

## Use of Fully Threaded Cannulated Screws Decreases Femoral Neck Shortening After Fixation of Femoral Neck Fractures

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**Purpose:** Femoral neck fractures (FNFs) are becoming increasingly common as the population ages. Nondisplaced fractures and displaced fractures in young patients are commonly treated by fracture reduction and fixation with cancellous, parallel placed, partially threaded cannulated screws (PTS). The rationale for using this fixation technique is to enable healing by controlled fracture impaction across parallel placed screws. However, sliding implants can lead to excessive fracture collapse, resulting in femoral neck shortening (FNS), which is of a major clinical concern. FNS can cause abductor muscle weakness as well as overall limb shortening. This has been shown to be correlated with reduced quality of life as measured by patient-reported outcome measures. Recently, as a policy, our institution has moved to fixation of nondisplaced fracture with more length-stable implants, ie, fully threaded screws (FTS) in order to minimize this phenomenon. The aim of this study was to compare the femoral neck shortening in patients treated with FTS as compared with historical controls treated with PTS.

**Methods:** Between 2014 and 2016, 38 patients were treated with FTS (2 or 3 out of 3) for mainly nondisplaced or valgus impacted FNF. Out of them 22 were available for complete radiographic follow-up. A group of 41 patients treated previously with PTS were available as a control group. Radiographic analysis was performed using TraumaCAD (BrianLAB, Munich) to assess the FNF in 3 vectors: horizontal (x), vertical (y), and overall according to the neck-shaft angle (NSA) as previously published. All measurements were performed by 2 fellowship-trained trauma surgeons.

**Results:** Patients' age, sex, Garden class, and major complication rate (osteonecrosis and nonunion) were similar in the 2 patient groups. Average FNS in the x axis (abductor lever arm) was significantly smaller in the FTS group than in the PTS group ( $3.1 \pm 3.6$  mm vs  $7.6 \pm 4.2$  mm, respectively,  $P < 0.01$ ) as well as y shortening ( $1.2 \pm 2.6$  mm vs  $4.9 \pm 4.2$  mm,  $P < 0.01$ ) and also decreased overall z shortening ( $2.5 \pm 3.5$  mm vs  $6.23 \pm 4.5$ ,  $P < 0.01$ ). There was a tendency toward a more valgus NSA in the PTS ( $137$  vs  $134^\circ$ ) although it did not reach statistical significance ( $P = 0.08$ ). When stratifying the shortening into mild ( $< 5$  mm) moderate (5-10 mm) or severe ( $> 10$  mm shortening) in all vectors, the FTS group had a significantly smaller number of patients in all categories. Screw pullout  $> 5$  mm occurred in 17 out of 41 patients in the PTS group and did not occur in the FTS group ( $P < 0.01$ ).

**Conclusion:** This study proves that moving to more length-stable implants improves the radiographic results following FNF fixation using cannulated screws. A larger, prospective study including clinical outcome measurements is required to further establish the clinical benefit of using this fixation method.