A Novel Radiographic Marker to Avoid Dorsal Screw Prominence During Distal Radius Fixation With Volar Locking Plates

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Purpose: The aim of this study was to evaluate a novel radiographic marker for use of intraoperative decision-making regarding screw length in fixation of distal radius fractures. This radiographic marker is visualized on the lateral wrist view and screw length is determined using the intersection of a line along the longitudinal axis of the radius and the most dorsal extent of the subchondral sclerotic line. We hypothesized that use of this marker would yield screws that did not penetrate the dorsal cortex and conferred appropriate biomechanical strength to the fixation construct.

Methods: This was a study performed on 10 matched pairs of cadaveric forearms. Each specimen in a matched pair was randomized into 2 groups—one group to receive distal locking screws measured using the radiographic marker (short) and the other group to receive locking screws that were long enough to be bicortical (long).

Specimens were all instrumented using volar locking plates and subsequently denuded of all soft tissue to determine presence of dorsal cortex penetration. Osteotomies were performed in order to simulate and extra-articular distal radius fracture with significant comminution (OTA 23-A3). All specimens were then tested under cyclical axial compression utilizing an MTS load frame with a force of 400 N for 1000 cycles to determine construct stiffness. They were then loaded under axial compression to failure.

Results: All 10 matched pairs were included in final analysis. No distal screws in the short group penetrated the dorsal cortex. All distal screws in the long group had bicortical purchase. No significant differences existed between the 2 groups in terms of stiffness or load to failure.

Conclusion: Results of our study would indicate that intraoperative use of this radiographic marker can yield appropriate screw lengths with no dorsal cortex penetration. Additionally, we also found that this technique without compromising strength of the fixation construct in cadaveric specimens.