

***Corresponding author**

*Tabbak.K, Traumatology and orthopedics emergency department of the chu ibn rochd of casablanca, Morocco

Open Radiocarpal fracture dislocation. A case report

El kassimi.C¹, Rouadi.S¹, Fadili.M¹Tabbak.K^{2*}, Rajaallah.A², Bachkira.M², Razaoui.A², Messoudi.A², Rahmi.M², Rafai.M²¹Laboratory of anatomy faculty of medicine and pharmacy Casablanca of the hassan II university, Morocco²Traumatology and orthopedics emergency department of the chu ibn rochd of casablanca, Morocco**Introduction**

Radiocarpal fracture-dislocation is a rare injury [1,2]. Open dislocations constitute an even smaller subgroup, representing 0.2% of all dislocations [3]. It is defined by a total and permanent loss of contact between the carpal unit and the lower articular surface of the forearm's two bones. It is often accompanied by fractures and its isolated form remains exceptional [5]. This injury occurs as a result of violent trauma, explaining the frequency of associated injuries.

Case Report

A 33-year-old man with no particular medical history was the victim of a 6-meter fall into a ditch with a point of impact on his left wrist in hyperextension and external tilt, causing an open injury at the same level. On general examination, the patient was conscious and stable in terms of hemodynamics and respiration; on clinical examination, he presented a wrist deformity in a forked back position with an 8 cm long internal poster opening from edge to



Figure 1: Preoperative clinical aspect of the wrist



Figure 2: Standard radiography of the wrist in dorsal and lateral views in cases of radiocarpal dislocation

edge, a contused and bleeding bed, with paresthesia in the territory of the ulnar nerve and well-perceived pulses.

The radiological examination revealed a posterior radiocarpal dislocation associated with a marginal posterior epiphyseal avulsion of the radius. The patient was urgently admitted to the operating room, where he underwent reduction under general anesthesia, debridement, and exploration of the wound, which did not reveal any tendon or vascular injuries. An embrochage of the marginal posterior radial was performed, followed by the radio-cubital and placement of a radio-metacarpal external fixator.

The external fixator was removed after six weeks, followed by the removal of the pins after two months, and then wrist and hand rehabilitation was initiated. The radiological follow-up showed satisfactory progress without recurrence of dislocation, with bone consolidation. After six months, the clinical outcome was satisfactory, evaluated based on pain, functional status, mobility, and grip strength. The wrist had 50° of palmar flexion, 35° of dorsal flexion, 15° of radial inclination, and 15° of ulnar inclination.

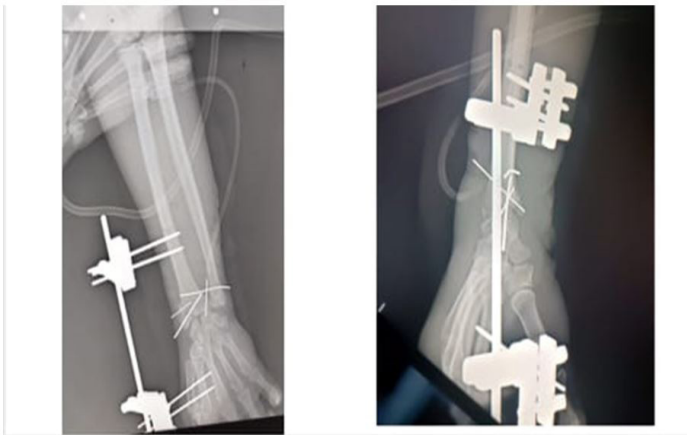


Figure 3: Postoperative follow-up radiography



Figure 4: Postoperative clinical aspect

Discussion

Radiocarpal fracture-dislocations are rare injuries, and few studies in the literature have addressed this serious wrist injury. The trauma responsible for the radiocarpal fracture-dislocation probably involves:

- A position of dorsal hyperflexion in general;
- Torsion [9, 15, 8];
- Lateral inclination [9].

Several arguments support such a mechanism: anamnestic arguments. Y. Gerard [9], for example, specifies that in two cases the mechanism was well defined by the interrogation: trauma occurring on a hand supported on the palmar surface in dorsal flexion and complete pronation; experimental arguments, notably the work of Weiss [23] who attempted to reproduce the injury mechanism in cadavers. This would probably involve hyperextension and pronation; radiological arguments. Dislocation, comminution of the articular rim, and more or less comminuted cuneiform fracture are evidence of probable radial impaction, probably caused by forced flexion and torsion. The fracture of the ulnar styloid is evidence of a probable mechanism of detachment, possibly caused by lateral inclination and torsion. The lower radioulnar dislocation, sometimes associated, is evidence of a torsion mechanism [19].

Dorsal dislocation is by far the most frequent form. Our findings are consistent with those in the literature, but it should be noted that all forms can be encountered: palmar [3, 6, 7, 11, 14], radial [2], or combined: dorso-cubital [2]... Pure dislocations are exceptional: only 3 cases have been described: Destot [5], Bohler [3]. Associated fractures are typical, the most common being the posterior marginal fracture as well as an external wedge fracture that takes away a portion of the postero-inferior end of the radial styloid tip [4, 6, 8]. Radiocarpal dislocations can also be associated with intracarpal lesions [4] or perilunate injuries [9]. Neurological involvement is common in the literature; Moneim [4] described a ulnar nerve injury in two patients who recovered completely. The regressive involvement of the median nerve, which seems to be the most frequent [1, 5, 8, 10], is due to its stretching over the deformed skeleton. In severe and open trauma, the rate of neurological complications rises to 100%. Tendon injuries are exceptional - Nyquist [15] reported a case of flexor rupture at the wrist during a dislocation-fracture with anterior opening. Cutaneous opening was found in a few cases [3, 19] but mainly in Nyquist's series [15], which adds an infectious risk to often major osteoarticular and nerve lesions. Although Mugdal et al. [1] found four cutaneous openings in 12 cases, Nyquist et al. [10] described ten cases, with etiologies mainly limited to traffic accidents and falls. An in-

depth study of the literature has shown no reported cases in sports practice. In Nyquist's series [10], patients were treated with debridement, open reduction supplemented by internal or external fixation. The majority of cases had ipsilateral limb fractures or dislocations, explaining the violence of the initial trauma. The median and/or ulnar nerve was contused in seven cases, requiring immediate decompression. Six patients were followed for an average of 15 months. Recovery was variable. Overall results were poor, regardless of treatment, with an average flexion-extension range of motion of 57°, and constant arthritic remodeling on follow-up radiographs. Surgical treatment involves longitudinal traction reduction, external or internal fixation to immobilize the joint, and synthesis of various associated bone injuries. The radiocarpal joint is then examined through the palmar wound by exploring the integrity of the tendinous, vasculonervous, and capsular elements. Careful debridement is necessary. The carpal tunnel and Guyon's canal can be decompressed as needed. Intraoperative radiography is used to identify carpal fractures or sprains of the interosseous ligaments, especially the scapholunate or lunotriquetral ligaments. If affected, capsuloligamentous surgery is necessary to prevent arthritic progression [4, 10, 13], which ensures good long-term results. A plaster cast can be associated for six to eight weeks [7, 12].

Conclusion

Radiocarpal dislocation is a rare traumatic injury. Its occurrence during sports practice is exceptional, because it is most often due to high energy trauma, during a fall from a high place or a serious accident from the public road. Skin opening and nerve damage worsen the functional prognosis of the wrist and hand. There therapeutic management is urgent, calling on a reduction of dislocation, stabilization of associated lesions, as well as an exploration of the wound in search of lesions tendons and vasculonerves. The major developmental risk is radiocarpal osteoarthritis, hence the importance of a good surgical procedure from the start, with capsule and ligament surgery, if necessary.

References

1. Mugdal CS, Psenica J, Jupiter JB. Radiocarpal fracture dislocation. *J Hand Surg* 1999;24B:92–8.
2. Girard J. Luxation radiocarpienne à propos d'une série de 12 cas et revue de la littérature. *Rev Chir Orthop* 2004;90:426–33.
3. Dunn AW. Fracture and dislocation of the carpe. *Surg Clin North Am* 1972;52:1513–38.
4. Moneim MS, Bolger JT, Omer GE. Radiocarpal dislocation-classification and rationale for management. *Clin Orthop Relat Res* 1985;192:199-209
5. Penny WH, Greene TL. Volar radiocarpal dislocation with ulnar translocation. *J Orthop Trauma* 1989;2:322-326.
6. Weber O, Müller M, Fischer P, Kabir K, Windemuth M, Pennekamp P, et al. Diagnosis and treatment of radiocarpal fracture dislocations. *Unfallchirurg* 2011;114:565-74
7. Bellinghausen HW, Gilula LA, Young LV, Weeks PM. Post traumatic palmar carpal subluxation. Report of two cases. *J Bone Joint Surg Am* 1983;65:998-1006
8. Bilos ZJ, Pankovicham, Yelda S. Fracture/dislocation of the radiocarpal joint. *J Bone Joint Surg* 1977;59:198–203.
9. Klein A, Bohrer SP, Martin W. Dorsal dislocation of the radiocarpal joint associated dorsal perilunar dislocation. *J Can Assoc Radio* 1986;37: 201–2.
10. Le Nen D, Riot O, Caro P, Lefevre C, Courtois B. Luxation/fractures de la radiocarpienne. Étude clinique de six cas et revue générale. *Ann Chir Main* 1991;10:5–12.
11. Dumontier C, Meyer ZU, Reckendorf G, Sautet A, Lenoble E, Saffar P, et al. Radiocarpal dislocations: classification and proposal for treatment. *J Bone Joint Surg* 2001;83A:212–8.
12. Freud LG, Ovesen J. Isolated dorsal dislocation of the radiocarpal joint. A case report. *J Bone Joint Surg Am* 1977;59:277
13. Nyquist SR, Stern PJ. Open radiocarpal fracture-dislocations. *J Hand Surg Am* 1984;9:707- 10
14. Hofmeister EP, Fitzgerald BT, Thompson MA, Shin AY. Surgical reconstruction of a latepresenting volar radiocarpal dislocation: a case report. *Am J Orthop* 2008;37:96-9
15. Maschke SD, Means Jr KR, Parks BG, Graham TJ. A radiocarpal ligament reconstruction using brachioradialis for secondary ulnar translation of the carpus following radiocarpal dislocation: a cadaver study. *J Hand Surg Am* 2010;35:256-61