



# Relationship between the Length of Distal Locking Screws and Diaphyseal Screws in Volar Plate Fixation of Distal Radius Fractures

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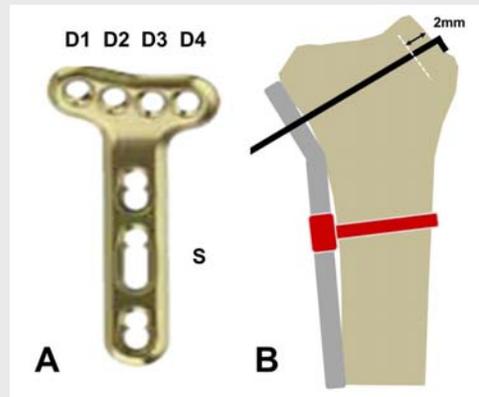


## Objectives

During volar plate fixation of distal radius fractures, determining the adequate screw length may be difficult due to the metaphyseal comminution. We hypothesized that the length of distal locking screws would correlate with the length of diaphyseal screws which can be measured more easily with depth gauge. The purpose of this study was to determine the relationship between the length of distal locking screws and diaphyseal screws in volar plate fixation of distal radius fractures.

## Materials and Methods

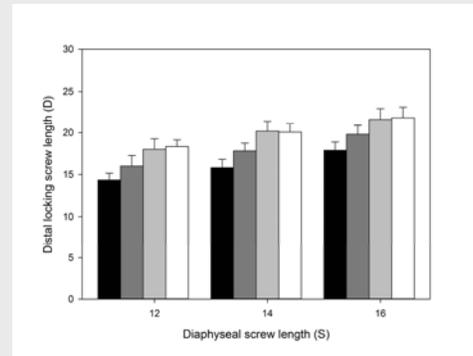
A retrospective review was performed of one hundred sixty-nine patients (mean age, 58 years) who underwent volar locking plate fixation for treatment of distal radius fractures. All patients received 2.4 mm LCP volar extra-articular distal radius plate (DePuySynthes, West Chester, PA). The length of a diaphyseal screw which was placed in the elongated hole was correlated with the length of a distal locking screw from radial most (D1) to ulnar most (D4). We also evaluated distal screw penetration of the dorsal cortex and plate removal rate.



**Figure 1.** (A) The length of the distal locking screw was measured from radial (D1) to ulnar (D4) and correlated with that of the cortical screw placed in the elongated hole (S). (B) The length of the distal locking screw was determined by measuring depth gauge and subtracting 2 mm.

## Results

The length of a diaphyseal screw which was placed in the elongated hole strongly correlates with the length of a distal locking screw ( $r=0.942$  with D1,  $0.967$  with D2,  $0.955$  with D3,  $0.936$  with D4). Average D1 screw length was 2 mm longer than the diaphyseal screw, and average D2 screw length was 4 mm longer than the diaphyseal screw. D3 and D4 screw were 6 mm longer than the diaphyseal screw. Plate removal was necessary in 13 patients (8%) due to screw irritation. These patients have significantly longer screws than average. Flexor or extensor tendon ruptures did not occur in this cohort.



**Figure 2.** Relationship between the Length of Distal Locking Screws and Diaphyseal Screws in Volar Plate Fixation of Distal Radius Fractures. Black bar represents the length of D1, while white bar represents the length of D4. Error bar represents standard deviation.



**Figure 3.** (A) The distal locking screw in the intermediate column (white arrow) was not protruded when it was 4 mm longer than the cortical screw. (B) The distal locking screw in the intermediate column (white arrow) was protruded from the cortical bone when it was 6 mm longer than the cortical screw.

## Conclusions

Length of the distal locking screws can be estimated with length of a diaphyseal screw. This information may help surgeons to select adequate length of distal locking screws during volar plating of distal radius fractures.

## References

Wall LB, Brodt MD, Silva MJ, Boyer MI, Calfee RP. The effects of screw length on stability of simulated osteoporotic distal radius fractures fixed with volar locking plates. *J Hand Surg Am.* 2012;37:446-453.