Surgical Treatment of Complicated Wrist Injury - 5-Month Follow-Up - A Case Report.

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HUMAN AND ANIMAL RIGHTS
This article does not contain any studies with human participants or animals performed by any of the authors.

ABSTRACT

A 40-year-old man was involved in a motorcycle accident in Thailand, where limited diagnostic capabilities led to the oversight of severe wrist injuries. Due to the mistaken assumption that the patient was a tourist, detailed imaging of the wrist was not carried out, resulting in a delay of treatment for many months. It was only upon return to Poland that CT scans were performed, revealing multiple fractures and dislocations of the wrist bones, requiring urgent surgical intervention. This case highlights the importance of accurate post-traumatic injury diagnosis, the consequences of its neglect and 5-month follow up of surgical treatment.

CASE REPORT

BACKGROUND

Complex wrist injuries are diagnostically and therapeutically challenging. The case underscores the vital role of advanced radiological assessment – especially CT – in evaluating post-traumatic wrist pain and planning surgical intervention. It also illustrates the long-term consequences of neglected carpal injuries, such as scaphoid non-union and persistent lunate dislocation. To our knowledge, this is one of the few documented cases demonstrating a successful delayed surgical reconstruction of such a complex carpal injury with partial radiological healing and functional improvement. This report contributes to the growing literature on the importance of early and comprehensive imaging in trauma patients and serves as a cautionary example of diagnostic oversight in international healthcare settings.

CASE REPORT

A 40-year-old male of Polish origin, permanently living and working in Thailand, had been involved in a motorcycle accident in November 2023. After being transported to a local hospital, he was considered a tourist, which affected the diagnostic and treatment decisions. Only imaging of the abdominal cavity and elbow bones were performed (due to the suspected fracture, which was not confirmed; physicians wrongly assumed that the patient would come back to Europe in a few days and undergo full diagnostics). The patient was severely battered, lacerated and suffered multiple abrasions of almost the whole body. Theoretically, a full set of examinations was warranted; however, a complete trauma scan was not performed. The patient was only provided with an orthopedic brace, recommending standard conservative treatment methods.

The condition of the wrist did not improve - the pain and limited mobility persisted for the following months. In March 2024, upon return to Poland, the patient reported to a general practitioner, who referred him for an X-ray. The results showed multiple fractures and dislocations within the wrist. After a few days the patient reported to the orthopaedist who referred him for CT scan (in Poland general practitioners are not authorized to refer patients for CT scan). After a few days, in April 2024, CT scan was performed (Figures 1-6).

It revealed that the distal carpal row - including the trapezium, trapezoid, capitate, and hamate- was largely intact, with no significant fractures and proper alignment in relation to the metacarpal bones. The pisiform bone was dislocated and displaced in a palmar and distal direction. Fragmentation of the triquetrum was noted, though the fragments showed only minimal displacement. Additionally, dislocation of the lunate bone was observed, as clearly depicted in (Figure 5) and particularly striking on the CT cross-section. Due to the thinned bone structure of the wrist bones, osteoporosis was suspected.

The patient faced the challenge of finding a specialist who would undertake the reconstruction of his wrist. Within the following weeks five orthopedic surgeons declined to perform the surgery — it was only the sixth who agreed to take on the case. At the end, the procedure was carried out in the Clinical Department of Orthopedics at the end of May 2024, where the surgery was performed with full awareness of the high risk of bone necrosis, particularly affecting the scaphoid.

In the beginning of September 2024, control CT scans were performed. At that time, the scaphoid fracture was ununited. A loose bone fragment measuring 8.5 x 5.5 mm was identified between the ulna, triquetrum and pisiform bones. It was suspected to represent either an avulsed fragment of the triquetral bone or an accessory carpal ossicle. In the end of October 2024, the third CT scan of the wrist was performed. Compared to the examination from September 3, 2024, partial bony union of the scaphoid fracture was observed, while other findings remained unchanged from the previous study.

Follow-up imaging demonstrated slow healing progress, with incomplete bone union. A healing fracture of the scaphoid with a persistent visible osseous fragment was noted. The lunate remained dislocated but retained structural integrity. A residual bone fragment adjacent to the triquetrum was still present (Figure 6-8). Nevertheless, functional recovery and motor improvement were observed. The patient was satisfied with the treatment, as he was already able to move his upper limb and perform an increasing number of daily activities.

DISCUSSION

Complex wrist injuries often occur as a result of falling onto an outstretched extremity and traffic accidents [1]. Motorcycle accidents are a particularly common cause of injuries amongst the upper limb [2]. Lack of immediate and comprehensive diagnosis may lead to delays in treatment [3].

The initial imaging of the patient did not include the wrist, which led to the oversight of serious injuries. In the following months, pain, swelling and limited mobility persisted. Imaging studies performed in Poland revealed numerous injuries.

The delayed diagnosis hampered the treatment process. The patient underwent wrist reconstruction surgery, although there was a high risk of necrosis, especially of the fractured and dislocated scaphoid bone, and failure to regain full fitness. Subsequent follow-up CT scans showed partial bone growth, but the patient required long-term rehabilitation and further monitoring.

In cases of chronic post-traumatic wrist pain, differential diagnosis should include de Quervain syndrome, wrist tightness, Kienböck's disease, complex ligament damage, joint degenerative disease, Linburg-Comstock syndrome [5].

Accurate imaging (X-RAY, CT, MRI) is crucial for proper diagnosis. In Europe, whole-body CT (trauma scan) is the standard procedure for patients with multiple injuries. It is considered the gold standard in assessing polytrauma, as it helps prevent missed diagnoses of severe limb injuries.

TEACHING POINT

This case highlights the importance of proper imaging diagnosis in cases of post-traumatic injuries, especially in situations where the patient is unable to obtain appropriate medical care immediately. Incorrect assumptions about the patient's status can lead to serious consequences, including delays in diagnosis and treatment. This case exemplifies the importance of detailed imaging at an early stage of post-traumatic diagnosis. A patient with this type of injury, especially one so extensive, should immediately undergo a trauma scan. Additionally, it should be emphasized that modern imaging methods can be helpful in planning orthopedic procedures, especially for such complex and extensive injuries.

QUESTIONS

Question 1: What is the most common mechanism of injury for a scaphoid fracture?

a. Direct blow to the dorsal wrist
b. Fall on an outstretched hand (FOOSH)
c. Twisting injury of the wrist
d. Sudden wrist hyperflexion

Correct answer: B

Explanation: The scaphoid is most commonly fractured when someone falls on an outstretched hand, especially with the wrist extended. This mechanism compresses the scaphoid against the radius.

Question 2: What is the most feared complication of a

scaphoid fracture?

a. Carpal tunnel syndrome
b. Ulnar nerve palsy
c. Avascular necrosis
d. Tendon rupture

Correct answer: C

Explanation: The scaphoid has a retrograde blood supply, especially the proximal pole, making it prone to avascular necrosis if not properly treated.

Question 3: Which of the following clinical signs suggests median nerve involvement in distal radius fracture?

a. Numbness in the dorsal hand
b. Weakness of the triceps muscle
c. Paresthesia in the first three fingers
d. Pain in ulnar side of the wrist

Correct answer: C

Explanation: Median nerve compression leads to paresthesia or numbness in the thumb, index and middle fingers. This may occur due to swelling or displacement after distal radius fracture.

Question 4: Which condition should be included in the differential diagnosis of chronic post-traumatic wrist pain with unremarkable radiographs?

a. Carpal tunnel syndrome
b. Kienböck's disease
c. De Quervain's tenosynovitis
d. All of the above

Correct answer: D

Explanation: Post-traumatic wrist pain may be due to occult ligamentous injuries, osteonecrosis (Kienböck's), nerve entrapments or tendinopathies. MRI is often indicated when radiographs are inconclusive.

Question 5: What is a common long-term complication of untreated or non-united wrist fractures?

a. Pulmonary embolism
b. Osteoarthritis and limited range of motion
c. Deep vein thrombosis
d. Hypertension

Correct answer: B

Explanation: Failure to treat wrist fractures adequately can result in joint instability and lead to post-traumatic osteoarthritis and stiffness over time.

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FIGURES

Figure 1: Coronal section – marked osteoporosis. The distal row (trapezium [a], trapezoid [b], capitate [c], and hamate [d] bones) is mostly intact, with no significant fractures and proper alignment relative to each other and the metacarpal bones [e]. The proximal row is essentially absent—there is a visible "gap" [f] between the distal row and the radius [g].

Figure 2: Sagittal section along the ulna [a] and obliquely through the fourth metacarpal bone [b]. The pisiform bone [c] is dislocated and displaced palmarly and distally. The triquetrum [d] is fragmented, though with only minimal displacement of the fragments. The hamate bone [e] remains in place.

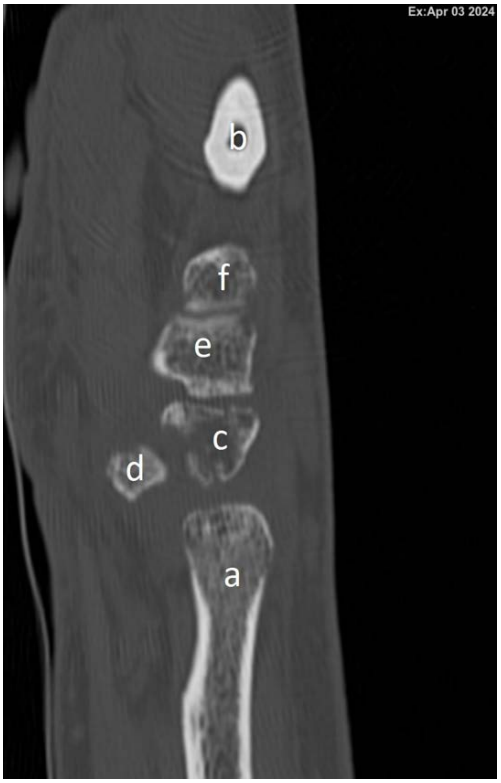

Figure 3: Sagittal section along the ulna [a] and obliquely through the third metacarpal bone [b]. The triquetrum [c] is fragmented, with only minimal displacement of the fragments. A dislocated fragment of an unidentified bone [d] is present. The hamate bone [e] remains in place. The fourth metacarpal bone [f] is also visible.

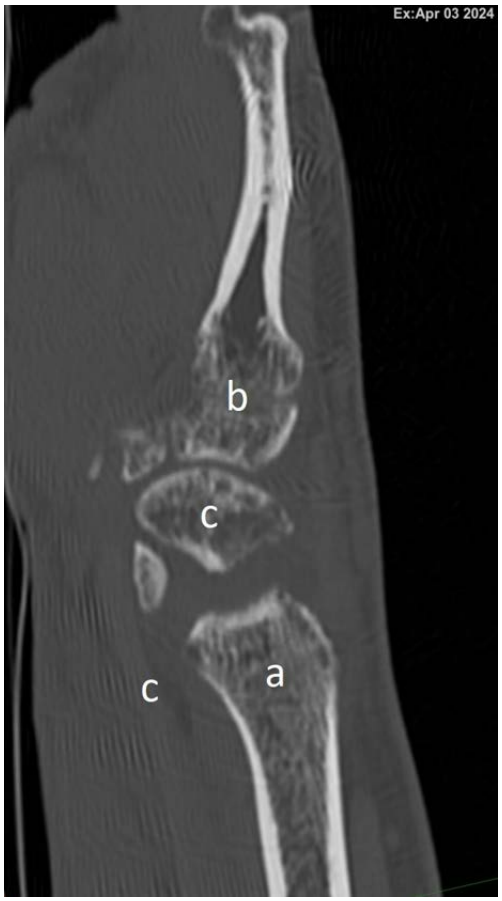

Figure 4: Sagittal section through the radius [a] and the second metacarpal bone [b]. Dislocated fragments of the scaphoid bone [c] are observed.

Figure 5: The lunate bone [a] is dislocated. Sagittal section through the radius [b] and the third metacarpal bone [c]. The capitate bone [d] is also visible.

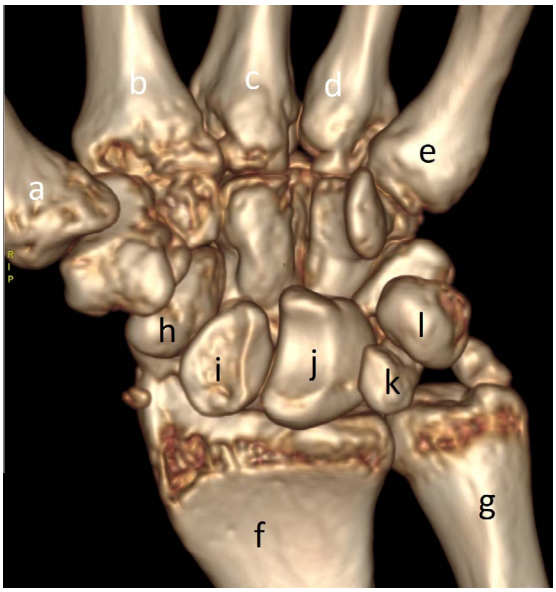

Figure 6: VR reconstruction, palmar view. The image shows a three-dimensional reconstruction of the wrist and hand bones from a palmar perspective. The first (a), second (b), third (c), fourth (d), and fifth (e) metacarpal bones are clearly visible. The radius (f) and ulna (g) form the proximal part of the forearm. The scaphoid (h) is fractured, with a visible fragment (i). The lunate (j) is dislocated but remains intact. A fragment of the triquetrum (k) is also present. The pisiform bone (l) is situated on the palmar aspect. The trapezium (m) and trapezoid (n) articulate with the first and second metacarpals, respectively, while the capitate (o) and hamate (p) align centrally within the carpal row. The triquetrum (r) is also noted. A distinct gap (s) is visible due to the lunate dislocation.

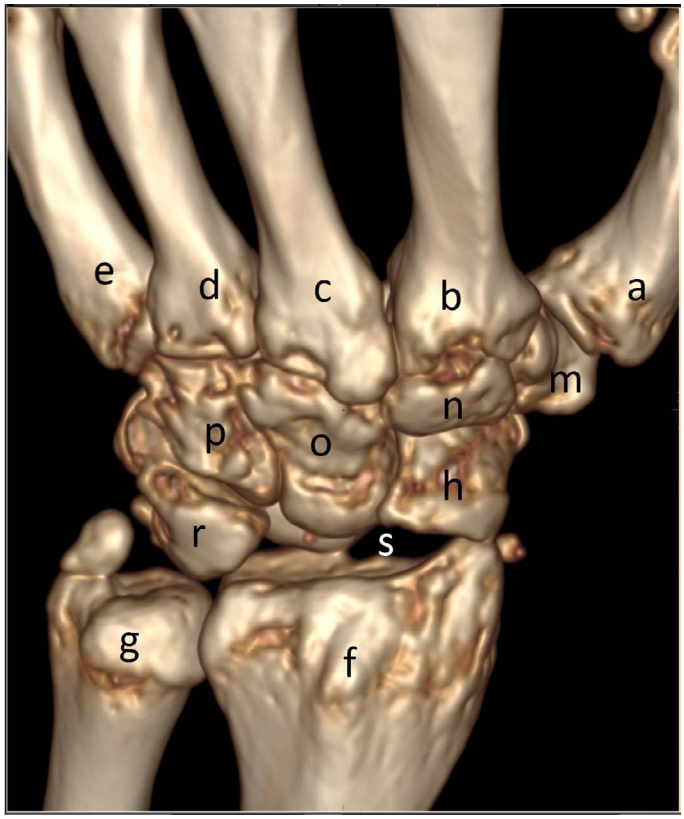

Figure 7: VR reconstruction, dorsal view. The image presents a three-dimensional reconstruction of the wrist and hand bones from a dorsal perspective. The labeling corresponds to Figure 6, maintaining the same anatomical references, but viewed from the opposite side, allowing for better visualization of carpal alignment and fractures from the dorsal aspect.

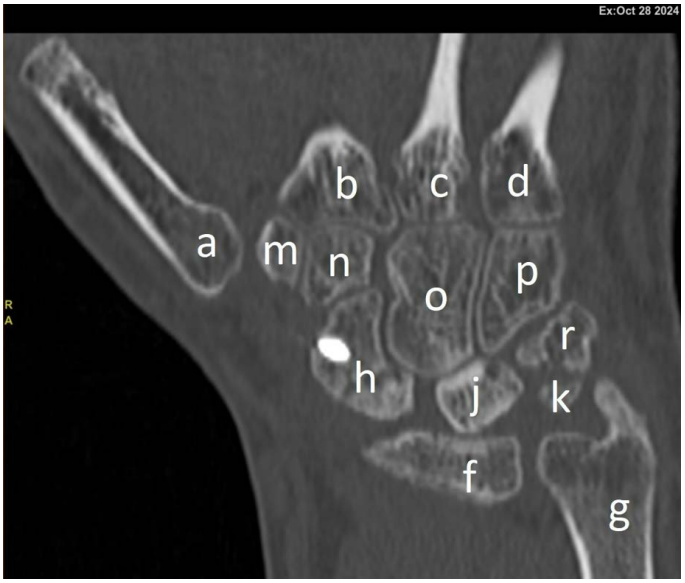

Figure 8: Coronal section, palmar view. The image shows a radiographic projection of the wrist and hand bones from a dorsal perspective. The anatomical structures correspond to those described in Figures 6 and 7, providing a conventional imaging comparison to the VR reconstructions.

KEYWORDS

Wrist trauma, carpal bone fractures, avascular necrosis, orthopedic fixation, post-traumatic complications

ABBREVIATIONS

MRI = Magnetic Resonance Imaging