Any Femoral Neck Shortening Post Fracture Fixation Negatively Impacts Functional Outcomes

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Purpose: Previous research has suggested that femoral neck fracture shortening is associated with worse functional outcomes; however, prior studies have been limited by relatively small sample sizes, limited power to test the association across different shortening thresholds, and populations that mixed patients with uncomplicated healing and concomitant healing complications such as osteonecrosis. By using data from a large clinical trial, we sought to overcome previous research limitations and test the hypothesis that increasing fracture shortening is associated with worse hip function among patients with healed femoral neck fractures.

Methods: Patients with radiographic healing, as determined by a blinded adjudication committee, were extracted from the FAITH (Fixation Using Alternative Implants for the Treatment of Hip Fractures) multicenter trial data of elderly hip fracture patients. All patients received fixation with either a sliding hip screw or multiple cancellous screws. The primary outcome was hip function measured by the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) score at 2 years post surgery. All included fractures were categorized as no shortening, mild shortening (≤5 mm), moderate shortening (6-10 mm), or severe shortening (>10 mm). Linear regression was used to estimate the association between femoral neck shortening and hip function.

Results: 350 patients were included in the final analysis. 50% received a sliding hip screw and 50% received multiple cancellous screws. Overall, 38% of the patients healed with no shortening, 30% with mild shortening, 20% with moderate shortening, and 12% with severe shortening. After adjusting for type of reduction and surgical treatment, a greater amount of femoral neck shortening was found to be associated with poorer hip function ($p < 0.01$). When stratified by implant, shortening and hip function remained associated; however, in patients with cancellous screws, WOMAC scores increased as femoral neck shortening worsened, but in those with a sliding hip screw, WOMAC increased between the no and mild shortening groups and then decreased.

Conclusion: In this population, it was found that increasing femoral neck shortening was associated with worse hip function. However, we also found significant differences in hip function between patients treated with cancellous screws and those treated with a sliding hip screw, which was unexpected. While internal fixation often successfully achieves union, patients that heal in a shortened position report worse functional outcomes.