

Does Stem Design Affect the Incidence of Periprosthetic Femoral Fractures in Arthroplasty for Femoral Neck Fractures? A Secondary Analysis of the HEALTH Trial.

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INTRODUCTION:

Periprosthetic femoral fractures (PFFs) after arthroplasty for fragility femoral neck fractures (FNFs) remain a major concern, as they carry high morbidity for this sensitive population. In this study we tried to evaluate how stem design influences the risk of PFFs after hemiarthroplasty (HA) or total hip arthroplasty (THA) for low energy FNFs.

METHODS:

We performed a secondary analysis to the HEALTH trial; a multicenter, prospective randomized control trial which assessed THA vs HA for low-energy FNFs. A total of 80 sites and 523 surgeons that operated on 1441 patients were included in the initial study. We used the same cohort but we excluded the patients that did not have full set of radiographs and those that did not have adequate femoral stem information. Hence, 1374 patients (414 male, 960 female) with a mean age of 80 years were finally included. The incidence of PFFs was compared between cemented vs cementless stems. Within the cemented stem group (n=896), we further analyzed the effect of taper-slip (n=482) vs composite-beam (n=414) designs, while within the cementless stem group (n=478), we assessed the impact of single-wedge stems (n=206) vs metaphyseal filling stems (n=272). The role of a collar (n=87) was also examined, within the press-fit stems. Student's t-tests were used to assess continuous variables, and chi-squared tests for categorical variables. Statistical significance was set at $p < 0.05$.

RESULTS:

Between the 1374 patients of this study, 72 patients sustained a PFF (5.2 %). Early PFFs (<90 days) were recorded in 57 patients and late fractures (>90 days) in 15 patients. Cemented stems had significantly lower incidence of PFFs, as compared to their cementless counterparts (2.6% vs 10.3%, $p < 0.001$). There was no difference in fracture rates between taper-slip and composite-beam stems (2.3% vs 2.9%, $p > 0.05$). Most of the PFFs in the composite-beam group occurred early (83%), while most of taper slip PFFs were late (55%). There was no difference between the examined press-fit stems, while the presence of a collar did not show protective results ($p > 0.05$).

DISCUSSION AND CONCLUSION:

In hip arthroplasty for fragility FNFs, cementless stems show a very high PFF rate, regardless their design or the presence of a collar. Cemented fixation is the safest option. Composite beam stems have higher early PFF rate. Taper-slip stems are responsible mostly for late fractures; raising concerns about their performance in longer follow-up.