Acute Proximal Row Carpectomy after Complex Carpal Fracture Dislocation

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Received: 17 May 2014 / Accepted: 13 October 2014 / Published online: 18 October 2014
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Abstract Acute proximal row carpectomy is an uncommon definitive treatment for perilunate fracture dislocations. In this report, we present five patients who had acute proximal row carpectomy (PRC) to treat perilunate fracture-dislocations. All patients were men between ages 31 and 87. The indication for PRC was lunate fracture in two patients, concomitant displaced scaphoid fracture and scapholunate ligament injury in two patients, and perilunate fracture-dislocation with preexisting articular damage from long-standing gout in one patient. At the final follow-up ranged from 4.5 month to 7.5 years, four patients had no pain and one patient was lost to follow-up. One patient had a concomitant PRC and a bridging plate that was never removed. The remaining three patients gained satisfactory range of motion. Our observation reveals that acute proximal row carpectomy is an option for some patients with complex carpal fracture dislocations, particularly those with fracture of the lunate, concomitant scaphoid fracture and scapholunate ligament injury, or preexisting wrist arthritis.

Keywords Acute · Perilunate fracture dislocation · Proximal row carpectomy · Scapholunate ligament · Trauma · Wrist arthritis

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Introduction

Complex fracture dislocations of the wrist are still a challenge [1]. Even when good alignment is obtained, arthrosis of the midcarpal joint is common within a few years [2, 3]. Proximal row carpectomy (PRC) is a salvage option, sometimes with interposition of capsule or an implant if the capitate articular surface has deteriorated [1, 4, 5]. Some injuries are so severe that proximal row carpectomy is considered as the primary treatment of the acute injury [1, 6–10].

In this paper, we present five patients underwent proximal row carpectomy as initial definitive treatment of a complex perilunate fracture-dislocation.

Materials and Methods

Between 2002 and 2013, five patients at our level-I trauma center had proximal row carpectomy (PRC) to treat acute carpal trauma. All patients were men between the ages of 31–87 treated for perilunate fracture-dislocations. The indication for PRC was lunate fracture in two patients, concomitant displaced scaphoid fracture and scapholunate ligament injury in two patients, and perilunate fracture-dislocation with preexisting articular damage from long-standing gout in one patient. All five patients had concomitant carpal tunnel release. We were unable to contact any of the patients for additional follow-up beyond that available in the medical records.

Patient 1

A 31-year-old right hand dominant fire fighter fell from a 10-meter height at work. He had a trans-radial styloid, trans-scaphoid, trans-triquetral perilunate fracture-dislocation of the wrist with a widely dislocated and fractured lunate as well

[Fig. 1a, b]. Other injuries included dislocation of the elbow with fracture of the radial head, bilateral tibia fractures, lumbar spine fracture, and left calcaneus fracture. The wrist was treated with proximal row carpectomy, external fixation, carpal tunnel release, forearm fasciotomy, pinning of the distal radioulnar joint, and pinning of the distal radius fracture. At the final evaluation 7.5 years after surgery, the patient had no pain, normal neurovascular function, full pronation, 10° of supination, radial and ulnar deviation of 15° each, 30° of wrist flexion, and 30° of wrist extension with slight crepitation in extension [Fig. 2a, b].

Patient 2

A 68-year-old man fell down the stairs in his home and had a hemo-pneumothorax and rib fractures, and a left perilunate fracture-dislocation with fractures of the scaphoid, lunate, and triquetrum. There was a concomitant scapholunate ligament tear. Operative treatment consisted of a proximal row carpectomy, carpal and Guyon's tunnel release, and a wrist immobilization with plate bridging the wrist that was not removed by the final evaluation. At the final evaluation 4.5 month after surgery, the patient had no pain, full finger motion, full pronation, and 45° of supination. No further follow-up is available.

Patient 3

A 53-year-old man was injured in a motor vehicle collision. In addition to bilateral lower extremity injuries and a comminuted zygoma fracture, he had a right perilunate dislocation with comminuted fractures of the lunate and volar rim of the radius. Operative treatment consisted of open reduction and plate and screw fixation of the radius, extended carpal tunnel release, proximal row carpectomy, and posterior interosseous neurectomy. During the first follow-up visit one month after surgery, slight volar subluxation of the wrist was noted. A new cast applying dorsal transitory force to the wrist restored positioning. No further follow-up is available.

Patient 4

A 49-year-old tractor trailer driver was injured in a motor vehicle collision. In addition to multiple lower extremity and spine fractures, degloving of the scalp, and a hemo-pneumothorax, he had an open right perilunate fracture-dislocation with fracture of the scaphoid and complete tearing of the scapholunate ligament and extrusion of the proximal half of the scaphoid. The wrist was stabilized with external fixation device and a carpal tunnel release was performed. Nineteen days later a second procedure was performed to remove the external fixator and perform a complete proximal row carpectomy. At final evaluation 15 months after injury, the

Fig. 1 a PA and b lateral injury radiographs of the right wrist showing trans-radial styloid, trans-scaphoid, trans-triquetral perilunate fracture-dislocation

patient had no pain, full forearm motion and wrist motion from 5° of extension to 40° of flexion.

Patient 5

An 87-year-old man presented to our office in a splint and sling treated after treatment at another hospital for a trans-scaphoid perilunate fracture-dislocation after a fall down a flight of stairs a few days earlier. Physical examination identified severe median nerve dysfunction. During surgery there

Fig. 2 **a** PA and **b** lateral radiographs of the right wrist after proximal row carpectomy at 8 months of post-operative follow-up

was extensive articular damage from long-standing gout. Operative treatment consisted of proximal row carpectomy and extended carpal tunnel release. Seven months later the patient had no pain, full digital motion, supination and pronation of 60° each, and wrist motion of 45° flexion and 30° extension.

Discussion

Acute proximal row carpectomy is an option for some patients with carpal fracture dislocations, particularly those with fracture of the lunate, concomitant scaphoid fracture and scapholunate ligament injury, or preexisting wrist arthritis. We present these cases to increase awareness of situations where this is a good option. While our follow-up time was limited, the goals of surgery were achieved, there were no major early complications, and we would expect these patients to have similar long-term results as other patients treated with proximal row carpectomy.

Acute proximal row carpectomy as definitive treatment of perilunate fracture-dislocation has been described by a few others [1, 2, 6, 9]. In a series of 6 patients with acute proximal row carpectomy after open perilunate fracture-dislocation, Marin-Braun reported no pain in 4 patients and moderate pain in two. The arc of flexion-extension and grip strength were more than 50 % of the opposite side [9].

Della Santa et al. compared six patients that had acute PRC within three weeks of injury due to what was termed “unsuccessful reconstruction or irreducible dislocation” without additional details and six patients that had salvage PRC to treat SLAC or SNAC arthritis. Patients treated with acute PRC had greater satisfaction and grip strength [6].

Kooten et al. performed acute PRC to treat perilunate injuries with fracture of the lunate in one patient, comminution of the scaphoid fossa of the distal radius and a comminuted scaphoid fracture in one, and damage to the lunate cartilage in two patients [1]. Three of four were described as having a good result. One of 14 patients with perilunate fracture dislocations described by Herzberg and Forrisier was treated with acute proximal row carpectomy for combined scaphoid fracture and scapholunate ligament tear [2].

In individual case reports Huish et al. described a patient treated with acute PRC for combined scaphoid fracture and scapholunate ligament injury with no pain 46 months after surgery [8]. In another report by Domeshek et al., an unusual open volar dislocation with a missing extruded scaphoid and a nearly completely devitalized lunate underwent acute proximal row carpectomy with minimal pain reported only at one month follow-up [7]. Marzouki et al. reported a transscaphoid transstyloid perilunate dislocation presented with proximally displaced proximal pole of scaphoid and lunate together with cartilage damage. Good anatomic and functional results were obtained three years after acute proximal row carpectomy [10].

The limitations of this study include the relatively small number of patients analyzed, retrospective analysis, reliance on the medical record, and limited follow-up. There were no similar cases during this treatment period treated with another method.

When lunate fracture, combined scaphoid fracture and scapholunate ligament injury, or pre-existing articular damage are encountered during acute perilunate fracture-dislocation, acute proximal row carpectomy is an option. In the few reported cases—including ours—the wrist was stable without the need for routine immobilization. Given the humbling results of more straightforward perilunate fracture-dislocations, we think immediate proximal row carpectomy is an option to consider.

Ethical Standards The manuscript does not contain clinical studies or patient data

Conflict of Interest None

Financial Support None

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