The Influence of Dorr Type and Femoral Fixation on Outcomes following Total Hip Arthroplasty for Acute Femoral Neck Fractures: A Multicenter Study

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INTRODUCTION: The American Academy of Orthopaedic Surgeons (AAOS) clinical practice guidelines report moderate evidence for cementing femoral stems during arthroplasty for hip fractures. However, the evidence for this recommendation derives mainly from hemiarthroplasty literature. Very little data exists on this topic in total hip arthroplasties (THAs), with recent registry data demonstrating similar findings. This is the first non-registry study comparing outcomes of cemented versus cementless THA for acute femoral neck fractures and examining the influence of various patient factors, including bone quality.

METHODS: A multicenter retrospective study was performed of 709 THA cases (199 cemented, 510 cementless) for femoral neck fractures from 2006-2021 at three large academic institutions. Demographics and perioperative characteristics were reviewed. Radiographs were examined to classify proximal femoral bone quality using the Dorr classification. Kaplan-Meier survivorship curves were generated for outcomes including periprosthetic fracture, aseptic revision, and dislocation. Univariate and multivariate analyses were performed with $p \leq 0.05$ denoting significance.

RESULTS: Compared to cemented stems, cementless stems had a higher all-cause aseptic femoral revision rate (5.1% vs. 0.5%, p=0.002) and periprosthetic femoral fracture rate (4.3% vs. 0%, p=0.001). Each successive Dorr grade had a higher fracture rate with cementless implants: 2.3%, 3.7%, and 15.9% in Dorr A, B, and C respectively (p<0.001). There was no difference in the proportion of female to male patients who sustained fractures (p=0.374). When accounting for confounding variables, logistic regression analysis confirmed that cementless stems (p=0.019) and Dorr C bone (p=0.001) are associated with periprosthetic fractures; collared stems (p=0.917) and prophylactic cables (p=0.400) did not confer additional protection against fractures in cementless fixation. There was no difference in dislocation rate (p=0.721) or septic revision rate (p=0.767) between cemented and cementless groups. Overall, the mortality rate was 1.3% at 30 days, 2.5% at 90 days, and 4.5% at 1 year postoperatively; there were no differences between groups at any timepoint. Five cases of postoperative pulmonary embolism occurred: 4 in the cemented group and 1 in the cementless group (p=0.0151). Lastly, we found a temporal trend with decreasing utilization of cemented stems over time, and institutional differences existed in utilization rates of cemented stems (p<0.001).

DISCUSSION AND CONCLUSION: Cementless stems utilized during THA for femoral neck fractures have a significantly higher periprosthetic fracture rate and all-cause aseptic femoral revision rate. While femoral fractures occurred in all types of bone quality, Dorr C bone was particularly prone with an alarmingly high fracture rate when using cementless stems. All fractures occurred in cementless cases, suggesting that cemented stems may minimize this complication, regardless of patient sex, stem collar, or prophylactic cable.