

HK 77 - Is there a limit to the number of exchange arthroplasty or surgical procedures in patients who continue to fail treatment for periprosthetic joint infection (PJI)?

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Response/Recommendation: Yes. Assuming that prior surgical procedures were carried out properly, patients failing a second two stage exchange should not be subjected to additional reconstruction surgery.

Strength of recommendation: Moderate

Delegate Vote:

Rationale:

Chronic prosthetic joint infection (PJI) of the knee and/or hip is a complex problem faced by orthopaedic surgeons that lacks a clear course of treatment. Many surgeons rely on their judgment, patient anatomy, and past experience to guide surgical decision making. Our recommendation aims to serve as a guide for surgeons in preoperative discussions with patients as to the extent of repeated surgeries to treat PJI. To answer this question, we focused on literature demonstrating the outcome of staged procedures; in this case, specifically repeating the two-stage exchange. The current literature specifies 5-6 procedures prior to definitive treatment.

We conducted a literature review based on ICM instructional guidelines (see Appendix). Based on our literature review, the success of a second two-stage procedure at the knee ranged from 36.4% to 78.9% [1-3]. The success of a second two-stage procedure at the hip ranged from 36% to 74% [1, 2, 4-6]. Factors that influence the success of recurrent infection treatment include polymicrobial infections, invasive infections (osteomyelitis), soft tissue status of the limb, and medical comorbidities such as anemia, diabetes, and immunosuppression. Since it is not possible to quantify the influence of these patient factors, the following suggestions are recommendations for best-case scenarios. The final, definitive procedure following a failed repeat two-stage for the knee was defined as an above-knee-amputation (AKA) or a knee arthrodesis. The final, definitive procedure for the hip was a resection arthroplasty or hip disarticulation. Patients placed on chronic suppression were not included.

We excluded third-two stage procedures due to its extremely low success rate [7]. *Khanna et al* closely analyzed the course of seven patients who all ultimately underwent an AKA after an average of 7 procedures [8]. Multiple studies have shown that a majority of patients report that knowing what they knew now, they would have undergone the AKA sooner [8, 9]. The choice of definitive procedure may affect patient overall outcomes as illustrated in a study by *Son et al*, demonstrating that patients who underwent AKA had a higher mortality rate, but those who underwent knee arthrodesis did not experience any change in mortality [10]. *Schnetz et al* found that the two-year mortality rate was significantly lower in patients who underwent arthrodesis compared to those who underwent AKA [11]. *Robinson et al* observed an average of three procedures for patients with PJI prior to undergoing a knee arthrodesis [12].

Less data is available on the number of procedures for hip patients requiring salvage procedures like resection arthroplasty or hip disarticulation. *Khan et al* evaluated the outcomes of repeat two-stage exchanges and found that further hip surgery was required to provide definitive

treatment to patients, but did not specify the type of procedure [13]. *Kheir et al* reviewed both the knee and hip patients with failed prior two-stage exchanges and described patients undergoing amputations and an arthrodesis, but did not specify outcomes by hip and knee [1]. For hips and knees, 17.2% of patients did not tolerate spacer retention and required an additional procedure [14].

While mortality is lower in arthrodesis patients than AKA patients, persistent infection and subsequent operations are lower in AKA patients. patient satisfaction is lower with arthrodesis [3, 9, 15, 16]. Patients with knee arthrodesis have a better functional status than those with AKA. On the contrary less than 50% of patients with AKA are ambulatory [17-19]. The mortality rate of patients with PJI, specifically those who undergo a repeat two-stage, is confounded by any final procedure the patient undergoes and by the overall health of the patient. *Khan et al* found a 33% mortality rate at two years in patients who underwent a repeat second-stage procedure [13]. In a study by *Hungerer et al*, comparing arthrodesis to AKA, those who underwent arthrodesis experienced a mortality rate of 4%, while those who underwent AKA experienced a mortality rate of 13% [20]. A bias exists in the difference in mortality between these procedures since AKA may more likely be indicated in patients with higher medical risks.

Conclusion:

While many studies have analyzed the efficacy and outcomes of various treatment algorithms and approaches for recurrent PJI management, no single study has explicitly demonstrated that a finite number of procedures exist in the treatment of chronic PJI of the knee or hip. There is limited and heterogeneous evidence on the number of repeated surgeries. Based on this review, a salvage procedure should be seriously considered after a failed second two-stage procedure (Figure 1).

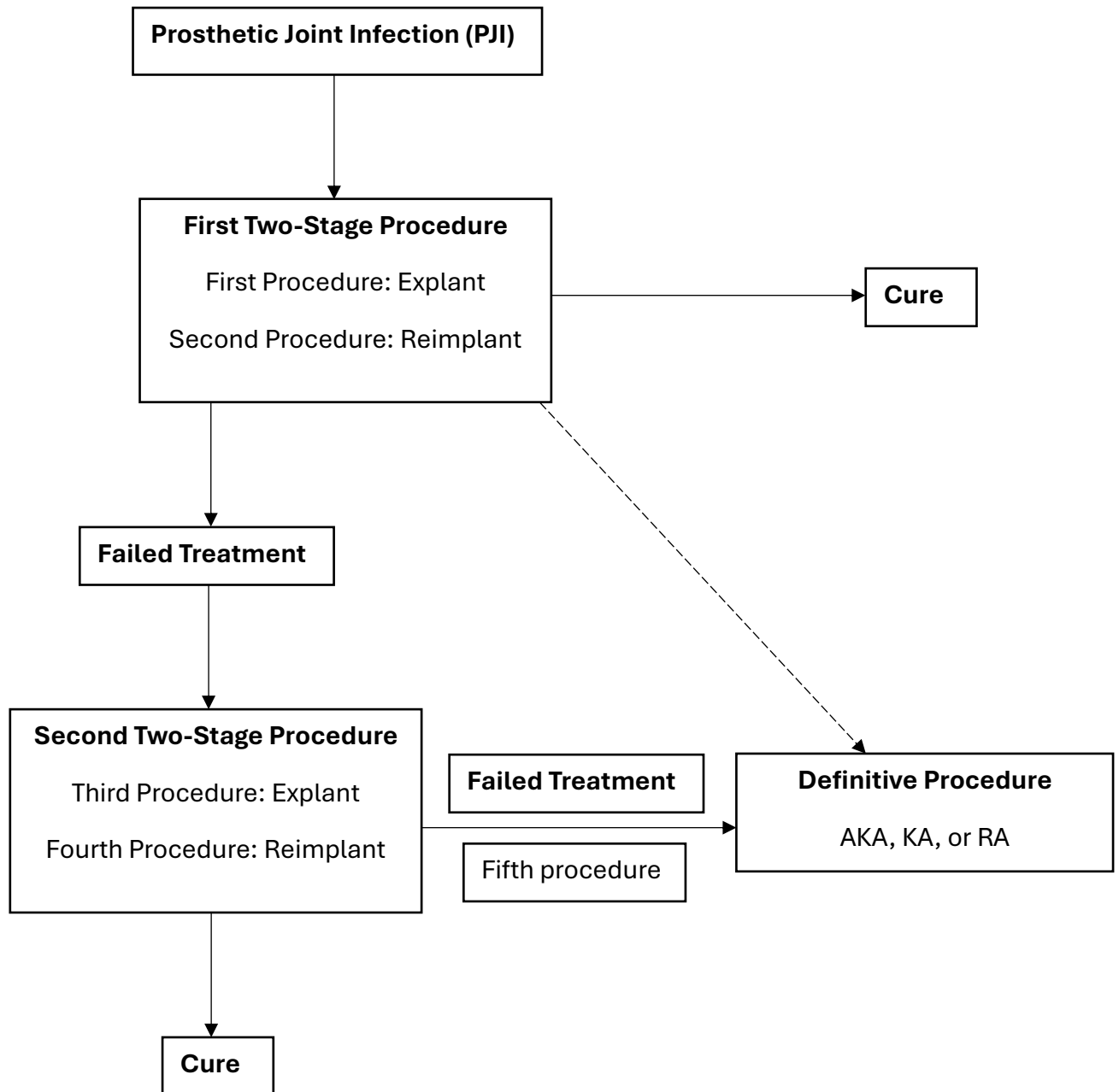


Figure 1. Algorithm representing the process in which a patient who has failed a second two-stage procedure would ultimately have undergone 5 procedures for definitive treatment. It is possible for a patient to undergo definitive treatment after the first two-stage procedure. Patients may also be cured at any step.

Appendix

Methodology

Following the ICM instructional guidelines, a literature review was conducted via PubMed and Scopus with the following terms: “prosthetic joint infection”, “hip”, “knee”, “total knee arthroplasty”, “total hip arthroplasty”, “complications”, “hip disarticulation”, “knee arthrodesis”, “revision knee”, “revision knee”, “resection arthroplasty”, and “above knee amputation”.

Covidence was used to conduct an initial abstract review of articles (N=1504). Of the 1504, 84 articles were distributed amongst the delegates for manuscript review. Ultimately, 32 articles were deemed helpful in this analysis.

Note: Articles pertinent to consensus discussion but not referenced [21-35].

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