Debridement, Antibiotics, and Implant Retention *plus* in Oncologic Megaprosthesis Prosthetic Joint Infections: Similar Treatment Success Rate to Two-Stage Revision at 2 and 5 Years after Index Surgery

Marcos R Gonzalez, Jose I. Acosta, Marilee Ja Clunk[1], Angad Bedi, Daniel Christoph Karczewski, Jens Pepijn Te Velde, Erik T Newman[2], Kevin A Raskin[3], Santiago Andres Lozano Calderon[4]
[1]MGH, [2]Massachusetts General Hospital, [3]Mass Gen Hosp, [4]Massachusetts General Hospital - Harvard Medical S

INTRODUCTION: Prosthetic joint infections (PJIs) in megaprostheses are associated with high rates of treatment failure and often lead to amputation. However, studies on optimal management PJIs in megaprostheses are scarce due to the infrequent use of these implants and treatment strategies have not been adequately standardized. Consequently, it remains unclear whether a two-stage revision for PJIs in megaprostheses offers superior eradication rates that would justify the additional morbidity associated with a second procedure. We sought to **1**) compare the effectiveness of initial PJI treatment between different surgical strategies in patients with oncologic megaprosthesis, and **2**) identify risk factors for PJI reinfection and amputation.

METHODS: A retrospective chart review of our institutional modular endoprosthesis database was conducted. We only included patients that underwent reconstruction with megaprosthesis for oncologic reasons at our institution between 2000 and 2020. PJI was defined according to the 2011 Musculoskeletal Infection Society (MSIS) criteria. Surgical strategies employed at our institution were debridement, antibiotics, and implant retention (DAIR), DAIR *plus* (debridement, antibiotics, and modular implant component exchange), and two-stage revision. The stems of the modular endoprosthesis were not revised in DAIR *plus* procedures. The primary outcomes were survivorship free of reinfection, reoperation, and amputation. Differences between groups were compared using Mann Whitney U test (non-parametric) for continuous variables and chi-square for categorical ones. Survival analysis was performed using the Kaplan-Meier method. Cox proportional hazards model was used for risk factor analysis.

RESULTS:

A total of 70 patients with megaprosthesis PJIs were included (Figure 1). Fifteen patients were treated with DAIR, 33 with DAIR *plus*, and 21 with two-stage revision (Table 1). PJI reinfection-free survival at 2 years was 59% for patients treated with DAIR *plus* or two-stage, and 23% for those treated with DAIR (p=0.0299) (Figure 2A). Reoperation-free survival at 2 years was 54% for patients treated with DAIR *plus* or two-stage revision and 20% for those treated with DAIR (p=0.0117) (Figure 2B). Two-year amputation-free survival was 84% for patients treated with either DAIR *plus* or two-stage revision and those treated with DAIR (p=0.8695) (Figure 2C). When comparing DAIR *plus* and two-stage revision, both groups showed similar 2-year PJI reinfection-free survival (59% and 57%, respectively) (Figure 3A). At 5 years, reinfection-free survival was 42% and 43% for DAIR *plus* and two-stage revision, respectively. No differences in reoperation-free survival were seen between groups at the 2- and 5-year marks (p=0.4152 and p=0.4436, respectively) (Figure 3B). Amputation-free survival at the 2- and 5-year marks was 84% for both groups (Figure 3C). On multivariate analysis, body mass index ≥ 30 and chronic kidney disease (CKD) were risk factors for PJI reinfection (Hazard ratio [HR] = 2.49 and HR = 13.89, respectively) (Table 2). Patients treated with DAIR *plus* or two-stage revision were 0.56 times less likely to develop reinfection (HR=0.44, p=0.045). After adjusting for age and sex, chronic kidney disease (CKD) was also a risk factor for amputation (HR=71.18, p=0.004) (Table 3).

DISCUSSION AND CONCLUSION: DAIR was associated with high rates of PJI treatment failure, which led to higher amputation rates than DAIR *plus* or 2-stage surgery. DAIR *plus* was not inferior to two-stage revision in terms of reinfection-, reoperation-, and amputation-free survival and might be an effective alternative for patients who cannot stand staged procedures. Further studies should focus on analyzing additional factors for treatment failure such as flap requirements for soft tissue coverage and presence of open wounds. Moreover, multicentric studies should be initiated to perform sub-analysis on specific subtypes of megaprosthesis and have a more homogeneous population.