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QUESTION 2: Is debridement, antibiotics and implant retention (DAIR) an emergency procedure for patients with acute periprosthetic joint infection(PJI) or should patient optimization be implemented prior to surgery to enhance the success of this procedure?

RECOMMENDATION: DAIR is not an emergency procedure but should be performed on an urgent basis when the patient with acute PJI is medically and surgically optimized.

LEVEL OF EVIDENCE: Limited

DELEGATE VOTE: Agree: 97%, Disagree: 3%, Abstain: 0% (Unanimous, Strongest Consensus)

RATIONALE

At the present time DAIR is reserved for patients with acute PJIs when no loosening of the implants is present [1,2]. Success rates vary among different studies from 16% - 82% [3–7]. The large majority of studies regarding DAIR focus on reporting the success rates or evaluating the factors that are correlated with success [2,4–6,8–16]. However, none of these studies have focused on the urgency of DAIR as a procedure.

DAIR should be considered an urgent, but not emergent procedure, as the time period from the onset of symptoms until the operation has been reported to be important factor affecting the success of the procedure [5]. Factors that are known to affect the outcome of DAIR include the type of infecting organism [5,10,17–21], duration of symptoms before intervention [4–7,11–13,17,20,21], type and duration of antibiotic therapy [6,14,22], age [11], erythrocyte sedimentation rate (ESR) values at presentation [4,13,19,20] , presence of underlying inflammatory conditions [4,19], exchange of modular components [7,17,23] and the presence of preoperative comorbidities like anemia [24].

An exact cutoff time beyond which DAIR should not be attempted has not been determined. Nevertheless, the duration of symptoms less than one week has been correlated to a higher success rate [4,5,7,12,17,21]. Furthermore, age of implant ≤ 15 days has been identified as a prognostic factor for successful DAIR [25].

There are patient-related factors and medical comorbidities, which, if not controlled, may result in severe complications and failure of the procedure. Comorbidities, such as rheumatoid arthritis, are not possible to adjust prior to debridement. However, correction of malnutrition, coagulopathy, anemia, hyperglycemia and diabetes should be pursued. Subjecting a patient to irrigation and debridement (I&D) without addressing an underlying coagulopathy could result in the development of a subsequent hematoma and its adverse effects. Thus, it is critical that conditions such as coagulopathy, nutritional status, uncontrolled hyperglycemia (>200 mg/ml), severe anemia (hemoglobin <10 mg/dL) and other reversible conditions are addressed prior to subjecting a patient to DAIR.

In conclusion, we therefore recommend that patients with acute PJI are evaluated on an urgent basis and the surgery is performed when patient is optimized from medical and surgical perspective.

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QUESTION 3: Does identification of the pathogen prior to performing debridement, antibiotics and implant retention (DAIR) help guide the surgeon's decision making? If so, should you wait, in a clinically stable patient, until the pathogen has been identified?

RECOMMENDATION: The identification of the responsible microorganism before DAIR is desirable. However, it should not prevent timely surgical intervention if delay in surgery is believed to promote further establishment of biofilm formation and compromise the outcome of surgical intervention.

LEVEL OF EVIDENCE: Limited

DELEGATE VOTE: Agree: 94%, Disagree: 4%, Abstain: 2% (Super Majority, Strong Consensus)

RATIONALE

In implant related infections, the need for use of targeted antibiotics with proven action against the infecting pathogen and penetration into the biofilm has been suggested [1]. For instance, experts would likely agree DAIR is appropriate when ciprofloxacin-susceptible *Escherichia coli* is the infecting organism but, would probably discourage DAIR if the infective organism is a *Candida* spp. Thus, from a general perspective, knowledge of the pathogen prior to surgical intervention is desired. However, the real debate is whether waiting to determine the infective organism would adversely affect the outcome of DAIR and the timely intervention. The answer to this question requires an understanding of the implications of delaying DAIR and the consequences of performing DAIR without knowledge of the infecting pathogen.

Regarding the issue of time, Infectious Diseases Society of America (IDSA) guidelines, in conjunction with other authors, recommend a maximum of 21 days of symptom duration before utilizing DAIR to treat periprosthetic joint infection (PJI) [1,2]. This time limit, which has not been identified in comparative studies, is the same as that used in the pivotal clinical trial by Zimmerli et al. on the use of rifampin: none of the patients included in that cohort underwent DAIR beyond 21 days [3]. However, it remains uncertain whether these patients could have benefited from therapy if they had been submitted to DAIR more than 21 days after the beginning of symptoms. To this end, many observational studies have tried to find a precise cut-off of symptom duration, but heterogeneous populations with poorly reproduced results have emerged. Brand et al. observed that as little as a two-day delay in performing DAIR would significantly increase the odds of failure in a cohort of patients with staphylococcal PJI, mainly managed with β-lactams [4]. Other studies have also observed a poor outcome among patients with longer duration of symptoms without identifying a reliable time limit [5–13].