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CASE REPORT

Open Reduction and Internal Fixation of a Distal Radius Fracture With a Volar Locking Plate: A Case Report

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Summary: Fractures of the distal radius are one of the most common fractures treated by orthopedists. The case of a 41-year-old woman who had initial closed reduction of a distal radius fracture with subsequent loss of reduction is presented. She was successfully treated by operative stabilization with a distal radius volar locking plate. The goal is to emphasize current treatment controversies and the clinical practice guidelines as recommended by the American Academy of Orthopaedic Surgeons in the treatment of distal radius fractures.

INTRODUCTION

Fracture of the distal radius is the most common fracture of the upper extremity and one of the most common fractures treated by orthopedists. With the population continuing to age, the annual incidence of more than 600,000 is expected to increase as well.¹ Over the past 10 years, a more aggressive treatment approach has been adopted by the orthopaedic community with a 2-fold increase in the number of patients treated with surgery from 1998 to 2008.² This includes an even larger increase in the number of fractures treated with open reduction and internal fixation (ORIF) with volar locking plates.

The problem with this more aggressive approach is the lack of scientific evidence supporting the large increase in the number of surgical cases. In an attempt to better define the indications for surgery and the most appropriate treatment for distal radius

fractures, the American Association of Orthopaedic Surgeons (AAOS) published the clinical practice guidelines in 2009.³ This case report of a distal radius fracture treated by ORIF with a volar locking plate is presented to highlight current treatment recommendations.

CASE REPORT

A 41-year-old woman fell on her right outstretched hand after falling down 2 or 3 stairs. She was otherwise healthy, and this was her only injury. She presented to the emergency department, and on physical examination, she was noted to have minimal deformity about her right wrist, although it was moderately swollen. Her sensibility to light touch was intact with no deficit in her median nerve function, and capillary refill was brisk. Her presenting radiographs are seen in Figure 1. She was noted to have a minimally displaced extraarticular distal radius fracture with mild volar comminution on her radiographs. Her alignment was felt to be acceptable, and she did not require a reduction.

She was treated with a sugar tong splint and seen in the office 5 days after the injury, and her follow-up radiographs are shown in Figure 2. Her radiographs revealed some mild displacement of the fracture with an increase of her dorsal tilt to approximately 10 degrees. Surgical versus nonsurgical options were discussed with the patient, and she elected to proceed with nonoperative treatment. She was placed in a short -arm cast, and repeat radiographs were obtained in 1 week.

The patient's radiographs at 12 days post injury demonstrated worsening alignment with the radial inclination decreased to approximately 12 degrees and dorsal tilt increased to 25 degrees (Fig. 3). This was determined to be unacceptable alignment, and she was advised to undergo surgery for ORIF with a volar locking plate.

The surgery was performed through a volar Henry approach between the flexor carpi radialis and the radial artery. The pronator quadratus was released, and the fracture was mobilized by removing the fracture callus. Once an adequate reduction was obtained, a volar locking plate was applied with care taken to

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FIGURE 1. A and B, Anteroposterior and lateral radiographs on presentation demonstrating minimal deformity, but mild volar comminution is present.

place the distal locking screws subchondral and into the dorsal rim of the distal radius fragment. It is important to obtain a 15 degrees oblique lateral view under C-arm imaging intraoperatively to show no screws penetrate into the joint because this

view may be harder to obtain in the follow-up radiographs in the office (Fig. 4).

Postoperatively, she was treated with a removable wrist brace and instructed to work on finger active range of motion (ROM) and



FIGURE 2. A and B, Anteroposterior and lateral radiographs of right distal radius fracture demonstrating displacement with an increased dorsal tilt on the lateral of approximately 10 degrees at 5 days post injury.



FIGURE 3. A and B, Anteroposterior and lateral radiographs at 12 days post injury with worsening alignment. Radial inclination is decreased and dorsal tilt increased to 25 degrees compared with earlier radiographs.



FIGURE 4. Intraoperative 15 degrees oblique lateral radiograph demonstrating acceptable alignment and distal locking screws engaging the dorsal rim.

pronation and supination. The brace was discontinued at 6 weeks postoperatively at which time she was allowed use as tolerated. No therapy was needed, and she regained near normal ROM. At 6 months postoperatively, the patient was pain free and had normal ROM except for a minimal loss of wrist flexion (Fig. 5).

DISCUSSION

This case presents the treatment of a patient with an extra-articular distal radius fracture that was initially nondisplaced and treated with a splint, then cast immobilization. Within 12 days after the injury, the fracture went on to displace and require ORIF. The initial treatment was appropriate, but the fracture was unstable as demonstrated by the displacement on follow-up. Signs of instability include dorsal angulation >20 degrees, dorsal or metaphyseal comminution, age >60 years, associated ulna fracture, and shortening or ulnar variance.⁴⁻⁶ Displacement after closed reduction is another sign of instability and one commonly used to decide if a fracture needs operative stabilization.

The question most commonly asked is what is an acceptable reduction and when is surgery indicated. This is still a very controversial issue. The AAOS published clinical practice guidelines in the treatment of distal radius fractures in 2009, and a summary was published in 2010.³ These guidelines recommend surgical fixation for patients younger than 55 years for fractures with >3 mm of shortening, >10 degrees of dorsal tilt, or intra-articular step-off of >2 mm.³ Patients older than 65 years, even with unstable fractures, have not been shown to benefit from surgical fixation according to the Disabilities of the Arm, Shoulder, and Hand score and the Patient-Rated Wrist Evaluation score at 1 year after injury as measured by radiographic and functional outcomes.⁷ There is also no convincing data recommending one surgical technique over the others when comparing ORIF with volar locking plates, external fixation or closed reduction, and percutaneous pinning.^{3,8} Volar locking plates have been shown to result in improved grip strength and restoration of better radiological parameters, but this has not been shown to result in improved range of motion, pain, or function in activities of daily living.^{1,7}



FIGURE 5. A and B, Anteroposterior and lateral radiographs at 6 months demonstrating complete healing with maintenance of alignment.

CONCLUSIONS

Treatment of distal radius fractures remains a very controversial issue due to the lack of good studies comparing the many treatment options. The AAOS clinical practice guidelines are useful in guiding treatment decisions. When operative fixation is indicated, volar locked plating of distal radius fractures may be an appropriate treatment option.

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VAX-CS-10_Rev-1, 09-2020

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