Can We Predict Failure of Percutaneous Fixation of Femoral Neck Fractures?

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Purpose: This study evaluated a series of geriatric femoral neck fracture treated with closed reduction and percutaneous pinning (CRPP) at a single Level-I trauma center to determine if there are any simple, reliable, radiographic characteristics that can be used to predict increased risk of postoperative failure in nondisplaced and valgus-impacted fracture patterns.

Methods: We conducted a retrospective cohort study of all patients with femoral neck fractures (AO/OTA 31B) who underwent CRPP over a 12-year period at a single Level-I trauma center. Failure was defined as radiographic failure within the first year after the index operation requiring revision surgery. Common patterns identified on initial review were the presence of a visible medial transcervical line (MTL) felt to indicate a tension-sided failure, a straight inferior calcar (SIC) indicating severe valgus impaction, and quality of intraoperative screw positioning. Radiographs of patients were then reviewed for these characteristics in a blinded manner by 3 different trauma fellowship-trained orthopaedic surgeons. Interrater reliability was calculated using Fleiss' Kappa Coefficient. Comparisons of failure rates between groups were made using a Fisher exact test.

Results: 139 patients who underwent CRPP for a femoral neck fracture and follow-up for at least 90 days were identified and reviewed. There were a total of 19 failures (13.6%) within 1 year. The patients with a varus fracture had a failure rate of 9/24 (37.5%). Of the valgus/nondisplaced fractures, MTL was identified in 42/115 patients (36%). Interrater agreement was high for the presence of an MTL (84%, Kappa 0.69). Patients with an MTL had a fourfold increase in risk of failure (7/42 = 17% with an MTL vs 3/73 = 4% without, P = 0.03). The presence of an SIC and quality of screw placement were not predictive of failure.

Conclusion: Varus femoral neck fractures have a high rate of failure (37.5%). Nondisplaced or valgus-impacted fractures with the presence of a visible medial transcervical line on preoperative radiographic imaging resulted in a fourfold increase in the risk of failure after CRPP. Identification of the MTL will help treating surgeons better counsel patients when making preoperative decisions between arthroplasty and CRPP.