



# Scaphocapitate Fracture Syndrome: A Rare Case Report and Literature Review

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## Abstract

**Introduction:** The scaphocapitate fracture syndrome is a rare injury and refers to concomitant fractures of the scaphoid and capitate carpal bones. It is a special type of perilunate fracture dislocation, accompanied with rotation of 90 or 180 degrees of the fractured proximal pole of the capitate bone.

**Case Presentation:** A right-handed 23-year-old man was presented due to left wrist pain after falling down from great height. His wrist was swollen with severe pain, tenderness, and remarkable restriction of the range of motion. Plain X rays and CT scan revealed scaphoid waist fracture accompanied with capitate fracture and rotation of its proximal pole indicating scaphocapitate fracture syndrome. The scaphoid and head of the capitate were reduced and fixed with headless Herbert screws and the injured lunotriquetral ligament was repaired followed by immobilization of the wrist for 6 weeks. After removing the cast, the patient was referred to physical therapy and finally achieved a painless wrist with acceptable range of motion and grip strength.

**Conclusions:** Careful clinical examination and appropriate imaging are essential for diagnosis of this rare injury. Open reduction through posterior approach as well as anatomic reduction and fixation with headless compression screws and repairing the ligamentous injuries can result in acceptable clinical and radiological outcomes.

**Keywords:** Scaphocapitate Syndrome Fracture, Perilunate, Scaphoid Fracture, Capitate Fracture

## 1. Introduction

The scaphocapitate fracture syndrome, as a combination of fractures of the scaphoid and capitate bones, is rare (1). It is a special type of the perilunate fracture dislocation, which is accompanied with rotation of 90 or 180 degrees of the proximal pole of the capitate bone (2). There are only few cases reported in the literature (3). This uncommon incidence can be the main reason for late diagnosis and mismanaging of this severe injury, which can burden considerable disability (1, 3, 4). We report a scaphocapitate syndrome in a young patient, its treatment process and result, alongside a literature review of this interesting injury.

## 2. Case Presentation

A right handed 23-year-old male reconstruction worker was presented to our emergency department due to left wrist pain after falling down from great height.

The left wrist was swollen with severe pain, tenderness, and remarkable restriction of the range of motion (ROM) and normal neurovascular status. Plain X rays revealed

scaphoid waist fracture accompanied with capitate fracture and rotation of its proximal pole (Figure 1). A computerized scan (CT scan) showed the nature of fracture of the mentioned carpal bone indicating a scaphocapitate fracture syndrome (Figure 2). Operation was carried out through a dorsal exposure between the 3rd and 4th extensor compartments. The proximal pole of the capitate was found to be rotated close to 180 degrees. Scaphoid fracture was at the waist of it, scapholunate ligament was intact, however, lunotriquetral (LT) ligament was disrupted (Figure 3).

The scaphoid and head of the capitate were reduced and fixed temporarily by Kirschner wires (KW) followed by applying Herbert screws for permanent fixation. As the LT ligament was injured, it has been repaired and supported by applying a KW. After applying the dressing, the wrist was immobilized in a sugar tong split. At 2 weeks, the sutures were removed and a short arm cast was applied for another 4 weeks, which after that, the cast and KW were removed and the patient was referred to the physical therapy department in order to improve the ROM.



**Figure 1.** A, Anteroposterior; B, Lateral X rays show scaphoid waist fracture and rotation of the fractured proximal of the capitate.



**Figure 2.** CT scan shows precisely the fractures as well as rotation of the proximal segment of the capitate.

At the 12 months follow up, both the fractured bone that achieved union without avascular necrosis and the wrist were painless (Figure 4). ROM of the right/left wrists were, 80/60, 70/45, 30/15, and 15/0 degrees for extension, flexion, ulnar deviation, and radial deviation, respectively. Grip strength in the left hand was 30 kg comparing to 40 kg of the right one measured by dynamometer (Hydraulic Hand Dynamometer SH5001, Saehan Corporation, Masan, Korea).

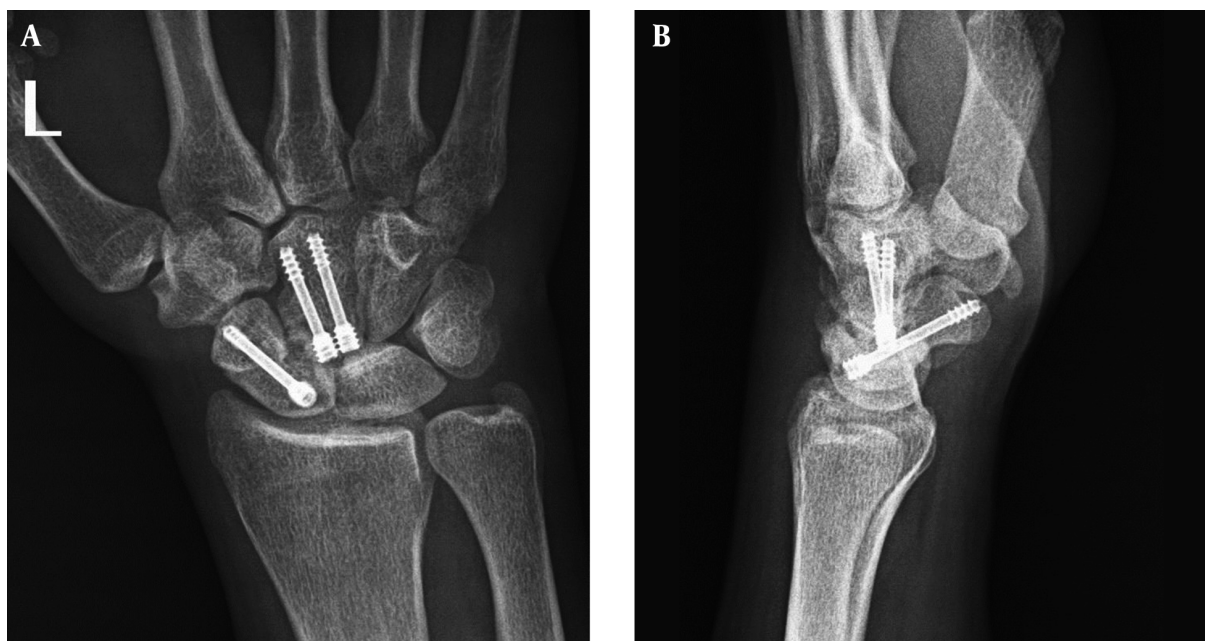
### 3. Discussion

The “scaphocapitate syndrome” is a rare injury, which has been defined by Fenton and Rosen in 1950 as associated fractures of the scaphoid and capitate, accompanied by 90 or 180 degrees rotation of proximal pole of the capitate (3-6).

Milliez et al. (7), reported a case of scaphocapitate syndrome and reviewed the previously reported cases and concluded that the injury always occurs in young men with



**Figure 3.** Intra operative photograph indicating the scaphoid fracture, intact scapholunate ligament. Note to the rotated proximal pole of the capitate. The freer rests on the lunate.



**Figure 4.** A, Postoperative anteroposterior; B, Lateral X rays at 12 months follow up. Normal scapholunate angle has been restored and bony union was achieved in both fractured carpal bones without avascular necrosis.

average age of 22 years. They also reported that both sides are equally affected and most injuries are due to falls from height or vehicle accidents. This was true for our case who was a young male worker with the mechanism of falling down from a great height.

In 1980 Vance et al. (8), by analyzing the previously reported cases including their own patients, categorized scaphocapitate fractures in six classes according to the pattern of the fracture and the direction of the dislocation. The present case fits into type two of Vance classification, in which the inverted proximal fragment of capitate remained in articulation with the lunate (3, 8).

The mechanism of injury remains still debatable and controversial. Hyperextension and radial deviation, pure hyperextension, or even pure extreme hyperflexion have been proposed as the mechanism of the injury. (1, 4, 8)

Stein and Siegel, in an attempt to explain why the proximal fragment of capitate rotates 180 degrees, proposed an interesting mechanism. According to it, dorsal ridge of the radius may impact the neck of the capitate once the scaphoid has fractured, and when the wrist goes back to neutral position, shortening of the carpus prevents reduction of the proximal fragment. The distal segment of the capitate, which is in its normal position, implies a flexion force to the proximal pole and this can rotate a 180-degrees the proximal fragment (9).

Diagnosis needs careful clinical examination includ-

ing careful neurological assessment (1, 3). Although it is rare, damage to the median nerve has been reported, especially when the fracture occurs with dislocation component (10). Median nerve palsy may be caused by volar displacement of the fractured proximal pole of the capitate or simply due to swelling and hemorrhage (10).

Conventional radiography can reveal this rare injury, and CT scan can show the exact pattern and concomitant fracture dislocations (3).

Delayed diagnosis and treatment has been reported due to rarity and complexity of the injury and can result in avascular necrosis, carpal collapse, nonunion, finally arthritis, which will burden severe disability in turn (1, 3, 4).

Conservative treatment by immobilization in a cast, although can result in union, is risky and there are reports of nonunion and avascular necrosis with this kind of treatment (7).

Osteonecrosis of rotated proximal segment of the capitate may occur due to the fact that this bone is supplied by the vessels entering from distal part of it like scaphoid bone (7).

Fractures are usually fixed through posterior approach by using headless compression screws or Kirschner wires (1, 3). In our case, we fixed both fracture bones by using headless compression screws (one for scaphoid and two screws for capitate) through posterior approach. Both frac-

tures achieved union without avascular necrosis of proximal poles of capitate or scaphoid. The patient could be able to resume his courier; the wrist had pain free acceptable ROM.

In conclusion, careful clinical examination, neurological assessment, and appropriate imaging are essential for diagnosis of rare scaphocapitate fracture syndrome. Open reduction through posterior approach and anatomic reduction and fixation with headless compression screws and addressing ligamentous injuries can result in acceptable clinical and radiological outcomes.

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