

Clinical Outcomes and Survivorship of a Fourth-Generation, Porous Tantalum Acetabular Component in Primary Total Hip Arthroplasty

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INTRODUCTION:

With favorable outcomes in revision total hip arthroplasty (THA), fourth-generation porous tantalum acetabular components have gained enthusiasm for use in primary THA. However, there is mixed data regarding clinical outcomes and implant survivorship, especially compared to widely used third-generation titanium cups. This study evaluates short to mid-term functional and radiographic outcomes, as well as survivorship of primary THA with a single-design, fourth-generation porous tantalum acetabular component. We hypothesized minimal rates of aseptic loosening and revision procedures, with excellent clinical outcomes and implant survivorship.

METHODS:

This retrospective case series identified 315 THAs (277 patients) with minimum 1-year follow-up. Patient demographics, adverse events, and revision surgery indications were recorded. Patient-reported outcomes at yearly follow-up were documented including HOOS-JR, EQ-5D, and EQ-VAS. Mean imputation was utilized for unpaired pre- and post-operative data to facilitate comparison using Wilcoxon signed-rank test. Radiographs available for 303 THAs were examined for signs of aseptic loosening (radiolucencies > 1mm) in DeLee and Charnley Zones 1 through 3.

RESULTS:

Mean follow-up was 3.5 years (range, 1 to 11.3 years). Patients reported significant improvements in functional outcomes with mean HOOS-JR increasing from 40.005 to 81.314, EQ-5D from 0.327 to 0.808, and EQ-VAS from 66 to 81 ($p < 0.001$). Single zone radiolucencies were observed in 13 of 303 (4.29%) cases; none required revision for aseptic loosening. Review of available long-term follow-up radiographs demonstrated robust osseointegration, with a representative example shown in **Figure 1**. Revision surgery was required in 16 cases (5.08%), with instability (6, 1.9%) being the leading indication. Fourteen patients (4.44%) were readmitted within 90 days for post-operative complications. Kaplan-Meier survivorship at final follow-up was 94.9% for all-cause revision and 100% for aseptic loosening (**Figure 2**).

DISCUSSION AND CONCLUSION:

A fourth-generation porous tantalum acetabular component has excellent clinical outcomes and survivorship in primary THA with no revisions for aseptic loosening. This study demonstrates that reliable fixation can be achieved using this implant, aligning with the theoretical advantages of porous tantalum.

Figure 1. 10-year follow-up radiograph demonstrating a well-integrated right THA.

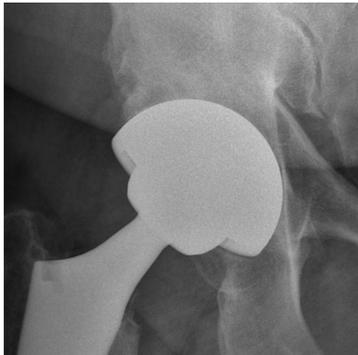


Figure 2. Kaplan-Meier survival curve for all-cause revision at final follow-up.

