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QUESTION 7: Can debridement, antibiotics and implant retention (DAIR) be utilized in patients with an acute chronic infection of a unicompartamental knee arthroplasty (UKA)?

RECOMMENDATION: In the event of acute infection following UKA, early DAIR can be considered. However, if initial treatment effort results in failure or chronic infection is present, the implanted prosthesis should be removed and a one-stage or two-stage conversion to total knee arthroplasty (TKA) should be performed in combination with antibiotic therapy.

LEVEL OF EVIDENCE: Limited

DELEGATE VOTE: Agree: 96%, Disagree: 2%, Abstain: 2% (Unanimous, Strongest Consensus)

RATIONALE

The main reasons for revision of UKA are loosening, progression of osteoarthritis to another compartment and infection [1]. The incidence of infection after UKA at 0.2 to 1% is lower than that reported after total knee arthroplasty (TKA) [1,2]. A distinctive feature of UKA infection is that both the prostheses and the native cartilage are involved [1]. This is in part attributed to the use of minimally invasive exposures, with less damage to the adjacent soft tissue and sparing of bone and ligamentous structures [3].

In the event of immediate or acute infection following UKA, early irrigation and debridement followed by antibiotic adminis-

tration can be a proper treatment solution. However, if the initial treatment effort ends up in failure or chronic infection is present, the implanted prosthesis should be removed and a one- or two-stage revision surgery should be carried out [3]. Labruyere et al. reported on failures for nine infected UKA cases managed with one-stage irrigation, debridement and conversion to TKA in combination with three months of antibiotic therapy [1]. Of note, five of these cases first failed DAIR. Kim et al. reported management of five infected UKA cases with two-stage conversion to TKA [3]. Bohm et al. reported two infected UKAs, one of which was managed with one-stage conversion

TABLE 1. Summary of infected UKA cases in the literature

Author/Year	N (infected UKA cases)	Failed DAIR	Treatment	Failures	Follow-up
Labruyere 2015[1]	9	5	one-stage conversion to TKA (9)	0	Median 60 months
Bohm 2000[4]	2 (0.7% infection rate)	?	one-stage (1) two-stage (1)	1 (AKA)	Mean 4 years
Saragaglia 2013[5]	8 (2% of failed UKAs)	?	?	?	?
Kim 2016[3]	5 (0.3% infection rate)	?	two-stage (5)	?	?

successfully and the other was treated with two-stage conversion, ultimately resulting in above the knee amputation [4].

In the setting of UKA, recommendations are weak as only five published papers examine the results of failed UKA, including infection and the rate of infection is very low (Table 1). Two of the infected UKA cases in one study [1] had been post-traumatic infections prior to implantation of the UKA and thus represent more complex scenarios potentially predisposing to treatment failure. There is no literature directly evaluating the role of DAIR in the setting of UKA. However, subsequent failure due to progression of osteoarthritis (OA) occurred in two cases (survival 49%) at an average of three years. Therefore, it may be advisable to proceed with one- or two-stage conversion to TKA at the time of infection in the setting of UKA to minimize the need for additional revision procedures in the future and prevent associated morbidity.

In general, the surgeon should assess prior UKA function, component position and fixation and condition of alternate knee

compartments to determine whether retention of implants with DAIR is an appropriate initial treatment in the setting of infection.

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QUESTION 8: Can debridement, antibiotics and implant retention (DAIR) be utilized in the treatment of acute periprosthetic joint infection (PJI) with a megaprosthesis?

RECOMMENDATION: DAIR is a viable treatment option in acute PJI of a megaprosthesis. The effectiveness of DAIR is still unclear due to lack of comparative data among the treatment options and limited evidence to suggest superiority of any one treatment. The treatment decision must be made on a case-by-case basis and account for underlying medical conditions, infection history, organism characteristics and surgical history. DAIR is most appropriate for acute PJI without complicating factors, such as extensive and pervasive infection by a high virulence or resistant organism.

LEVEL OF EVIDENCE: Limited

DELEGATE VOTE: Agree: 96%, Disagree: 1%, Abstain: 3% (Unanimous, Strongest Consensus)

RATIONALE

Acute PJI of megaprotheses is a terrible complication and a difficult situation for treatment [1]. Infection rates in patients with megaprotheses have been reported to range from 3% to greater than 30% [1-3]. In principle, the treatment of acute PJI with a megaprosthesis is similar to treatment of other acute PJI, except there is significantly more potential space and a greater soft tissue infectious burden requiring more extensive exposure and debridement [4,5]. The surgical options include DAIR [6-8], one-stage revision surgery [4], two-stage revision with an interval cement spacer [9-11], arthrodesis and amputation [5,8]. Unfortunately, there is limited data on the outcome of these different procedures [1,9]. The lack of comparative data is due to the limited indications for a megaprosthesis as well as the clinical heterogeneity of the affected patients [5]. Additionally, treatment details vary greatly, particularly for DAIR. Specific information on the debridement, the type of irrigation solutions, modular component exchange and local and systemic antibiotic use and duration are generally lacking.

Two-stage revision remains the preferred method for treatment of PJI [8-10]. However, two-stage revision significantly increases surgical and perioperative risks and includes a substantial period of reduced mobility between stages, which has heightened interest in alternative surgical options such as DAIR. DAIR is an attractive option as it may prevent the unnecessary removal of implants, which could result in further bone loss and fracture [6,11,12]. DAIR is also the simpler and less costly procedure with a demonstrated

shorter length of hospital stay [13]. The overall goal of attempting DAIR should be to select the cohort of patients in whom successful treatment is most likely.

Sujith et al. summarized the absolute and relative contraindications for DAIR [13]: The absolute contraindications are loose prosthesis, poor soft tissue coverage and compromised bone cement mantle. The relative contraindications are the presence of sinus tracts, methicillin-resistant and methicillin-susceptible *Staphylococcus aureus* (MRSA and MSSA) infection, previously revised joints, immunosuppression, rheumatoid arthritis, polymicrobial involvement, bacteremia, C-reactive protein (CRP) >100 mg/L, erythrocyte sedimentation rate (ESR) >60 mm/h, two or more previous debridements and >3 weeks of symptoms.

The decision to perform DAIR can also be based on the classification of the infection. According to Pilge et al. if intraoperative cultures are positive without other signs of infection (Tsukayama Type I), implant retention is attempted and prolonged systemic antibiotic treatment is recommended. Implant retention should also be attempted with stable arthroplasties in type II or III infections (early postoperative infection or acute hematogenous infection). If there are radiological signs of implant loosening, a one- or two-stage revision must be performed [14,15].

During DAIR, thorough debridement is necessary to improve outcome. All infected and nonviable tissue around a well-fixed prosthesis must be removed. Retained components are irrigated and