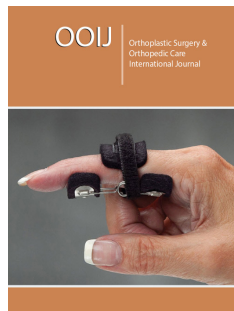


How Successful is Debridement, Antibiotics, and Implant Retention in the Management of Early Prosthetic Joint Infection?

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Abstract

Debridement, Antibiotics and Implant Retention (DAIR) is a valuable option for the management of early post-operative and late acute hematogenous Periprosthetic Joint Infection (PJI), however its effective ability to eradicate infection is debated. We evaluate the current literature about how successfully PJI can be managed by DAIR. The studies on DAIR are mostly small series. In cases of infected hip arthroplasty, the overall success rate of DAIR is 72.2%. Similar success rate is reported for DAIR in cases of PJI in revision hip arthroplasty. In cases of PJI in knee arthroplasty varies between 38% and 100%.

Keywords: DAIR; PJI; THA; TKA; Outcome

Introduction

Although infection after arthroplasty is not a common complication, it is associated with morbidity, mortality and high cost of treatment. Management of Prosthetic Joint Infections (PJI) with Debridement, Antibiotics, and Implant Retention (DAIR) is an attractive option. It offers a single procedure avoiding the need for staged protocols, a shorter period of disability and the ability to retain the implant. Despite its benefits, DAIR has demonstrated inferior infection eradication when compared to staged revision surgery [1,2]. As a result of these findings, there are several relative contraindications to DAIR, including chronic infection, polymicrobial infections, multi-resistant organisms, and fungal infections [3]. Current indications for DAIR include PJI with implantation time of less than three months, acute hematogenous infection with symptoms of less than three weeks, absence of a sinus tract and a stable implant [4]. Success rates following DAIR vary widely (14%-100%), which is partially due to heterogeneity of reported populations, treatment protocols, definition of success and length of follow-up [5]. Two prognostic scores-the KLIC (kidney, liver, index-surgery, cemented prosthesis, C-reactive protein>115 mg/L), which applies to early post-operative infections [6] and CRIME-80 (Chronic obstructive pulmonary disease, C-active protein> 150mg/L, rheumatoid arthritis, index surgery (following fracture), male, polyethylene exchange, age>80 years), which applies to hematogenous infections [7] are used to evaluate the probability of DAIR success.

Hip Arthroplasty

The studies reporting on DAIR in infected primary Total Hip Arthroplasty (THA) are mostly of small cohorts and retrospective in nature. In a review of 39 cohort studies from 1971 to 2016 that included 1,296 patients, Tsang et al. [8] reported that the proportion of success following DAIR in the management of infected THA appeared to improve after 2004, with an overall chance of success of 72.2%. The authors noted improved success (75.7%) when DAIR was performed within seven days from onset of symptoms and included exchange of modular components (77.5%).

Revision Arthroplasty

DAIR is reported to be a suitable option for management of PJI after revision with megaprotheses [9]. In a series reported by Tornero et al. [10] revision surgery was an independent predictor of failure, with a greater failure rate of 12-22% compared to that seen in primary arthroplasty. Goosen et al. [11] reported that the overall success rate after one year of 100 cases with early DAIR after revision THA or Total Knee Arthroplasty (TKA) was 79% and infection free success rate was 85%. The authors also noticed that empirical antimicrobial mismatch with causative microorganism was associated with lower success rate (70%) compared to non-mismatch when empirical antibiotics were appropriate for the identified organism (95%). Veerman et al [12] reported an overall success rate of 68% of DAIR, with respect to component retention and cure of infection after two years. Repeat DAIR within 90 days, use of immunosuppressive agents, and mismatch between antibiotic treatment and microorganism susceptibility were associated with a reduced reduction in the success rate.

Knee Arthroplasty

The studies reporting on outcomes of DAIR after TKA are all small cohort studies. Although arthroscopic irrigation and debridement is not recommended as it does not allow adequate debridement and exchange, some authors have reported varying results. Success rates reported with this technique vary between 38% in 16 patients [13] and 100% in 5 patients [14]. Success rates of 32.6% - 100% have been reported with DAIR management of PJI after primary TKA [15,16].

Revision arthroplasty

The literature on DAIR for infected revision TKA is limited. Chiu and Chen [17] reported success rates of only 30%.

Functional Outcome

Theoretically DAIR is associated with less favorable outcomes when compared to primary surgery. In a study by Grammatopoulos et al. [18]. DAIR patients had inferior Oxford Hip Scores (OHS) compared to primary THA patients, but significantly better OHS compared with two-stage revision patients. Other authors reported that PJI patients treated with DAIR had similar improvement from pre-arthroplasty to 12-months post-arthroplasty as patients without PJI in quality-of-life measures [19]. Lizaur-Urilla et al.

[20] reported that DAIR had a negative impact on the functional outcome of a subsequent two-stage revision surgery. The authors recommended that DAIR for PJI should only be used in selected patients, and that the first option for PJI infected with *Staphylococcus spp* should be two-stage revision surgery.

Factors Affecting Success

Late or delayed PJI treated with DAIR are significantly associated with failures [21]. Poor general condition of patients, high preoperative C-reactive protein level, repeated joint surgeries and Methicillin-resistant *Staphylococcus aureus* (MRSA) infections are associated with lower DAIR success rate. On the other hand, early surgery, radical debridement, exchange of removable components, wash with iodine and vacuum dressing may improve success rate of DAIR [22].

Conclusion

DAIR procedure can be a successful treatment option for PJI. It can achieve infection eradication in the majority of patients. The most important factors influencing success are timing of DAIR from onset of symptoms and exchange of modular components at the time of debridement surgery. The studies reporting on outcomes of DAIR in PJI are mostly retrospective in nature with small cohorts. Prospective studies are necessary for better understanding of the role of DAIR in the management of PJI.

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