

**Femoral Neck Shortening Is Associated with Worse Functional Outcome: Analysis of the Prospective Multicenter Study of Hip Fracture Outcomes in China (SHOC)**

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**Purpose:** Young femoral neck fracture patients (age  $\leq 55$  years) require surgical fixation to preserve the native hip joint and accommodate increased functional demands. Recent reports have identified a high incidence of fracture shortening and this may have negative functional consequences. We sought to determine if fracture shortening is associated with poor functional outcome in young femoral neck fracture patients.

**Methods:** 142 femoral neck fracture patients ages 18-55 years were enrolled in a prospective cohort study in three Chinese hospitals. Patient, injury, and treatment variables were recorded at injury, 6 weeks, and 3, 6, 12, and 24 months. Patient-reported functional outcomes were measured with the Harris Hip Score (HHS), Timed Up and Go test (TUG), and Short Form (SF)-36 Physical Component Summary (PCS) at 1 year. Radiographic fracture shortening was measured along the long axis of the femoral neck and corrected for magnification. Severe shortening was defined as  $\geq 10$  mm. The primary analysis measured associations between severe radiographic shortening and functional outcomes at 1 year post-fixation. Continuous variables were summarized with their mean  $\pm$  standard deviation. Statistical significance was set at  $P \leq 0.05$ .

**Results:** 107 patients had complete radiographic and functional outcomes available for analysis at 1 year. The mean age of participants was  $44.0 \pm 10.7$  years and 54% were male. 53% of fractures were displaced and 38% were vertically orientated (Pauwels Type 3). The mean functional outcome scores were: HHS  $90 \pm 11$ , TUG  $12 \pm 5$  seconds, and PCS  $49 \pm 8$ . Major shortening occurred in 13% of patients and was associated with worse functional outcome scores: HHS mean difference 10 ( $P = 0.02$ ), TUG mean difference 3 seconds ( $P = 0.08$ ), and PCS mean difference 5 ( $P = 0.05$ ).

**Conclusion:** Severe shortening is a clinically significant complication following fixation of young femoral neck fractures, occurring in 13% of patients in this population. The principle of fracture site compression utilized by modern constructs may promote healing; however, excessive shortening is associated with worse patient-reported outcomes and objective functional measures.