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## Dorsal dislocation of trapezoid: Uncommon case

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### Abstract

Dislocation of carpometacarpal joints are uncommon. They represent 1% of all injuries of hand and wrist region [1]. Up to 70% of carpometacarpal dislocations are missed or misdiagnosed [2]. Dorsal dislocations of the trapezoid are rare. We present an uncommon case of dorsal dislocation of the trapezoid with the second metacarpal base at the scaphotrapeziotrapezoidal (STT) due to motor vehicle accident. Dorsal dislocation of the trapezoid is associated with high-velocity trauma such as road traffic accidents. These cases typically occur concomitantly with other fractures or dislocations of the carpal bones or carpometacarpal (CMC) joints. Many reports of delayed diagnosis due to concomitant injuries and difficulty of recognition on plain radiographs have been reported. We report an uncommon case with concomitant injury to the metacarpal and phalangeal bones.

**Keywords:** Scaphotrapeziotrapezoidal dislocation, trapezoid dislocation, Gilula's arcs

### Introduction

Dislocation of the trapezoid at the scaphotrapeziotrapezoidal (STT) joint is an uncommon injury resulting from high-velocity trauma [1-5]. Previously reported mechanisms of injury include industrial trauma and fall from height [1-5]. Reports of trapezoidal dislocations have been isolated case reports or small case series and isolated injuries represent the most uncommon variant of these cases.

Delayed diagnoses have been reported in trapezoidal dislocations as a result of concomitant injuries, failure to image the injured extremity and difficulty in recognizing the dislocation on plain radiographs [4, 5]. Concomitant injuries to the hand including multiple carpometacarpal (CMC) joint fractures/dislocations and associated carpal bone fractures are commonly associated with trapezoidal dislocations and isolated injury has been extremely rare in literature [1, 4-6]. These injuries are difficult to recognize on plain radiographs unless the attending doctor is aware of the Gilula's arcs.

The purpose of this report is to describe a case of dorsal dislocation of the trapezoid at the STT joint due to motor vehicle accident that was not appropriately recognized at the time of presentation to another health centre 25 days back. Given that these are uncommon injuries, a high degree of suspicion for further imaging is necessary to avoid delayed diagnosis, treatment and morbidity.

### Case Report

A 56-year-old gentleman presented to the out-patient department with pain and swelling of right hand for the last 25 days after a motor vehicle accident. He was admitted in a district hospital for a lacerated wound over the right foot dorsum and the fractures of metacarpals and phalanges of 4<sup>th</sup> and 5<sup>th</sup> fingers were splinted in a plaster-of-paris below elbow slab. He continued to have swelling and pain on moving the fingers and hence he presented to our out-patient department for a 2<sup>nd</sup> opinion with a radiograph done 20 days after injury by the general surgery department (Fig 1). After clinical examination and review of his radiographs he was admitted for open reduction and stabilization (Fig 2).

Physical examination revealed swelling on the dorsal aspect of his right hand and 4<sup>th</sup> and 5<sup>th</sup> fingers. He had significant tenderness to palpation in the region of the first, second and third CMC joints and in the region of 4<sup>th</sup> and 5<sup>th</sup> metacarpals. Range of motion of fingers was limited and painful but both flexor and extensor tendons to all digits were intact. His neurovascular examination was normal.

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Two radiographic views of his right hand were taken and they showed disruption of Gilula's arcs, fracture mid shaft of 4<sup>th</sup> metacarpal, fracture proximal 1/3<sup>rd</sup> of 5<sup>th</sup> metacarpal shaft, displaced fracture mid shaft of 5<sup>th</sup> proximal phalanx and comminuted fracture of base of 4<sup>th</sup> proximal phalanx with healed wound over dorsum of base of proximal phalanx of 4<sup>th</sup> finger. He was planned for open reduction and stabilization through dorsal approach. Intra-op the trapezoid with its associated second metacarpal base was dorsally dislocated and proximally migrated and the ligamentous attachments between the trapezoid, scaphoid and capitate were torn. The trapezium did not maintain its attachment with the trapezoid and had a rotational deformity. The trapezoid was reduced back into its anatomic location after excising the fibrous tissue that had formed around the injury. The reduction was held with two Kirschner wires (K wires), one through second metacarpal and the second K-wire through trapezoid into capitate. 4<sup>th</sup> and 5<sup>th</sup> metacarpal shaft fractures were open reduced and fixed with k-wires, 5<sup>th</sup> proximal phalanx was open reduced and fixed with k-wires. 4<sup>th</sup> proximal phalanx fracture was conservatively managed since it was found to be uniting in a reasonably good position (Fig 3).



**Fig 1:** AP and Oblique view radiograph of wrist with fingers showing disrupted Gilula's arcs and metacarpal and phalangeal bone fractures of 4<sup>th</sup> and 5<sup>th</sup> fingers.



**Fig 2:** Clinical pictures showing the swelling of wrist and fingers with healed scar at the base of 4<sup>th</sup> finger.



**Fig 3:** Post-operative radiographs showing restoration of Gilula's arcs and reduction and stabilization of metacarpal and phalangeal bone fractures with Kirschner wires.



**Fig 4:** Post-operative clinical pictures at 5 weeks



**Fig 5:** Post-operative radiograph at 5 weeks.



**Fig 6:** Post-operative radiograph at 18 months follow up.



**Fig 7:** Range of movement of hand at 18 months post-operative period.





**Fig 8:** Improvement in grip strength from 8 months to 18 months post-operative period.

## 5. Discussion

In this case report, we describe an uncommon case of missed dorsal trapezoidal dislocation maintaining its association with second metacarpal base in addition to fractures. Trapezoidal dislocations are extremely uncommon injuries that have been reported as isolated cases or small case series<sup>[1-6]</sup>. Axial loading of the second metacarpal with the wrist flexed has been postulated to result in dorsal trapezoidal dislocation because of weaker ligamentous attachments dorsally and the wedge shape of the trapezoid at the STT articulation, where the trapezoid becomes and loses its bony support from the scaphoid with the wrist in flexion<sup>[3, 6]</sup>. Traditional mechanisms of injury include industrial accidents, motor vehicle accidents and falls from height<sup>[1-5]</sup>. More recently similar to our case, Benjamin and Stephanie described an unusual case of trapezoidal dislocation due to steering wheel injury after head-on collision<sup>[6]</sup>.

Trapezoidal dislocations are often reported in conjunction with other injuries in the wrist. The commonly described associated injuries include trapezium dislocation as a part of an axial disruption of the carpus<sup>[1-3]</sup> and multiple carpometacarpal dislocations<sup>[1, 4-6]</sup>. Complete dislocation of the trapezoid from scaphoid and second metacarpal articulations with proximal migration of the second metacarpal into the remaining defect has also been described<sup>[1, 3]</sup>. Palmar dislocation of trapezoid appears to be less common than dorsal dislocations because the palmar ligamentous attachments of the trapezoid are stronger than the dorsal ligaments<sup>[7]</sup>. Similar to our case, injury isolated to the STT with maintained relationship of the trapezoid and second metacarpal appears to be a less common variant that has been described infrequently in previous studies<sup>[8]</sup>. Due to the high-energy nature of these injuries, associated soft tissue injury frequently occurs<sup>[2]</sup>. The high prevalence of concomitant injury increases the risk of missing the subtle radiographic findings of this injury. A straight PA view may aid in identifying the Gilula's arcs. CT scan can also help identify injury at the STT joint when radiographs are inconclusive, and thin cuts and 3D reconstructions may be necessary to obtain the proper planes needed to identify subtle changes<sup>[1, 9]</sup>.

A high index of suspicion must be maintained after high velocity injuries to the hand and wrist because concomitant injuries and subtle radiographic findings may delay diagnosis. Ostrowski *et al.* described a case of a severe crush injury with an open laceration to the hand where dorsal dislocation of the trapezoid along with subluxation of the base of the second and third

metacarpals was unrecognized on initial injury radiographs<sup>[5]</sup>. Maxwell *et al.* reported scaphotrapezial and trapezoidal dislocations in a motorcyclist in association with third, fourth, and fifth CMC dislocations<sup>[4]</sup>. The subtle radiographic findings at the STT joint were not recognized until the postoperative period after the other fractures and dislocations at the CMC joints had been addressed. Broadbent *et al.* reported an in situ rotatory dislocation of the trapezoid associated with CMC joint dislocations that was recognized only after advanced imaging<sup>[10]</sup>. A low threshold for advanced imaging is critical after high-energy mechanisms of injury such as crush injury or MVA and pain or swelling out of proportion to plain radiographic findings. Axial loading of the hand on the steering wheel during MVA appears to be a common mechanism associated with trapezoidal dislocation in recent years.

In conclusion we report an uncommon case of dorsal dislocation of the trapezoid at the STT joint with its associated 2<sup>nd</sup> metacarpal along with metacarpal shaft and phalangeal fractures.

**Conflict of Interest:** The authors declare that they have no conflict of interest.

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