Calcar Screw Position in Proximal Humerus Fracture Fixation: Don’t Miss High
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Purpose: Locked plate fixation of proximal humerus fractures relies upon the calcar fixation to provide much-needed medial column support. Little is known about the consequences of “missing” the calcar during plate positioning. This study characterized the biomechanics associated with proximal and distal placement of plates in a 2-part fracture model. We hypothesized that missing the calcar in either direction would result in decreased biomechanical strength.

Methods: This experiment was performed with elderly cadaveric specimens and again with osteoporotic sawbones. Proximal, neutral, and distal plate placements were simulated. Nondestructive torsional and axial compression tests were performed prior to an axial fatigue test and ramp to failure. Torsional stiffness, axial stiffness, humeral head displacement, and stiffness during fatigue testing, and ultimate load were compared between groups.

Results: Cadavers: No significant differences between groups. Sawbones: Distal placement increased torsional stiffness and axial stiffness when compared to proximal placement. When compared to neutral placement, distal placement increased torsional stiffness in external rotation, increased axial stiffness, decreased humeral head displacement during fatigue testing, and increased stiffness during fatigue testing.

Conclusion: Missing the calcar proximally is potentially deleterious to fixation strength. It is safe, and perhaps even desirable, to aim slightly distal to the intended target.