

Optimal Fixation Strategies for Displaced Femoral Neck Fractures in Patients 18-59 Years Old: An Analysis of 626 Cases Treated at 27 Level One Trauma Centers

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Purpose: Young and middle-aged patients with displaced femoral neck fractures (FNFs) are often treated with operative repair as outcomes of arthroplasty in this group have not been well defined and revision surgery is anticipated due to implant wear over time. Repair in younger populations have proved highly variable, resulting in failed fixation and/or nonunion in a sizable portion of those failing treatment. There remains a need to delineate which fixation strategy is superior.

Methods: This is a retrospective study of patients 18 to 59 years old with a displaced FNF treated with surgical repair from 2005 to 2017 at 27 Level I trauma centers. Data collected included patient, injury, treatment method focusing on the reparative construct, and treatment outcomes (nonunion/ failed fixation, osteonecrosis, need for total hip arthroplasty [THA] or femoral osteotomy).

Results: 626 patients met criteria and were studied. Of 277 hips treated with fixed angle (FA) constructs, overall incidence of failure was much lower than those 349 treated with cannulated screw (CS) constructs (40% vs 60%, $P < 0.001$). Among FA constructs, use of a sliding hip screw (SHS) with addition of an anti-rotation screw (AR) and medial neck plate (Mdpl) demonstrated the lowest incidence of failure overall (15%). Among fractures in patients with body mass index > 25 , use of either a SHS+Mdpl or SHS+AR+Mdpl construct both demonstrated an overall 0% failure rate compared to 33% for SHS+AR's overall failure ($P = 0.03$ and 0.04 , respectively). Finally, hips treated with a SHS+AR+Mdpl having a good-excellent reduction quality failed least frequently (11%) compared to an SHS alone (80%, $P < 0.001$) and an SHS+AR construct (34%, $P < 0.04$) of equivalent good-excellent reduction quality. Among patients < 44 years old, use of SHS+Mdpl demonstrated decreased overall failure compared to SHS+AR (7% vs 31%, $P = 0.046$).

Conclusion: Historically "standard" fixation of FNFs in young and middle-aged adults performed poorly compared to more recently proposed constructs. Specifically, FA constructs performed better than CSs overall, and SHSs augmented with a Mdpl or AR screw or both improved treatment outcomes. The best outcomes among the entire cohort were seen in FNFs treated with a good-excellent reduction utilizing a SHS+AR+Mdpl construct. Further consideration of patient demographics including age and weight demonstrated benefits of the medial plate in particular.