## Comparative Outcomes of Modular vs. Monoblock Fluted Tapered Stems in Revision THA: An American Joint Replacement Registry Analysis

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INTRODUCTION: Both modular and monoblock fluted tapered femoral stems have become the workhorse in revision total hip arthroplasty (rTHA). Modularity provides benefits for intraoperative flexibility with a proximal body but concerns for cost and taper junctional failure persist. We examined the associated risk of all-cause revision, infection, dislocation, periprosthetic fracture (PPFx), or aseptic loosening comparing modular to monoblock fluted tapered stem designs.

METHODS:

An analysis of rTHA in patients aged $\geq$65 years from 2012 through 2021 in the American Joint Replacement Registry (AJRR) was performed. 9,121 patients with fluted tapered stems were identified, 7,565 modular and 1,556 monoblock. Outcomes including all-cause re-revision, re-revision for infection, dislocation, PPFx, and aseptic loosening were captured through December 2023, for minimum 2-year follow-up. Adjusted cause-specific Cox proportional hazard models were used to assess the association of stem design with outcomes, accounting for gender, age, body mass index (BMI), index reason for revision, Charlson Comorbidity Index (CCI), presence of osteoporosis/osteopenia, geographic region, and year of procedure.

RESULTS:

The all-cause re-revision rate was 8.52%. Modular and monoblock stems did not differ in the risk for all-cause re-revision (aHR 0.745, 95% CI: 0.554-1.002, p=0.052). However, monoblock stems had a lower associated risk of re-revision for dislocation (aHR 0.587, 95% CI: 0.349-0.987, p=0.045). Index procedures for dislocation (aHR 1.509, p=0.03) and PPFx (aHR 1.342, p=0.009) were associated with increased re-revision risk. No associated risk of infection (aHR 0.879, 95% CI: 0.566-1.366, p=0.566), PPFx (aHR 0.719, 95% CI: 0.473-1.092, p=0.122), or aseptic loosening (aHR 0.946, 95% CI: 0.568-1.576, p=0.831) was found.

DISCUSSION AND CONCLUSION: No increased associated risk of all-cause re-revision between modular and monoblock fluted tapered femoral stems in rTHA was found. However, monoblock stems were associated with a lower risk of subsequent re-revision for dislocation – potentially due to selective use in less complex cases.