Uncemented Humeral Stems are a Safe Alternative to Cemented Stems in Reverse TSA for Proximal Humerus Fractures: A Large Comparative Cohort, Registry Based Study

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INTRODUCTION:

Reverse Total Shoulder Arthroplasty (RTSA) has become an effective treatment option for complex, acute proximal humerus fractures (PHF), or proximal humeral malunions and nonunions. RTSA is typically recommended in the elderly patient population, or cases where ORIF will have a high failure rate. Traditionally, humeral stems are cemented in elderly patients, patients with poor bone quality, or concern for stem fixation due to comminution of the bone. However, the use of uncemented stems has gained popularity due to newer, more stable designs. There is a paucity of data comparing outcomes between uncemented and cemented stems for RTSA for the above indications from a large registry-based cohort. Therefore, the purpose of this study was to evaluate whether there were any differences in uncemented vs. cemented stems with respect to revision risk.

METHODS:

Data from a US-based healthcare system's Shoulder Arthroplasty Registry was utilized to conduct a cohort study. Adult patients with primary RTSA for acute PHF, proximal humeral malunion or nonunion from 2011-2024 were included. The exposure of interest was humeral stem fixation, classified as cemented vs uncemented. Propensity score-weighted Cox proportional hazard regression was used to evaluate the risk for all-cause revision. Propensity score weights were calculated prior to outcome evaluation using multivariable logistic regression and included age, sex, body mass index, race/ethnicity, and American Society of Anesthesiologist's classification. Hazard ratios (HR) and 95% confidence intervals (CI) are presented. $p<0.05$ was considered statistically significant.

RESULTS:

The cohort comprised 1,526 patients who underwent RTSA; 512 with uncemented stems and 1014 with cemented stems. The use of uncemented stems increased over time, surpassing cement usage by 2024.(**Figure 1).**

At 5-years follow-up, the crude revision probability was 3.8% for uncemented humeral stems and 3.6% for cemented humeral stems (**Figure 2**). After propensity score weighting, no difference was observed in all-cause revision for cemented vs uncemented humeral stems (HR=1.05, 95% CI=0.58-1.91, p=0.88). Of those who did have a revision during follow-up, the most common reason for revision was dislocation (5-year cumulative incidence=1.4% cemented vs 0.9% uncemented), followed by infection (0.9% cemented vs 1.4% uncemented), humeral component loosening (0.8% cemented vs 0.4% uncemented), and peri-prosthetic fracture (0.4% cemented vs 0.3% uncemented). Not enough events occurred for adjusted analyses for cause-specific revisions.

DISCUSSION AND CONCLUSION:

In our study, we identified a recent paradigm shift in surgeon preference favoring uncemented stems over cemented stems in RTSA for the above indications. This study supports the use of uncemented stems in RTSA performed for acute PHF, malunions, and non-unions as no differences in revision risk relative to cemented stems were observed. However, we still recommend surgeons consider cemented humeral stem fixation on a case-by-case basis in patients with complex fractures, poor bone quality, and metabolic conditions affecting bone density.