



## Case Report

# Trans-scaphoid perilunate fracture dislocation beyond Mayfield stage IV: a case report on a new classification proposal



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### ABSTRACT

This report and review of the literature aims to recognize the complete enucleation beyond stage IV of the classification proposed by Mayfield. The addition of a fifth category is proposed, added for complete ligament injuries that lead to nonexistent circulation for the radiolunate ligament, preventing surgical reconstruction, thus influencing surgical treatment.

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### Fratura luxação trans-escafo-perissemilunar além do estágio IV de Mayfield. Estudo preliminar. Proposta de nova classificação: relato de caso

### RESUMO

Esse relato e revisão na literatura tem como objetivo reconhecer a enucleação total além do estágio IV da classificação proposta por Mayfield. Propõe-se a adição de uma quinta categoria, para lesões ligamentares completas que levam a uma circulação inexistente do ligamento radiolunar, impedindo a reconstrução cirúrgica, influenciando assim o tratamento cirúrgico.

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## Introduction

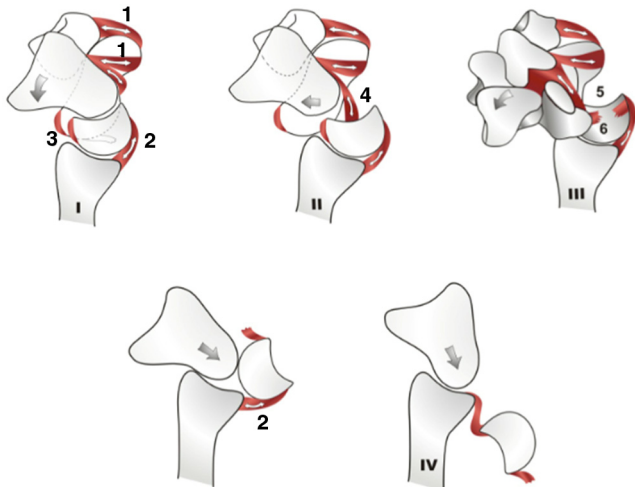
Carpal instability is synonymous with dysfunction. Carpal bone trauma occurs in approximately 16% of wrist and hand

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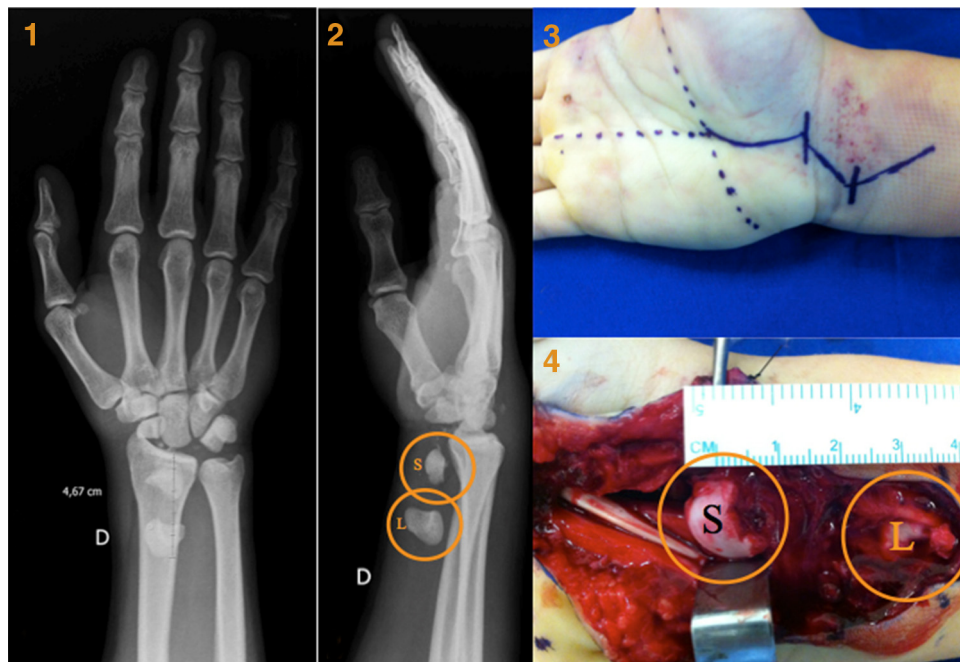
**Fig. 1 - Mayfield classification for perisemilunar injury.**

traumas. Perilunate fracture dislocation of the carpus involves a sequence of injuries that start with the dissociation of the scaphoid from the lunate bone. Mayfield et al.<sup>1</sup> identified four types of carpal bone injuries based on their radiological diagnosis. Scapholunate ligament injury (type I) occurs in the wrist with radial deviation, leading to a scaphoid fracture by the action of the scaphocapitate radius ligament. Scaphocapitate radius ligament injury (type II), presents with capitate dislocation along with the lunate bone. Ligament injury between the lunate and pyramidal bones is classified as Type III. If all the ligaments that surround the lunate are injured, the capitate applies force on the dorsal side of the lunate, resulting in volar extrusion of the lunate bone (type IV) (Fig. 1).

This report aims to recognize total enucleation beyond stage IV of the classification proposed by Mayfield et al.<sup>1</sup> In addition to a complete ligament injury that leads to the absence of circulation in the radiolunar ligament and prevents surgical reconstruction, the addition of a fifth category influences surgical treatment.

**Case report**

A 28-year-old man fell from a height of about three meters. Physical examination revealed swelling on the right wrist, without sensory and motor changes or bone exposure. Reaction to pain by local palpation, light pain with finger extension and the presence of a palpable radial and ulnar wrist/pulse were reported. Radiographs revealed a trans-scaphoid perilunate fracture dislocation beyond the type IV Mayfield. The lunate was located anteriorly, four centimeters proximal to the radius surface with total enucleation (extrusion). Additionally, a fracture of the scaphoid middle third was evidenced with complete volar dislocation of its proximal pole, which was located two centimeters from the radial surface. The distal third of the scaphoid remained in its normal position (Fig. 2A and B). The patient was taken to the surgery room for assessment and treatment. Inspection of the volar surface of the distal third of the forearm revealed only a small intact portion of the palmar fascia. Similarly, almost the entire transverse carpal ligament was avulsed from the ulnar to the radial side. The median nerve had edema, but with no structural injuries. The lunate, as well as the proximal pole of the scaphoid, were displaced and rotated completely out of their normal position. It was located in the volar surface, medial to the flexor muscles of the forearm without any kind of ligament connection (Fig. 2C and D). The surface of the capitate joint was found



**Fig. 2 - 1 and 2, anteroposterior radiographs and profile of the right wrist, demonstrating enucleation of the scaphoid (S) and lunate (L); 3, surgical planning; 4, intraoperative image showing enucleation of the scaphoid (S) and lunate (L).**

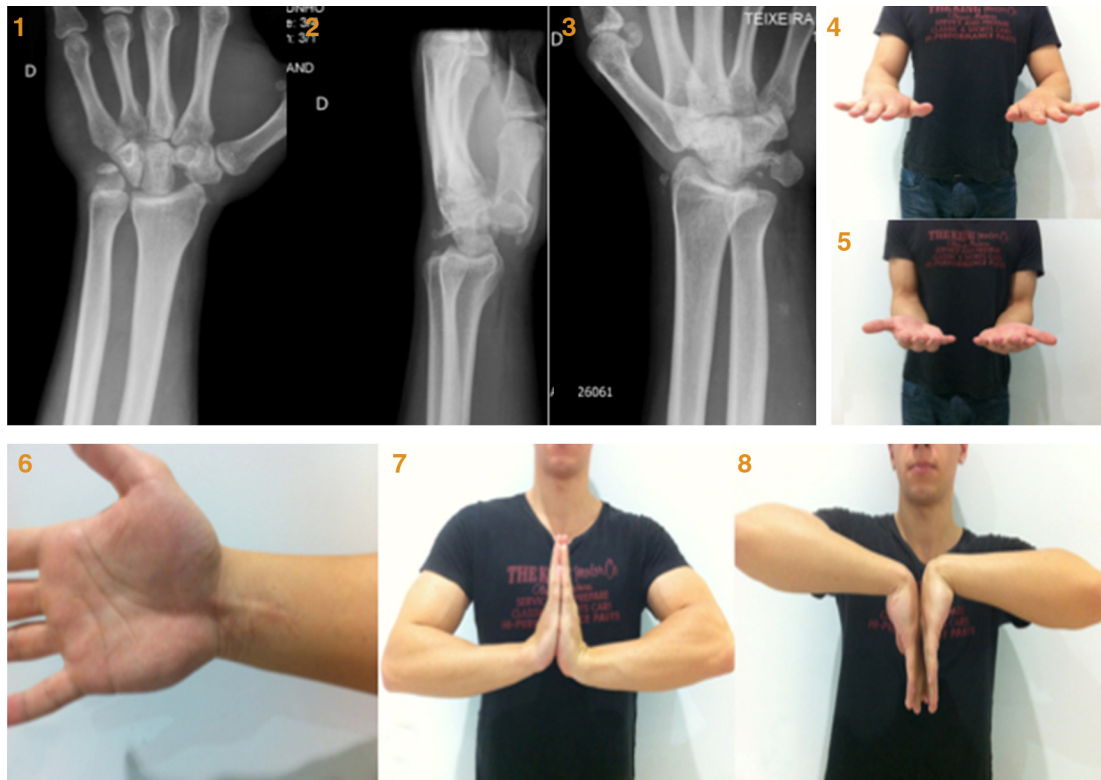


Fig. 3 – Postoperative follow-up visit after 1 year and 4 months. 1, anteroposterior radiograph; 2, lateral radiograph; 3, oblique radiograph; 4, pronation; 5, supination; 6, image of volar scar; 7, extension; 8, flexion.

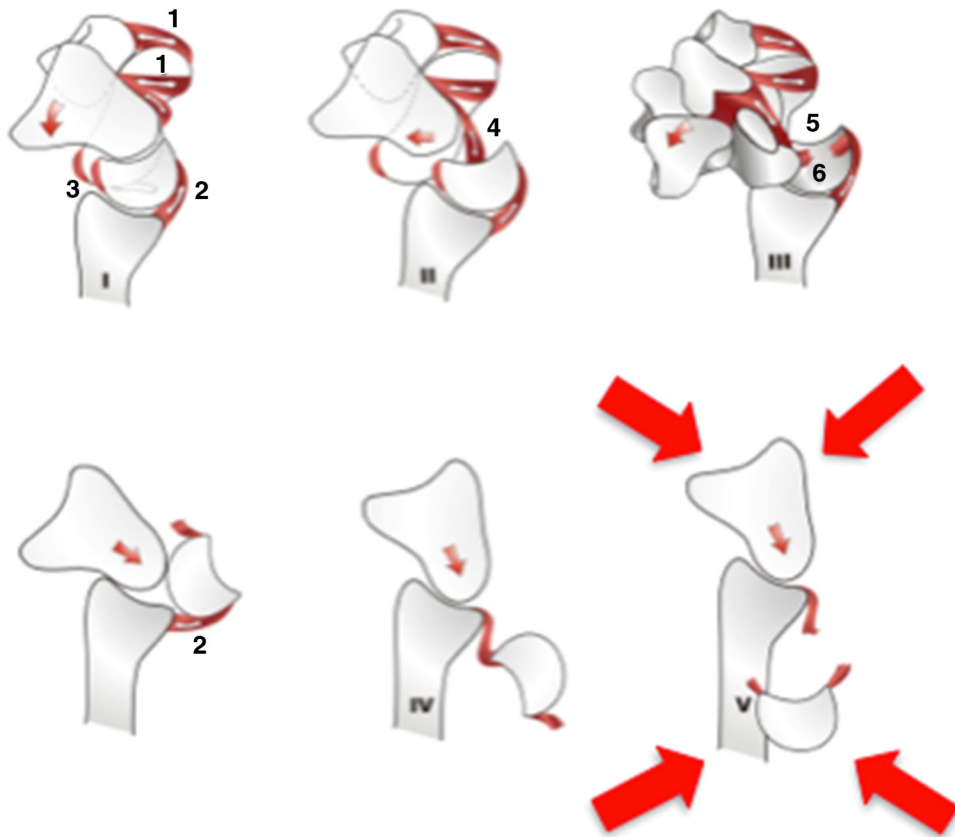


Fig. 4 – An illustration of the modified Mayfield classification as proposed by the authors.

intact. A proximal carpectomy was performed, and the capitate bone was articulated in the lunate cavity, as visualized by means of fluoroscopy (Fig. 3A-C).

Postoperatively, the wrist was immobilized with a cast volar splint. Stitches were removed on the 15th postoperative day and a plaster glove was kept in place for four weeks. The patient was instructed to perform active and passive exercises of fingers. The glove was subsequently removed and physical therapy was started. After one year and six months, the patient was asymptomatic and able to perform his daily labor activities normally (flexion of the right wrist 86/Extension 70/ulnar deviation 30/radial deviation 25) (Fig. 3D-H).

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## Discussion

Few reports in the literature discuss enucleation, i.e., the distance between multiple carpal bones without preservation of ligaments.<sup>2,3</sup> We found two case reports were in our literature review. One described enucleation of the scaphoid and lunate while the other discussed open wrist injury and loss of the lunate bone. This type of injury involves a higher energy and has decreased treatment options.

With a perilunate dislocation, the volar radiolunate ligament remains intact (Mayfield IV) stabilizing the lunate to the radius. When performing a surgical stabilization of a perilunate fracture-dislocation, the surgeon often stabilizes the carpal row proximal to the lunate. If the lunate is enucleated and without a ligament bond, then the treatment

algorithm should change because of the absence of the blood supply due to the ligament injury.<sup>4</sup> The authors propose a modification of Mayfield classification with the addition of a fifth category which recognizes a complete enucleation and adds a complete ligament injury that leads to non-existent radiolunate ligament circulation which subsequently hinders surgical reconstruction (Fig. 4).

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## Conflicts of interest

The authors declare no conflicts of interest.

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