

Management of Complications of Distal Radius Fractures



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KEYWORDS

- Preventive • Complications • Early diagnosis • CRPS • Malunion • Infection • Extensor tendon
- Flexor tendon

KEY POINTS

- Prevention of the possible complications associated with a fracture of the distal radius should be the treating surgeon's primary concern.
- Complication type may vary depending on the method of treatment.
- Complication rates can depend on patient factors including patient lifestyle, age, social support, and medical comorbidities.
- Early diagnosis and treatment is important to avoid possible long-term consequences.

INTRODUCTION

Fractures occurring at the distal end of the radius are seen frequently in emergency departments, representing approximately one-sixth of all fractures.¹ Based on decades of extensive research, surgeons have developed multiple approaches for the treatment of distal radius fractures, including conservative and nonconservative options. These options include closed reduction and casting, closed reduction and percutaneous pinning, external fixation, and open reduction with internal fixation (ORIF).² The conservative treatment of closed reduction and casting has historically been the mainstay of treatment of distal radius fractures. However, because of the increased complication rate associated with this treatment, such as fracture collapse, surgical options, specifically ORIF, are becoming more common.^{1,3}

Overall, distal radius fracture complication rates have been found to vary between 6% and 80% of patients, depending on the definition of complication.⁴ Complications after distal radius fractures occur for many reasons, and often vary depending on the method of treatment.² When deciding on a treatment option, it is important that surgeons focus on recognition, management, and prevention of known associated complications to achieve a good outcome.⁵ Patient factors must also be taken into account when considering treatment methods. Factors including patient lifestyle, age, mental attitude, social support, comorbid conditions, and compliance with treatment can influence the likelihood for complications.¹ For example, a prospective cohort study designed to identify predictors of hand outcomes after distal radius fracture treatment found that increased

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age and lower income led to a significantly worse long-term outcome 1 year after successful surgery using a volar locking plating system.⁶ Awareness of potential risk factors can aid in the prevention of possible complications. This article focuses on the prevention and management of complex regional pain syndrome (CRPS), malunions, infections, and tendon complications after distal radius fracture treatment.

COMPLEX REGIONAL PAIN SYNDROME

Characterized by autonomic dysfunction, trophic changes, and impaired function, CRPS can occur after operative and nonoperative treatments of a distal radius fracture.⁷ The rate of incidence of CRPS after a fracture of the distal radius has been found to vary (1%–37%)^{8–10} and often rises with increasing severity of the fracture.¹¹ There is no definitive cause or treatment of this syndrome; however, many association factors have been discovered. For operatively treated fractures, excessive distraction with an external fixator can raise the risk of CRPS development.¹² For fractures treated nonoperatively, a correlation was found between an increased incidence of CRPS and an increase in pressure under the cast.¹³ There are also several theories for the pathophysiologic mechanism leading to the development of CRPS; however, the true cause remains unclear. Possible involvement of the sympathetic nervous system, abnormal inflammatory reactions, sequelae of nerve injury, and psychological disturbances have all been considered.¹⁴

CRPS can be categorized into two different types depending on the presence or absence of nerve trauma. Formerly known as reflex sympathetic dystrophy, CRPS type I is defined as chronic pain without an identifiable nerve injury.⁷ Conversely, CRPS type II is characterized by nerve involvement. It has been reported that women, the elderly, and individuals with a psychological predisposition have a higher likelihood of developing CRPS type I.¹⁵ For example, Roh and colleagues¹¹ recently evaluated potential factors influencing the rate of CRPS type I after the surgical treatment of a distal radius fracture, and found female patients to be 2.2 times more likely to develop CRPS type I compared with male patients. Additionally, incidences of CRPS have been shown to be higher in smokers compared with nonsmokers.¹⁶

Early diagnosis is important for ensuring the best possible recovery. Patients with suspected CRPS can begin to show symptoms 2 weeks after surgery, but symptoms can also develop several weeks after surgery.¹⁴ Early diagnosis and

treatment of CRPS has been shown to result in recovery in 80% to 90% of cases.¹⁴ However, diagnosing CRPS can prove to be difficult because there are no formal, standardized diagnostic criteria available to date. Zyluk and Puchalski¹⁴ highlighted the recent increase in use of the International Association for the Study of Pain criteria of diagnosis in many scientific studies. The International Association for the Study of Pain criteria involve four categories for diagnosing CRPS: (1) sensory, (2) vasomotor, (3) sudomotor/edema, and (4) motor trophic.¹⁷

In a clinical setting, patients with possible symptoms of CRPS usually present with pain, swelling, and changes in color, temperature, and perspiration of the affected limb.¹⁴ Pain is normally described as a tearing or burning sensation and is often intensified by exposure to cold.¹⁸ We often observe a shiny appearance of the upper extremity as an indication of CRPS (Fig. 1). The absence of pain relief after narcotic use is also a good indication for possible CRPS, because patients with this condition are typically unresponsive to this form of pain medication.¹⁸ Other indications that require careful consideration of possible CRPS include patients with unexpected intense pain, stiffness, sleep difficulties, or slower than anticipated recovery.¹⁸

Certain diagnostic tests have been found to aid in the diagnosis of CRPS. Radiographic images can display irregularities in patients with CRPS; however, changes may not be visible until 2 or more weeks post injury.¹⁸ Radiographs may show osteopenic bone with subchondral and periarticular resorption, but normal results may be found in 30% of patients with CRPS symptoms.¹⁸ Additionally, phase I and phase II bone scans may show hyperperfusion (hot or warm hand) and hypoperfusion (cold, stiff hand), which are common symptoms of patients with CRPS.⁷ Three-phase



Fig. 1. Patient diagnosed with complex regional pain syndrome presenting with a shiny appearance of the right hand.

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