

Can Screw Configuration Minimize Shortening Following Valgus-Impacted Femoral Neck Fracture (OTA Type 31B1.1)?

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Purpose: Biomechanical studies have suggested that various screw patterns may be helpful in preventing excessive femoral neck collapse following repair of a femoral neck fracture (FNF). The purpose of this clinical study was to compare 3 different cancellous screw configurations used for Garden 1 FNF (OTA 31B1.1) to assess construct superiority with regard to screw failure, femoral neck shortening, and fracture healing.

Methods: This retrospective study was conducted across a single large urban academic medical center and included patients treated between 2012 and 2021. 68 patients who presented with a Garden I (valgus-impacted) FNF, were treated by a single surgeon, and underwent in situ fixation with cancellous screws were included. 27 patients (40%) had 2 screws placed in a parallel fashion, 20 (29%) had 3 screws placed in an inverted triangle configuration, and 21 (31%) underwent 3-screw fixation, with placement of one “out of plane” (OOP) screw perpendicular to the long axis of the femur. Radiographic healing was determined by the treating surgeon in concert with the radiologist. Femoral neck shortening was evaluated radiographically using the measuring tool on the PACS (picture archiving and communication system; Siemens, Erlanger Germany).

Results: 68 patients (60 females, 8 males) with a mean 1-year follow-up and an average age of 70 years (range, 19-94) were identified. All 68 patients (100%) went on to union with no evidence of hardware failure. Four patients (8.7%) went on to develop osteonecrosis by the 6-month mark, 3 of whom necessitated conversion to total hip arthroplasty. 23 patients (34%) developed some femoral neck shortening. This included 11 patients (41%) in the 2 parallel screw group, 7 (35%) in the inverted triangle group, and 5 (24%) in the OOP screw group, with shortening averages of 3.91 mm, 3.21 mm, and 5.79 mm, respectively. There was no significant difference among the 3 groups for number of patients who developed neck shortening ($P = 0.48$) or mean overall shortening ($P = 0.92$).

Conclusion: Femoral neck shortening following impacted FNF appears to be an unavoidable consequence of injury. The OOP screw does not appear to effectively alter the ultimate amount of neck shortening. All 3 screw configurations are acceptable with regard to achieving healing and minimizing femoral neck impaction.

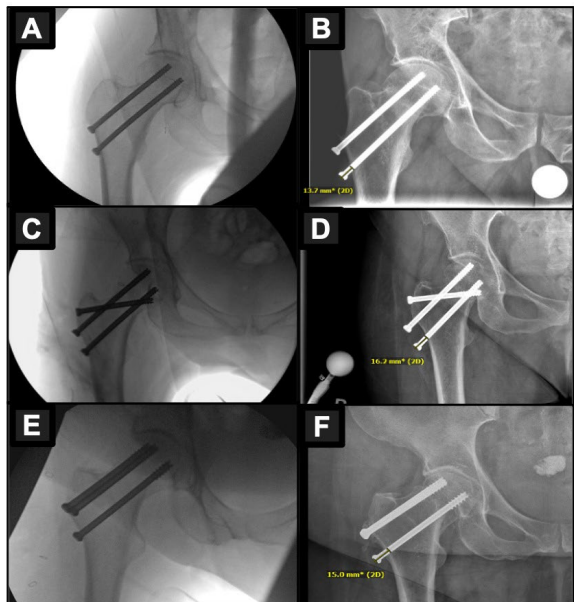


Figure 1: Panel A, C, E: Intra-operative images of each technique. Panel B, D, F: Post-operative imaging of each patient measuring amount of screw backout. All measurements were calibrated via known screw length from operative reports.

See the meeting website for complete listing of authors' disclosure information. Schedule and presenters subject to change.