Comparative Survival Analysis of Two Porous Metal Acetabular Components in Total Hip Arthroplasty

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Introduction: Porous metal acetabular components have been used to achieve improved initial fixation and ultimately osseointegration, particularly in revision total hip arthroplasty (THA), as compared to conventional cementless acetabular components. While porous tantalum (PoTa) acetabular components are well-studied with demonstrated short-term success in revision THA, less is known about widely used porous titanium (PoTi) acetabular components. The aim of this study was to perform a comparative survival analysis between a single design PoTi and PoTa acetabular component evaluating rate of revision and presence of periacetabular radiolucencies.

Methods: We utilized a retrospective cohort study design. Our source population was all patients who underwent primary or revision THA using a single design PoTi (n=1,511) or PoTa (n=151) acetabular component at our institution from 2006 to 2011 with minimum 2-year followup. Paprosky classification of acetabular defect at the time of index surgery, radiolucencies in DeLee and Charnley acetabular zones at most recent followup or at time of revision, and date of revision were recorded. Kaplan-Meier survival curves were created for PoTi and PoTa acetabular components used in primary and revision THA. Wald Chi-square test or Fisher’s Exact test was used to test the difference between groups. p<0.05 was considered significant. The power to detect a difference in revision rate greater than 18% between groups was >0.80.

Results: Mean time to followup for all patients was 44 months (range 24 to 91 months). Survival of the PoTi acetabular component with revision for any reason as the endpoint was 99.1% when used in primary THA and 97.5% when used in revision THA. Survival of the PoTa acetabular component with revision for any reason as the endpoint was 100% when used in primary THA and 98.3% when used in revision THA. The rate of revision of the PoTi component was higher when used in revision versus primary THA (p=0.0168). There was no difference in rate of revision of the PoTa component when used in primary versus revision THA. While there was no difference in rate of revision between the PoTi and PoTa components when used in either primary or revision THA, the acetabular defects in cases with PoTa components were graded higher in the Paprosky classification scheme (p≤0.0004). There was no difference in number of periacetabular radiolucencies between the PoTi and PoTa components.

Discussion: At mean 44-month follow-up, there was no difference in revision rate between the PoTi and PoTa acetabular components when used in either primary or revision THA. However, the PoTa components were utilized in the reconstruction of more severe acetabular defects than the PoTi components. While the rate of revision of the PoTi components increased with severity of acetabular defect, this was not observed with the PoTa components.
Significance: Porous tantalum acetabular components are well-studied with demonstrated short-term success in revision total hip arthroplasty, but less is known about widely used porous titanium acetabular components. Though porous titanium and porous tantalum components had similar revision rates, greater preoperative acetabular defect severity was associated with increased rate of revision among porous titanium, but not porous tantalum, components.

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