Femoral Neck Prophylaxis With Lateral Femoral Plating: A Biomechanical Study

Jacob D. Schultz, MD*; Nathaniel Schaffer, MD, PhD; Joseph O. Labrum, MD; Lauren Luther, MD; Emily Beretsky, BS; Sasidhar Uppuganti, MS; Jeffry Nyman, PhD; Phillip M. Mitchell, MD*

Purpose: Lateral femoral plating is a commonly performed orthopaedic procedure and proximal extension of the plate can cause potential stress risers in the femoral neck, thus putting osteoporotic patients at risk of secondary fracture. This study tested the load to failure (Ff) of three constructs for prophylactic femoral neck fixation to test the hypothesis that single-screw prophylaxis would not prevent femoral neck (AO/OTA 31B3) fractures.

Methods: 18 osteoporotic femur models were instrumented with a 4.5-mm lateral plate and divided into 3 subgroups: no prophylaxis, single-screw prophylaxis with 4.5-mm screw, and 3-screw prophylaxis with one 4.5-mm screw and two 7.3-mm screws. Each model was loaded via a sideways fall model and ultimate load to failure calculated.

Results: The mean Ff was 3219.7 ± 226.9, 3358.0 ± 214.5, and 3533.5 ± 484.0 N for the no, single-screw, and 3-screw prophylaxis groups, respectively. Two 3-screw femurs were excluded due to procedural failures. No construct had significantly different Ff. The fracture patterns between groups did differ with 100%, 83%, and 0% of no, single-screw, and 3-screw femurs resulting in AO/OTA 31B3 type fractures.

Conclusion: There is no increased load to failure from additional single 4.5-mm screw femoral neck prophylaxis osteoporotic models with lateral femoral plates. Additional testing is required to determine the benefit of 3-screw prophylaxis with overlapping plate and cannulated screw constructs.