

## Should All Garden I and II Femoral Neck Fractures in the Elderly Be Fixed? Effect of Posterior Tilt on Rates of Subsequent Arthroplasty

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**Purpose:** Internal fixation is the standard of care for Garden I and II femoral neck fractures in the elderly. However, the outcomes following this procedure are not uniformly positive, as prior studies have documented rates of reoperation ranging from 8% to 23%. One factor commonly considered as a potential predictor of failure is the degree of posterior tilt on the preoperative lateral radiograph. Prior research on this topic has been contradictory, however, and there is currently no consensus as to whether there is an amount of posterior tilt on the preoperative lateral radiograph above which failure is likely, and primary arthroplasty would be preferred. The purpose of this study was to determine whether the degree of posterior tilt on the preoperative lateral radiograph predisposes to failure (in the form of subsequent arthroplasty) following internal fixation of Garden I and II femoral neck fractures in the elderly.

**Methods:** This study represents a secondary analysis of data collected in a prior international multicenter randomized clinical trial comparing the sliding hip screw to cannulated screws in the management of femoral neck fractures in patients age 50 years or older. For each patient with an adequate preoperative lateral radiograph ( $n = 555$ ), the image was reviewed to categorize the amount of posterior tilt as  $\geq 20^\circ$  or  $< 20^\circ$ . This review was done in duplicate with discrepancies resolved by a third reviewer. Multivariable Cox proportional hazards analysis was used to assess for an association between posterior tilt and failure (defined as subsequent arthroplasty during the 2-year follow-up period) while controlling for potential confounders as identified by prior studies (age, sex, quality of implant placement, and prefracture functional status). Results were reported as hazard ratios (HRs), 95% confidence intervals (95% CIs), and P values. Tests were 2-tailed with  $\alpha = 0.05$ .

**Results:** Of 555 patients in the study sample, posterior tilt was classified as  $\geq 20^\circ$  for 67 (12.1%) and  $< 20^\circ$  for 488 (87.9%). Reviewer agreement in the assessment of posterior tilt was substantial (89.7% agreement,  $\kappa = 0.61$ ). Overall, 13.2% (73/555) of patients underwent subsequent arthroplasty in the 24-month follow-up period. In the multivariable analysis, patients with posterior tilt  $\geq 20^\circ$  had a significantly increased risk of subsequent arthroplasty compared to those with posterior tilt  $< 20^\circ$  (22.4% [15/67] vs 11.9% [58/488], HR 2.22, 95% CI 1.24-4.00,  $P = 0.008$ ). The other factor associated with subsequent arthroplasty was age  $\geq 80$  years ( $P = 0.03$ ).

**Conclusion:** In this study of patients with Garden I and II femoral neck fractures, posterior tilt  $\geq 20^\circ$  was associated with a significantly increased risk of subsequent arthroplasty. Primary arthroplasty may be considered for Garden I and II femoral neck fractures with posterior tilt  $\geq 20^\circ$ , especially among older patients.