CASE REPORT

Acute scaphoidectomy and four-corner fusion for the surgical treatment of trans-scaphoid perilunate fracture dislocation with pre-existing scaphoid non-union

Darren Roberts,¹ Dominic Michael Power²

¹Birmingham Hand Centre, Birmingham, Edgbaston, UK

²Queen Elizabeth Hospital Birmingham, Birmingham Hand Centre, Birmingham, Edgbaston, UK

Correspondence to

Dominic Michael Power, dominicpower1@gmail.com

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SUMMARY

This paper presents a rare case of trans-scaphoid perilunate fracture dislocation with concurrent scaphoid non-union of the left wrist following a motorcycle accident. Emergent CT identified scaphoid non-union advanced collapse and an acute scaphoidectomy, four-corner fusion, denervation and radiocarpal ligament repair was performed.

BACKGROUND

Owing to the overlying bones following fracture dislocations of the carpus, together with possible multifragmentary fracture patterns, it can be difficult to diagnose that a scaphoid fracture is not acute. A missed diagnosis of scaphoid non-union will inevitably lead to unnecessary surplus operations. We advocate the use of CT scanning prior to theatre to identify not only fracture patterns, but also the diagnosis of scaphoid non-union and scaphoid non-union advanced collapse (SNAC) wrist. In this situation, scaphoidectomy and acute four-corner fusion should be considered as a salvage procedure.

CASE PRESENTATION

A 46-year-old right-handed man sustained an injury to his left hand following a motor cross accident. He fell with a flexed hand and presented to us on the day of injury with significant pain in the left wrist. On examination, the wrist was swollen and deformed with an inability to move the wrist without discomfort. There was global wrist joint tenderness and severe paraesthesia in the median nerve sensory distribution. He could not recall any previous history of injury to this hand or wrist.

INVESTIGATIONS

Plain radiographs showed trans-scaphoid perilunate dislocation with probable non-union of the scaphoid (figures 1 and 2). An emergent CT scan confirmed non-union and identified degenerative changes in keeping with a SNAC wrist (figure 3).

TREATMENT

Under general anaesthesia and arm tourniquet, open reduction with carpal tunnel decompression was performed. The scaphoid had a sclerotic proximal pole with an atrophic non-union. There were signs of degenerative change at the mid-carpal joint

Figure 1 Posteroanterior wrist radiograph: trans-scaphoid perilunate dislocation. Distal pole of scaphoid dislocated (arrow).

with chondral ulceration on the capitate head and dorsal rim osteophytes consistent with SNAC stage II. Scaphoidectomy was performed with preservation of the lunate. The mid-carpal joint was prepared for fusion. Bone graft taken from both the radius and distal scaphoid pole was placed between the capitate, hamate, lunate and triquetrum bones. Two radiocapitate wires were inserted to protect the radioscapohcapitate ligament and then double

Figure 2 Lateral wrist radiograph: trans-scaphoid perilunate dislocation. The capitate (arrow) is dislocated dorsal to the lunate (asterisk).

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Figure 3 CT coronal image: non-union of scaphoid and scaphoid non-union advanced collapse wrist. Distal pole of scaphoid with sclerotic margins suggestive of non-union (arrow).

K wires were placed across the mid-carpal joints between lunate and capitate, triquetrum and hamate, as well as lunate and triquetrum. Stable reduction was achieved. Denervation was performed by resecting the anterior and posterior interosseous nerves. The dorsal capsular ligament, having been avulsed from the radius, was reattached with two Mitek anchors. A splint was

Figure 4 Posteroanterior and lateral wrist radiograph: scaphoidectomy and four-corner fusion with bone anchors in distal radius for ligament reconstruction.

used for 6 weeks postoperatively and the radiocapitate wires were removed at 7 weeks.

OUTCOME AND FOLLOW-UP

At 6 months follow-up, the patient had no symptoms of pain. The ranges of movements were 30° flexion, neutral extension, 10° radial and ulnar deviation with 10° pronation and 20° supination. Follow-up radiographs confirmed satisfactory fusion (figure 4). The patient achieved a DASH score of 6.9 and Quick DASH score of 15.9.

DISCUSSION

This unusual case highlights the importance of recognising the possibility of non-union of the scaphoid following trans-scaphoid perilunate dislocation of the carpus. Incidental asymptomatic non-union of scaphoid is observed in clinical practice, however, plain radiographs may not always be helpful in confirming the diagnosis in this situation. An emergent CT scan can delineate between acute and chronic scaphoid fractures more readily, thereby aiding operative planning. The most appropriate definitive surgical treatment can then be offered to the patient without incurring unnecessary trips to theatre. Trans-scaphoid perilunate dislocation associated with an acute scaphoid fracture requires urgent scaphoid fixation and similar ligament reconstruction with temporary carpal stabilisation, however, in the situation with a SNAC wrist, leaving the remaining arthritic scaphoid articulation would undoubtedly evolve and lead to the onset of symptoms.

Untreated acute scaphoid fractures have a propensity to progress to non-union. Prevalence of incidental scaphoid non-unions has been quoted as 0.14% of the general population having plain radiographs.¹ The mechanical imbalance of the carpus places undue forces across the scaphoid fossa of the distal radius and causes subsequent migration of the carpus. This is termed as SNAC and is an inevitable long-term sequelae if a non-union is left without surgical intervention. If identified early (SNAC grade I), which is degeneration of the radial styloid only, then the scaphoid can be fixed with bone graft with a concomitant styloidectomy. However, once more advanced collapse occurs, the scaphoid needs to be removed and the arthritic capitate dealt with by fusing the mid-carpal joint between the

capitate and lunate bones. Owing to the small surface area between these two bones, most surgeons recommend four-corner fusion, where the capitate, hamate, lunate and triquetrum are fused together, thereby preventing further collapse.

Trans-scaphoid perilunate dislocation through a scaphoid non-union is rare but has been reported twice in the literature.^{2 3} In one report, a scaphoid non-union resulted from an initial trans-scaphoid perilunate dislocation, a secondary injury resulted in a further dislocation through this non-union, and the fracture was then treated with fixation and bone graft. To the best of our knowledge, there have been no case reports of this type of injury occurring through a SNAC grade II wrist. Four-corner fusion as a primary procedure has been advocated in cases of acute scaphoid fractures that are not reconstructable.⁴ Proximal row carpectomy (PRC) has also been considered in

this situation.⁵ With early degenerative changes to the proximal capitate, PRC is not advised.

It is also important to reconstruct ligament injuries that occur with a trans-scaphoid perilunate dislocation, in particular the radioscapohcapitate ligament, to prevent ulnar translocation of the carpus following four-corner fusion.

The follow-up DASH scoring suggests, in the short-term, that patients can do well with salvage procedures following an acute trans-scaphoid perilunate dislocation on the background of scaphoid non-union and SNAC wrist.

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Learning points

- ▶ Consider the possibility of non-union following trans-scaphoid perilunate dislocation.
- ▶ Emergent CT is recommended to confirm non-union and for operative planning.
- ▶ Acute scaphoidectomy and four-corner fusion should be considered to negate unnecessary additional operations.

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