7], in 2023, performed a systematic review with meta-analysis for the treatment of patients with septic arthritis undergoing single- and two-stage arthroplasty. Seven retrospective studies (Bauer et al.[9]; Bochatey et al.[10]; Hooper et al.[11]; Papanna et al[12]; Portier et al[13]; Tan et al.[14]; Zhang et al.[15]) with a total of 413 patients were included. Pooled analysis showed no difference in the reinfection rate between single-and two-stage arthroplasty. Subgroup analysis found no difference between the single-and two-stage arthroplasty groups in the incidence of infection of the hip and knee. They also compared the joint function after single- and two-stage arthroplasty for patients with septic arthritis. Three of the included studies reported the postoperative joint function (7, 16, 27). Two of these studies evaluated the hip, while one evaluated the knee. The pooled Harris Hip Score results suggested that there was no difference between groups in the joint function. However, the pooled results were highly heterogeneous ($I2 = 94.5\%$) owing to the inclusion of a small number of studies and a small sample size. Therefore, their confidence in the results was low and they did not report them. The joint function after single- vs two-stage arthroplasty for SA should be investigated in future studies.

In cases of tuberculosis infection, single-stage arthroplasty is considered a safe option in patients with prolonged use of antituberculosis medications.[16]. Postoperative infection poses a risk for patients with untreated disease or those on systemic corticosteroids treatment.[17] In these cases and where sinus tracts are present or extensive bony destruction with multiple abscesses is predominant, a two-stage approach may be recommended.[18,19]

In 2022, Wei et al.[20], performed a retrospective review of 105 TJA patients with prior septic arthritis. At a mean follow-up of 10.3 years, the PJI rate was 16.2%. The adjusted Cox proportional hazards model showed that male gender (HR, 9.95; $p < .01$), end-stage renal disease (HR, 37.34; $p < 0.01$), debridement surgery >3 times (HR,4.75; P=0.04) and polymicrobial infection in primary septic arthritis (HR, 10.02; P= 0.02) were independent risk factors for PJI. Neither the types of initial debridement, nor one-stage vs two-stage arthroplasty was related to the risk of PJI. There was a higher risk of PJI re-infection by the same microorganisms isolated in prior septic arthritis if TJA was performed within 6 months after septic arthritis. All patients received a minimum of 4-week antibiotic therapy. The course of antibiotic treatment depended on the clinical symptoms and signs, erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP) level. Antibiotic cement use in definitive TJA was not a predictor of success regarding infection rates [HR 2.08 (0.73-5.89); p=0.17].

Conclusion:

There is minimal data related to the optimal management of patients with prior septic arthritis undergoing total joint arthroplasty. The available evidence, all retrospective, suggests that performing the arthroplasty either in one setting or two stage does not influence the outcome. The available data suggests that a single-stage arthroplasty is a reasonable treatment strategy in most patients, including for septic arthritis caused by *Mycobacterium tuberculosis* where anti-tuberculosis medications have been commenced.

The optimal management of these patients should include investigation for the presence of infection that should include ordering serological test, selective preoperative aspiration of the joint, sending samples of tissue and bone for culture during surgery. Patients with an active infection, except for *Mycobacterium tuberculosis*, may best be treated with two- stage arthroplasty. Patients with inactive infection can then be treated with arthroplasty in one setting. If any organism, particularly an organism that caused the initial septic arthritis, is isolated by culture then treatment with extended course of antibiotics may be required.

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