

Risk Factors for Dislocation After Total Hip Arthroplasty: Does Head-to-Cup Size Ratio Matter?

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INTRODUCTION:

Dislocation is a known complication after total hip arthroplasty (THA). Utilizing a large femoral head may reduce the risk of dislocation. However, large head sizes may not be available for smaller cups depending on the manufacturer. The head-cup ratio may be a more tailored measure of determining optimal head size to prevent dislocation. This study aims to determine if the head-to-cup ratio predicts dislocations within 90 days after primary THA.

METHODS:

This was a retrospective study of 6,167 patients who underwent a primary THA at a single academic institution from 2012-2024, who were prospectively enrolled in the Michigan Arthroplasty Registry Collaborative Quality Initiative. Univariate and logistic regression analyses were performed, controlling for confounders (age, approach, body mass index, Elixhauser score, head offset, laterality, manufacturer, robotic use, and sex) in the latter. ROC curves were generated to determine the optimal head-to-cup ratio to prevent dislocation.

RESULTS:

Eighty-six patients (1.4%) sustained a dislocation within the first 90 days postoperatively. A temporal trend of increasing head size over this period had a decreasing dislocation rate. The optimal head-to-cup ratio to prevent dislocation was identified as ≥ 0.7 (AUC 0.61; sensitivity 79.1%, specificity 43.0%). Seventy-five of 86 dislocations (87.2%) occurred in patients with head-cup ratio < 0.7 . In our univariate analyses, a higher head-cup ratio ($p < 0.01$) and use of robotic technology (0.2 vs 1.5%, $p = 0.02$) were associated with lower dislocation rate. Our logistic regression analysis demonstrated that higher head-cup ratio and lower Elixhauser scores were associated decreased rate of dislocation ($p = 0.01$).

DISCUSSION AND CONCLUSION:

A higher head-to-cup ratio is associated with a significantly lower rate of prosthetic hip dislocations in the first 90 days postoperatively, even when controlling for confounders. Robotic use demonstrated a lower risk of dislocation. With highly cross-linked polyethylene, surgeons should consider using larger femoral head for patients to reduce this complication.