Performance of 3D Printed Metal-Backed Patella Components in the American Joint Replacement Registry

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INTRODUCTION: Cementless total knee arthroplasty has shown a resurgence as porous metal surfaces generated with new additive manufacturing methods have led to the development of improved implant fixation. While fixation of cementless femoral and tibial devices show promising results, concerns still exist about the patellar components. Historically, metal-backed patellar components have shown high early failure rates due to fracture, lack of osseous integration, and polyethylene wear and dissociation. This study aimed to determine mid-term survivorship (5 years) and the reasons for failure of the first widely used additively manufactured metal-backed patella using data collected from the American Joint Replacement Registry.

METHODS:

American Joint Replacement Registry (AJRR) data were queried between Jan 2012 and March 2022. Cases from 738 surgeons across 436 sites utilizing 3-dimensionally-printed metal-backed patellar (3DMBP) components were identified. All Registry information for Medicare-eligible patients (≥65 years of age) was merged with available Center for Medicare & Medicaid Services (CMS) data to create a single report. There were 28,478 cases identified at a mean follow up of 5 years (maximum 8 years). Cumulative percent revision was queried, and KM survival curve and age/sex adjusted hazard ratio was produced with 95% confidence interval. Reasons for revision were investigated.

RESULTS: In this analysis, 41,660 metal back patella were available in the AJRR over the 10 year assessment period, with 28,478 of which were 3-dimensionally-printed. Excellent survivorship was seen with the 3DMBP with an all-cause revision rate of 1.28% when benchmarked to other MBP in the registry (Figure 1). Reasons for revision as captured by the registry included infection (0.57%), instability (0.22%), mechanical complications (0.14%), and pain (0.14%).

DISCUSSION AND CONCLUSION:

The limitation of registry data is that categorization of revision is not discrete. Reasons for failure identified in this analysis may not have been primarily driven by the patella. Previous metal-backed patellar designs have been shown to have a high rate of loosening by mid-term follow up. Although longer-term follow up is needed to determine future performance, the present study based on AJRR and CMS data on the first 3D-printed cementless patella shows a low revision rate out to 8 years. The present AJRR analysis is the largest reported real-world cohort of mid-term metal-backed patella performance.