Comparison of the Henry versus Thompson Approaches for Fixation of Proximal Radial Shaft Fractures: A Multicenter Study

Jesse Dashe, MD[1]*; Brett Murray, BS, MA*[2]*; Paul Tornetta III, MD*[3]*; Kelly Grott, BS*[4]*; Brian Mullis, MD*[5]*; Kate D. Bellevue, MD*[6]*; Reza Firoozabadi, MD, MA*[6]*; Harish Kempegowda, MD*[7]*; Daniel S. Horwitz, MD*[7]*; Philip Fontenot, MD*[8]*; Shaan Patel, MD*[8]*; Hassan R. Mir, MD*[9]*; John Ruder, MD*[10]*; CAPT (ret) Michael Bosse, MD*[10]*; Jerald Westberg, BA*[11]*; Benjamin Sandberg, MD*[12]*; Kasey J. Bramlett, PA-C*[13]*; Andrew J. Marcantonio, DO, MBA*[13]*; Alex J. Sadauskas, BS*[14]*; Lisa K. Cannada, MD*[14]*; Alexandra Goodwin, MD*[15]*; Anna N. Miller, MD, FACS*[15]*; Samuel Klatman, MD*[16]*; Mary P. George, MD*[16]*; Peter Krause, MD*[17]

[1]*Boston University Medical Center, Boston, Massachusetts, USA;*
[2]*Boston University, Boston, Massachusetts, USA*
[3]*Boston Medical Center, Boston, Massachusetts, USA;*
[4]*Indiana University, Indianapolis, Indiana, USA;*
[5]*Eskenazi Health, Indianapolis, Indiana, USA;*
[6]*Harborview / University of Washington, Seattle, Washington, USA;*
[7]*Geisinger Medical Center, Danville, Pennsylvania, USA*
[8]*Florida Orthopaedic Institute, Tampa, Florida, USA;*
[9]*Florida Orthopaedic Institute, Temple Terrace, Florida*
[10]*Carolinas Medical Center, Charlotte, North Carolina, USA*
[11]*Hennepin County Medical Center, Minneapolis, Minnesota;*
[12]*University of Minnesota, Dept of Orthopaedic Surgery, Minneapolis, Minnesota, USA*
[13]*Lahey Hospital and Medical Center, Burlington, Massachusetts, USA;*
[14]*Saint Louis University, St. Louis, Missouri, USA;*
[15]*Wake Forest Baptist Hospital, Winston-Salem, North Carolina, USA*
[16]*Louisiana State University, New Orleans, Louisiana, USA;*
[17]*Louisiana State University Health Sciences Center, New Orleans, Louisiana, USA*

Background/Purpose: The standard of care for radial shaft fractures is compression plating. A volar Henry approach is recommended for the distal 2/3 of the radius. In contradistinction, many sources recommend a dorsal Thompson approach for proximal 1/3 fractures to allow for more proximal fixation points and to identify and protect the posterior interosseous nerve (PIN). Other surgeons are comfortable using the extensile volar Henry for proximal fractures, with fixation up to the biceps insertion, which avoids dissection of the PIN and uses a medial release of the supinator to protect the nerve in the supinated position. There are no clinical series describing the use of the volar Henry approach for proximal 1/3 radial shaft fractures. The purpose of this study was to compare these two approaches in a large series of proximal 1/3 radial shaft fractures with respect to complications and resultant range of motion.

Methods: All patients with a proximal 1/3 radial shaft fracture (with or without associated ulna fracture) treated operatively in 8 trauma centers were included. Demographic patient, injury, fracture, and surgical data were recorded. Final range of motion and complications of infection, wound dehiscence, neurologic injury, compartment syndrome, malunion/nonunion, pain, hardware irritation, contracture, and severe restriction of range of motion

See pages 49 - 106 for financial disclosure information.

(<90° arc) were gathered and compared for volar versus dorsal approaches using t tests for continuous variables and Fisher's exact test for categorical variables.

Results: 172 patients (119 M, 53 F) aged 18-84 years (average 35.9) with 63 transverse, 32 oblique, 57 comminuted, and 20 segmental fractures of the proximal 1/3 of the radius were evaluated. Patients were followed an average of 347 days and all patients were followed through union or the diagnosis of nonunion. 60 fractures were open (51 I-IIIA; 9 IIIBC), 121 patients had an associated ulna fracture, and 85 patients had associated injuries. 131 were fixed through a volar and 41 via a dorsal approach. There were no differences in the patient factors between the groups. Patients treated with a dorsal approach had fractures that were slightly more proximal (71 mm vs 86 mm from the radiocapitellar joint) (P = 0.0006). This did not translate to more fixation proximal to the fracture with the mean number of screws being 4 for both approaches. No other patient or fracture factor correlated with the chosen approach. 52% of the volar and 53% of the dorsal plates ended distal to the bicipital tuberosity and the remainder engaged or were proximal to the tuberosity. Double plating was used in 14% of the volar and 10% of the dorsal approaches. Complications occurred in 32% of dorsal and 23% of volar approaches (P = 0.3). Complications were more common in open fractures approached dorsally (P = 0.005) but not in those approached volarly (P = 0.51). There were only 3 neurologic injuries (1.7%) in the series, 2 in the volar and 1 in the dorsal group. Three patients had a deep infection, all in the volar group. Nine (5%) nonunions occurred, 5 volar and 4 dorsal. Nine patients had significant restrictions in their rotation (<90° arc). After removing these outliers, the average arc of pronosupination in the volar and dorsal groups was 160° and 159° and elbow range of motion was 5°-132° and 6°-128°, respectively. The presence of an ulna fracture did not influence pronosupination in either group or the combined series (P = 0.58).

Conclusion: This multicenter series demonstrates no difference in the complication rates between a volar and dorsal approach for proximal 1/3 radius fractures. Specifically, fixation to the level of the tuberosity is safely accomplished via the volar approach without an increase in risk to the PIN. Nonunion was more common in the dorsal approach, but no other differences were seen in the complication rates between the groups. 5% of patients had significant restrictions in their arc of motion (<90°), but all others in both groups had a final average arc of 160°. This series demonstrates the safety of the volar Henry approach for proximal 1/3 radial shaft fractures with a trend toward a lower complication rate than the dorsal approach. Surgeons may employ the volar approach with greater confidence despite the general recommendations to use a dorsal approach for neurologic safety.