Complications of Distal Radius Bridge Plating

Robert N. Matar, MD, MSc*; Phillip R. Ross, MD; Alan K. Swenson, MD; A. Scott Emmert, BS; John Bonamer, BS; Brian Johnson, MD; Peter J. Stern, MD*

Purpose: We hypothesize that treatment of distal radius fractures with dorsal spanning distraction ("bridge") plating is frequently performed for high-energy, intra-articular fractures and that complications and implant failure with this method are common.

Methods: A retrospective review was performed on all patients at a university Level I trauma center treated with a dorsal bridge plate for a distal radius fracture from 2014-2022. Patient demographic and injury mechanism data were recorded, and radiographs were evaluated for fracture patterns, reduction quality, and development of arthritis. Complications were organized into major and minor categories, depending on the need for a subsequent surgical intervention.

Results: 78 patients (mean age, 53 years) with distal radius fractures underwent bridge plating. 18 (23%) were involved in low-energy mechanisms and 60 (77%) in high-energy mechanisms with 56 (73%) closed, 7 (9%) Gustilo I, 6 (8%) Gustilo II, and 8 (10%) Gustilo IIIa fractures. The majority of fractures were intra-articular (78% AO Class C vs 22% AO Class A/B). Overall, 11 were lost to follow-up and 67 were included in the final analysis. At final follow-up (mean, 5 months), radiographs demonstrated an average radial height of 11 mm, radial inclination of 11°, ulnar positive variance of 0.2 mm, and volar tilt of 3°. Of 71 wrists evaluated in 67 patients, the majority (61%) remained free of significant posttraumatic arthrosis (radiographic grade 0 or 1). In comparison to the uninjured side, patients lost an average of 22° of wrist flexion, 35° of wrist extension, 4° of forearm pronation, and 23° of forearm supination. There were 38 major complications requiring surgical interventions in 24 patients (36%). An additional 11 patients (17%) had 18 minor complications. The most frequent major complications were hardware failure (23%), neuropathy (17%), nonunion (14%), and deep infection (11%); stiffness (24%) was the most common minor complication. Characteristics of patients sustaining complications are included in Table 1.

Conclusion: Bridge plating remains a valuable tool for treating complex articular fractures of the distal radius and can maintain satisfactory reduction. In addition to mandatory plate removal, complications (36%) requiring surgical intervention with bridge plating were disturbingly frequent. Catastrophic hardware failure is concerning and is likely multifactorial based on plate design, patient compliance, and technique.

TABLE 1. Demographic, radiographic, and surgical characteristics of patients undergoing dorsal bridge plating for distal radius fractures at the University of Cincinnati from 2014-2022.

Sample size (n)	78
Number of patients with adequate follow-up	66
Age (mean)	53
Male (%)	53
Female (%)	47
Smoker (%)	47
Right-hand dominant (%)	87
Left-hand dominant (%)	13
Right-hand injured (%)	54
Left-hand injured (%)	46
High-energy mechanism (%)	77
Closed injury (%)	73
Open G1 injury (%)	9
Open G2 injury (%)	8
Open G3A injury (%)	10
AO distal radius fracture classification	
A (%)	8
B (%)	14
C (%)	78
Carpal tunnel release at time of plate fixation (%)	15
Radial plate augmentation (%)	39
Kirschner wire augmentation (%)	21
2nd metacarpal mounting (%)	85
3rd metacarpal mounting (%)	18
Average days follow-up	150
Average days Kirschner wire retained	38
Average days plate retained	114
Major complications (%)	**36**
Hardware failure (%)	23
Neuropathy (%)	17
Nonunion (%)	14
Deep infection (%)	11
Arthritis (%)	6
Tendon rupture (%)	1
Minor complications (%)	**17**
Stiffness (%)	24
Adhesions (%)	4
Severe post-traumatic osteoarthritis (%)	39
Final wrist flexion on injured side (°)	38
Final wrist extension on injured side (°)	35.9
Final wrist supination on injured side (°)	64.5
Final wrist pronation on injured side (°)	65.7
Final wrist flexion on native side (°)	60.3
Final wrist extension on native side (°)	71.1
Final wrist supination on native side (°)	87.1
Final wrist pronation on native side (°)	70
Pre-operative radial height (mm)	5.2
Pre-operative radial inclination (°)	10.7
Pre-operative ulnar variance (mm)	5.3
Pre-operative dorsal tilt (°)	18
Final radial height (mm)	10.8
Final radial inclination (°)	20.1
Final ulnar variance (mm)	0.2
Final dorsal tilt (°)	-3.2
Ulnar styloid fracture present (%)	63
Percentage of ulnar styloid fractures achieving union (%)	61