Opening the DOOR in Orthopaedics: DAIR versus 2-stage Revision for Periprosthetic Joint Infection Using a Desirability of Outcome Ranking (DOOR) in a Prospective Multicentre Study

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INTRODUCTION:

Periprosthetic joint infection (PJI) is the most common reason for revision knee arthroplasty and one of the most common reasons for revision hip arthroplasty. DAIR (debridement, antibiotics and implant retention) is commonly used in early or acute PJI whilst 2-stage revision is used in late or chronic PJI. Treatment results for PJI are typically binary i.e. success or failure. Binary measures based on these endpoints do not measure infection cure, joint function, and mortality as one composite outcome whilst a Desirability of Outcome Ranking (DOOR) does. No prospective study has compared DAIR and 2-stage revision for early and late PJI separately. We aimed to compare these treatments using a previously published novel DOOR for PJI (DOOR-PJI).

METHODS:

Patients >18 years old with a knee or hip PJI treated by DAIR or 2-stage revision from a large prospective cohort study in Australia and New Zealand were analysed. Patients were recruited from 27 major hospitals. Infections were classified as early (≤90 days post arthroplasty) or late (>90 days post arthroplasty). The DOOR-PJI combines joint function (Oxford hip or knee scores), infection cure (International consensus meeting criteria and no suppressive antibiotics) and mortality. The DOOR-PJI was calculated for each patient to assign a rank from 1 (best) to 5 (worst). Good joint function meant an Oxford score of > 37.5 for hips or > 32.5 for knees. A rank of 1 = good joint function and infection cure, a rank of 2 = poor joint function but infection cured, a rank of 3 = good joint function and infection not cured, a rank of 4 = poor joint function and infection not cured and a rank of 5 = mortality. The DOOR-PJI at 2-year follow-up was the primary outcome. Win ratios (WR) were utilised to report results. A win ratio greater than 1 means 2-stage revision was better than DAIR. Correspondingly a win ratio less than 1 means DAIR was better than 2-stage revision. All patients included had 2-years of follow up.

RESULTS:

Overall 433 patients with hip or knee PJI were included. DAIR was used for 295 patients whilst 138 patients had 2-stage revision. In early PJI, 125 patients were treated by DAIR and 45 patients treated by 2-stage revision. In late PJI, 170 patients were treated with DAIR and 93 were treated by 2-stage revision. In early PJI, DAIR was superior to 2-stage revision (WR 0.51, 95% CI 0.30-0.86, p = 0.0119). In late PJI, 2-stage revision was superior to DAIR (WR 1.61, 95% CI 1.11-2.33, p = 0.0123). These findings were maintained even following stratification by <2 comorbidities versus ≥2 comorbidities in early PJI (WR 0.73, 95% CI 0.22 to 0.99, p = 0.047) and late PJI (WR 1.63, 95% CI 1.07 to 2.50, p = 0.024). When analysing by symptom duration of ≤7 days these findings also persisted in early PJI (WR 0.36, 95% CI, 0.19-0.70, p = 0.003) and late PJI (WR 2.13, 95% CI 1.24-3.65, p = 0.006).

DISCUSSION AND CONCLUSION:

This is the first application of a DOOR in orthopaedics. Using the DOOR-PJI to assess treatment outcomes for patients, DAIR was superior to 2-stage revision for early PJI while 2-stage revision was superior to DAIR for late PJI. These findings still persisted after accounting for comorbidities. Additionally, time from arthroplasty (early or late) was more important than symptom duration when choosing between DAIR and 2-stage revision. The treatment superiority found in this study is based on prospective data unifying joint function, infection cure and mortality which can be used to inform decision making when choosing between DAIR and 2-stage revision in early and late PJI.