

HK57: Does a prior DAIR influence the outcome of subsequent exchange arthroplasty in patients with PJI?

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Response/Recommendation: Prior DAIR may increase the likelihood of failures in two-stage reimplantation. This may be due to selection bias, those patients failing DAIR possibly being sicker or having organism related or surgery related factors pre-disposing them to worse outcomes.

Level of Evidence:

Delegate Vote:

Rationale

Among the treatments for periprosthetic joint infection (PJI), Debridement, Antibiotics, Implant Retention (DAIR) and Two-Stage Revision are widely used. DAIR is less invasive, less morbid and less costly but has failure rates ranging from 10% to 44.5% (mean: 29%)[1]. This raises the question of whether a failed DAIR procedure affects the outcome of subsequent two-stage revision. The previous International Consensus Meeting (ICM) had an inconclusive response to the above posed question due to limited evidence. With new evidence, we tried to draw further conclusions.

A comprehensive database search, including PubMed, Scopus, Web of Science, and Embase 772 papers. Studies were identified and after two step screening, 7 were selected for a metaanalysis. All studies were retrospective cohorts[2-8]. Outcomes measured in the collected studies are: (1) success of the procedure 2) functional knee scores and range of motion (ROM) (**Table 1**).

The overall success rate of direct two stage revision is 85% while it is 79% for Failed DAIR. There was a high heterogeneity between studies ($I^2=64\%$). Though in general pooled study data favored two stage revision over failed DAIR, the result was not significant (OR= 0.655 (CI=0.393-1.092) ($p=0.105$)) (**Fig. 1**). Sensitivity analyses showed that excluding certain studies made the results significant, favoring two stage revision over failed DAIR (**Fig. 2**). The retrospective observational study of Brimmo et al [2] has inherent limitations, including the lack of detailed clinical information, variability in treatment protocols, and restrictions on publishing small cell sizes. The follow-up period was limited to 4 years, potentially missing late failures. The authors also decided to exclude anyone who had a DAIR greater than 2 years before their two-stage procedure. Additionally, this study has some statistical flaws. The study lacks a discussion on statistical power, particularly due to the small sample size in DAIR group ($n=57$), which might limit the ability to detect significant differences. Kaplan-Meier curves are suitable, but small group differences and lack of significance suggest low statistical power.

Excluding Brimmo et al. [2] resulted in a change in the overall pooled odds ratio from 0.655 (CI: 0.393-1.092) to 0.554 (CI: 0.354-0.874), making the results significant ($p = 0.011$) and favoring direct two stage revision over one carried out after a prior failed DAIR (fig.2). This change not only resulted in statistically significant findings but also reduced the heterogeneity from $I^2 = 64\%$

to $I^2 = 49\%$, indicating improved consistency among the included studies. However, heterogeneity among studies remained moderate.

The negative effect of prior DAIR on subsequent two stage revision might be due to an inherent selection bias. Patients who were optimal hosts, had an infection with a sensitive organism, and received an adequate DAIR in a timely manner were excluded based on the successful eradication of infection. This might have resulted in only those who failed their DAIR being left as a group of poor hosts, with more virulent organisms, and who experienced delayed or inadequate debridement.

Two studies [4, 5] compared the functional outcomes of two stage revision after prior DAIR and direct two stage revision. They found that the ROM was significantly lower in the DAIR group. Both studies reported lower clinical and functional Knee Society Scores (KSS) in the DAIR group, although only one study showed a statistically significant difference.

This meta-analysis has several important limitations. Most of the included studies are retrospective and observational. There is a risk of selection bias, where more compromised patients may have been preferentially treated with DAIR initially to avoid the morbidity of a resection. However, most studies included adjusted analyses to account for host quality in an attempt to address this limitation. Finally, there is a moderate heterogeneity between the included studies.

In conclusion, the findings of this meta-analysis suggest that a prior DAIR procedure may negatively impact the outcomes of subsequent two-stage reimplantation in patients with PJI. The overall success rate of direct two-stage reimplantation is higher compared to one carried out in patients with a failed DAIR, and functional outcomes such as range of motion and Knee Society Scores are generally lower in the DAIR group. However, the results also highlight the inherent limitations and variability among the included studies, such as selection bias and differences in treatment protocols. Despite these limitations, the evidence indicates that careful consideration should be given when opting for DAIR, as it may compromise the success of future revision surgeries. Further research with more robust study designs is needed to confirm these findings and provide clearer guidance for clinical practice

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