Comparative Risk of Periprosthetic Fractures with Cemented and Uncemented Femoral Stems in Hip Arthroplasty: A Multi-Center Retrospective Analysis

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INTRODUCTION: Following total hip arthroplasty (THA) and hemiarthroplasty (HA), periprosthetic fractures, although rare, continue to present as one of the most challenging complications. The decision between cemented and uncemented femoral stem fixation remains controversial despite the general success of both techniques. While uncemented stems rely on biological fixation and minimize cement-related complications, cemented stems provide instant stability and have been the preferred method of fixation in older patients with lower bone quality. There is still conflicting evidence surrounding fixation techniques and their impact on postoperative fracture rates. The purpose of this study was to examine the incidence of periprosthetic fractures in a multi-center cohort of arthroplasty patients using cemented and uncemented femoral stems.

METHODS: A multi-center retrospective cohort study was conducted within the Virtua Health Department of Orthopedics in South Jersey. Institutional research ethics board approval was obtained (#G25041). Adults >18 years that underwent THA or HA between 2020 and 2023 with a minimum of two years follow-up were included. Patients treated with open reduction internal fixation or intramedullary nailing were excluded. Binary outcomes were measured using two-sided Fisher exact tests with calculation of odds ratio (OR), ratio risk (RR), and absolute risk (ARD) with 95% confidence intervals.

RESULTS: A total of 353 patients (cemented, n=93; uncemented, n=260) were analyzed. Patients that received cemented stems were older (mean age 81.8 ± 10.1 years), predominantly female (80.6%), and had lower BMIs (24.5 ± 3.9 kg/m²) than uncemented patients (70.0 ± 11.5 years; 61.9% female; 30.3 ± 5.7 kg/m²). Postoperative periprosthetic fractures occurred in 2/93 (2.15%) and 3/260 (1.15%) of cemented and uncemented cases, respectively (p = 0.61; OR = 1.88, 95% CI, 0.31–11.45, RR = 1.86, 95% CI, 0.32–10.98, ARD = +0.99 percentage points, 95% CI, −2.75 to 7.11). THA (n=248) and HA (n=105) periprosthetic fracture rates occurred in 1.21% and 1.90% of patients, respectively (p = 0.64; OR = 0.63, 95% CI, 0.10–3.85). Adverse events were rare across both fixation methods. Two uncemented stem periprosthetic fractures required revision versus one cemented femoral stem requiring additional surgical management.

DISCUSSION: The rates of periprosthetic fractures were low and statistically similar for femoral stems that were cemented and those that were not. Fixation type did not affect postoperative fracture risk or significantly influence management outcomes. These findings support the safety and reliability of either fixation strategy. Therefore, clinical decision making should continue to be guided by bone quality, functional goals of the patient, and surgeon preference rather than minimal differences in periprosthetic fracture incidence.

SIGNIFICANCE/CLINICAL RELEVANCE: Our analysis demonstrates that both cemented and uncemented femoral stems achieve similarly low rates of postoperative, periprosthetic fracture.