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CASE REPORT

Isolated posttraumatic ulnar translocation of the radiocarpal joint

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Abstract An isolated posttraumatic ulnar translocation of the carpus is unusual. In cases in which the translocation occurs without accompanying injury to distal radius, ulna, or carpal bones, the diagnosis is often delayed due to the unfamiliarity of the treating physician with this rare radiographical finding. By presenting two patients with such an injury, we hope to increase awareness of this injury.

Keywords Isolated ulnar carpal translocation · wrist

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Introduction

Isolated posttraumatic ulnar translocation of the carpus is uncommon. In most of the patients described in published reports, the ulnar translocation occurs in association with injury to the distal radius or ulna, fracture of one or more carpal bones, or intercarpal ligament injury [1–12]. We found only two reports of isolated ulnar translocation of a normal carpus from a normal distal radius and ulna [13, 14]. This creates an unusual and unfamiliar appearance on radiographs that can be missed or misinterpreted. There is some pessimism regarding the ability to get ruptured volar radiocarpal ligaments to heal properly. We describe two patients with delayed recognition and delayed repair of isolated ulnar translocation of the carpus in order to increase awareness of this injury and discuss management issues.

Case reports

Patient 1

A 35-year-old man injured his left, dominant wrist and fractured his right femur in a motorcycle accident. Radiographs of the wrist were interpreted as normal and he was diagnosed with a wrist sprain and splinted. The fracture of the femur was repaired with an intramedullary implant.

Two months later the patient complained of persistent wrist pain and radiographs demonstrated ulnar translocation of the radiocarpal joint without associated fracture or intercarpal injury (Figs 1a and b). In retrospect this was apparent on the initial injury radiographs. Range of motion was limited to 20 degrees each of flexion and extension.

The wrist was approached through a volar-radial (Henry) exposure (Fig. 1c) [15]. There was an avulsion of the entire volar capsule from the volar articular margin of

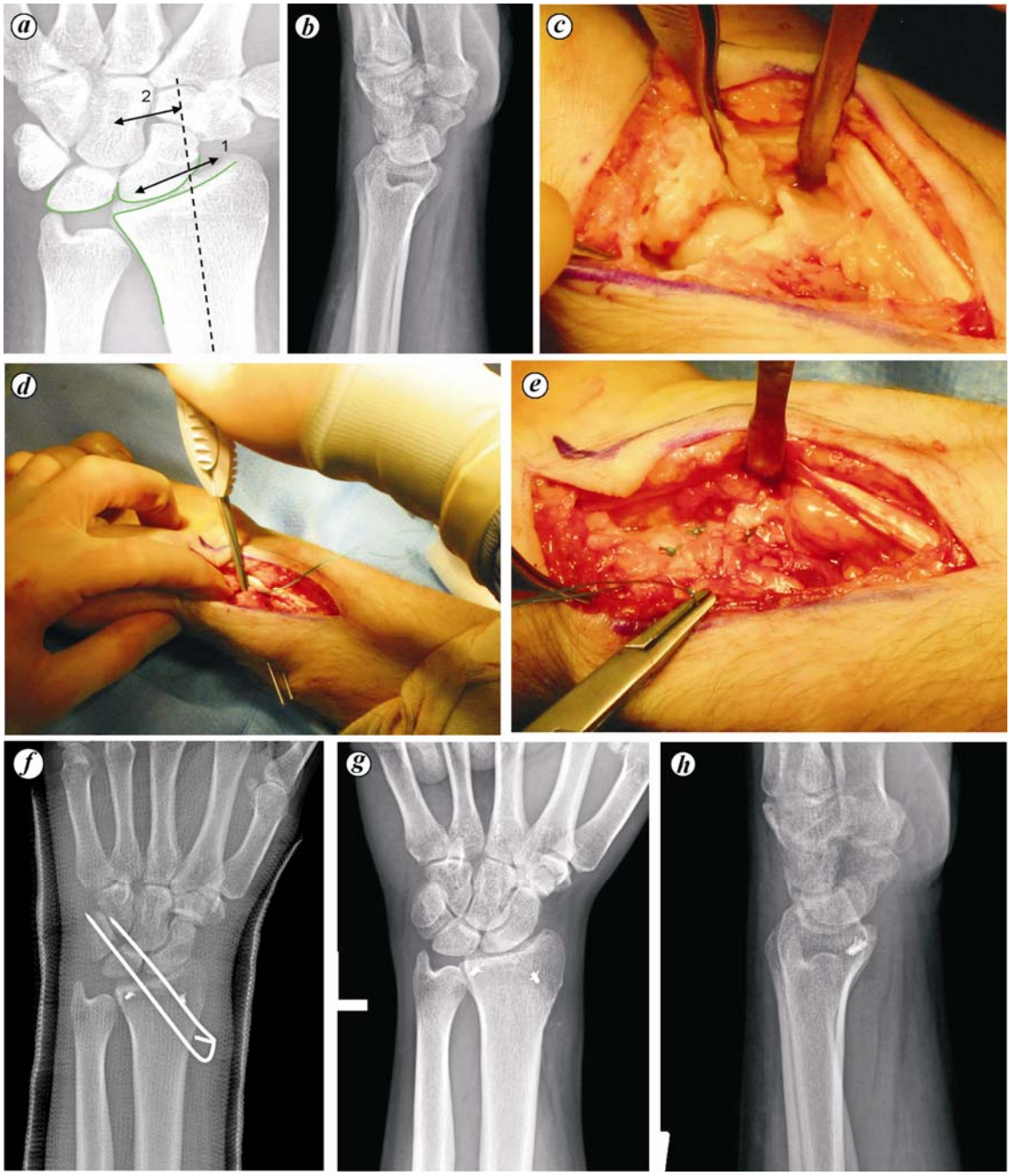

Fig. 1 A 35-year old man sustained an isolated ulnar carpal dislocation of his left wrist in a motor vehicle accident. **a**, A posteroanterior radiograph obtained two months later demonstrates ulnar translocation of the wrist. In retrospect, the initial posteroanterior radiograph had the same appearance, but the injury was not recognized. The interval designated by a 1 demonstrates an increased distance between radial styloid and scaphoid. Here, the scaphoid seems positioned in the lunate fossa. The interval designated by a 2 indicates an increased distance between a line drawn centrally through the radius, and through the center of the capitate. The distance here is more than the normal average of 5.7 ± 1.4 mm, indicating ulnar translocation of the carpus [16]. **b**, The lateral radiograph shows no apparent abnormality. The slight dorsal tilt of the lunate follows the third metacarpal. **c**, An intraoperative view demonstrates exposure of the volar wrist capsule through a Henry, volar-radial exposure. The sheath of the flexor carpi radialis is entered and the digital flexors and median nerve retracted ulnarward. The Hohman retractor is over the lunate and the forceps is grabbing the avulsed wrist capsule. **d**, The joint was cleared of tissue, realigned, and pinned with smooth Kirschner wires. The wrist capsule was reattached with suture anchors. **e**, A final intraoperative view demonstrating repair of the ligaments. **f**, A posteroanterior view obtained after surgery demonstrates temporary transfixation of the wrist and suture anchor repair of the ligament avulsions. The arm was immobilized in a below elbow cast. **g** and **h**, Posteroanterior and lateral radiographs six months after the initial injury demonstrate good alignment. The patient has 50° of wrist flexion and 40° of wrist extension.

the distal radius with incomplete attempts at healing. The joint was debrided of interposed fibrous tissue and the carpus was realigned and stabilized to the distal radius using two 0.062-inch smooth Kirschner wires (Fig. 1d). The wires were buried under the skin using a small radial incision. The ligament origins were reattached to the volar margins of the distal radius articular surface using suture anchors (Mitek, Inc.; Framingham, MA) (Fig. 1e).

The wrist was immobilized in a below elbow cast for eight weeks (Fig. 1f). Eight weeks after the initial surgery, the Kirschner wires were removed under local anesthesia. A removable wrist splint was prescribed and the patient was advised to gradually wean out of it. Wrist motion exercises were initiated under the supervision of an occupational therapist.

One year later, the patient experienced slight discomfort in his wrist while perfoming certain tasks with repetitive wrist movement. Wrist flexion was 50°, extension 40°, radial deviation 20° and ulnar deviation 30°. Forearm and digit motion were full. There was some residual loss of reduction and recurrent ulnar drift of the carpus, but no development of interval arthrosis (Figs. 1f, g).

Patient 2

A 21-year-old man injured his right, dominant wrist during hockey practice. He experienced immediate pain and the wrist was swollen on exam. By report his wrist was slightly swollen. Radiographs were interpreted as normal. He was diagnosed with a wrist sprain and given a removable splint for comfort.

Two months after the original injury he presented to one of us with persistent wrist pain. Physical examination revealed a fullness on the radial side of the wrist that was reducible with radial translation (Fig. 2a). Radiographs revealed ulnar translocation of the carpus (Figs. 2b and c). The patient requested operative treatment.

The operative treatment was identical to that described for the first patient with the following exceptions: (1) Patient 2 had concomitant prophylactic carpal tunnel release; (2) A suture anchor was placed in the scaphoid as an additional fixaiton point of the radioscaphocapitate ligament; and (3) The Kirschner wires were left superficial to the skin and were removed one month after surgery because they were infected.

Nine months after surgery, he had 50° each of wrist flexion and extension and a grip strength of 70 pounds (50% of the opposite, uninjured limb). Radiographs demonstrate substantial narrowing of the radioscaphoid articular surface and dorsal angulation of the lunate.(Figs. d and e) He continued to play hockey.

Discussion

Isolated ulnar translation of the carpus is uncommon and therefore unfamiliar. The radiographic appearance is unusual and can be somewhat subtle. Ulnar carpal dislocation may be present when less than 50% of the lunate articulates with the radius in neutral position in the posterioranterior radiograph [1, 2], although it may be necessary to compare with radiographs of the opposite, uninjured wrist. Ulnar translation of the carpus may also be evident as an increase in the distance between radial styloid and scaphoid, or positioning of the scaphoid in the lunate fossa [1]. Also, the distance between a line, drawn through the central axis of the radius, and the center of the capitate can be measured. The average value is 5.7 ± 1.4 mm and a measurement greater than 9 mm has been associated with ulnar translocation of the carpus [16]. Nonetheless, these measurements are quite variable and should be compared to radiographs of the opposite, uninjured wrist.

The mechanism of injury appears to be hyperextension of the wrist, combined with a torque and pronation of wrist or forearm, in which the radiocarpal ligaments are ruptured [2, 3]. The stout radioscaphocapitate ligament normally prevents the carpus from sliding ulnarly along the natural slope of the articulating surface of the distal radius [17, 18]. The radiolunate ligament is considered crucial in prevention of volar translation [19]. The extent to which ligament disruption must occur before ulnar translocation occurs is not certain, although most cadaver studies show that extensive disruption of volar ligaments is necessary. Viegas et al. [20] used 5 human cadaver wrists in a biomechanical loading study and consecutively transsected the radioscaphocapitate, the long radiolunate, the dorsal radiolunotriquetral ligament and the dorsal capsule, measuring ulnar translocation. They concluded that as long as the radioscaphocapitate and the long radiolunate ligament are intact, ulnar translocation will not occur. However, they also conclude that during biomechanical loading the radioscaphocapitate ligament alone does not prevent ulnar translation. Viegas further suggested that volar translocation of the carpus will occur before ulnar translocation, and that all wrists with ulnar translocation also have volar translocation [20]. Rayhack et al. [2] describes that the translocation can only occur when all volar radiocarpal ligaments have been transsected. The volar subluxation can be relatively subtle, as seen in our patients.

Arslan and Tokmak [13] presented a case of pure ligamentous injury and ulnar dislocation which they treated with closed reduction and application of an external fixator for six weeks. After 1 year, they noted redislocation of the carpus.

Howard et al. [21] presented a case of pure volar radiocarpal dislocation with postreduction ulnar translocation

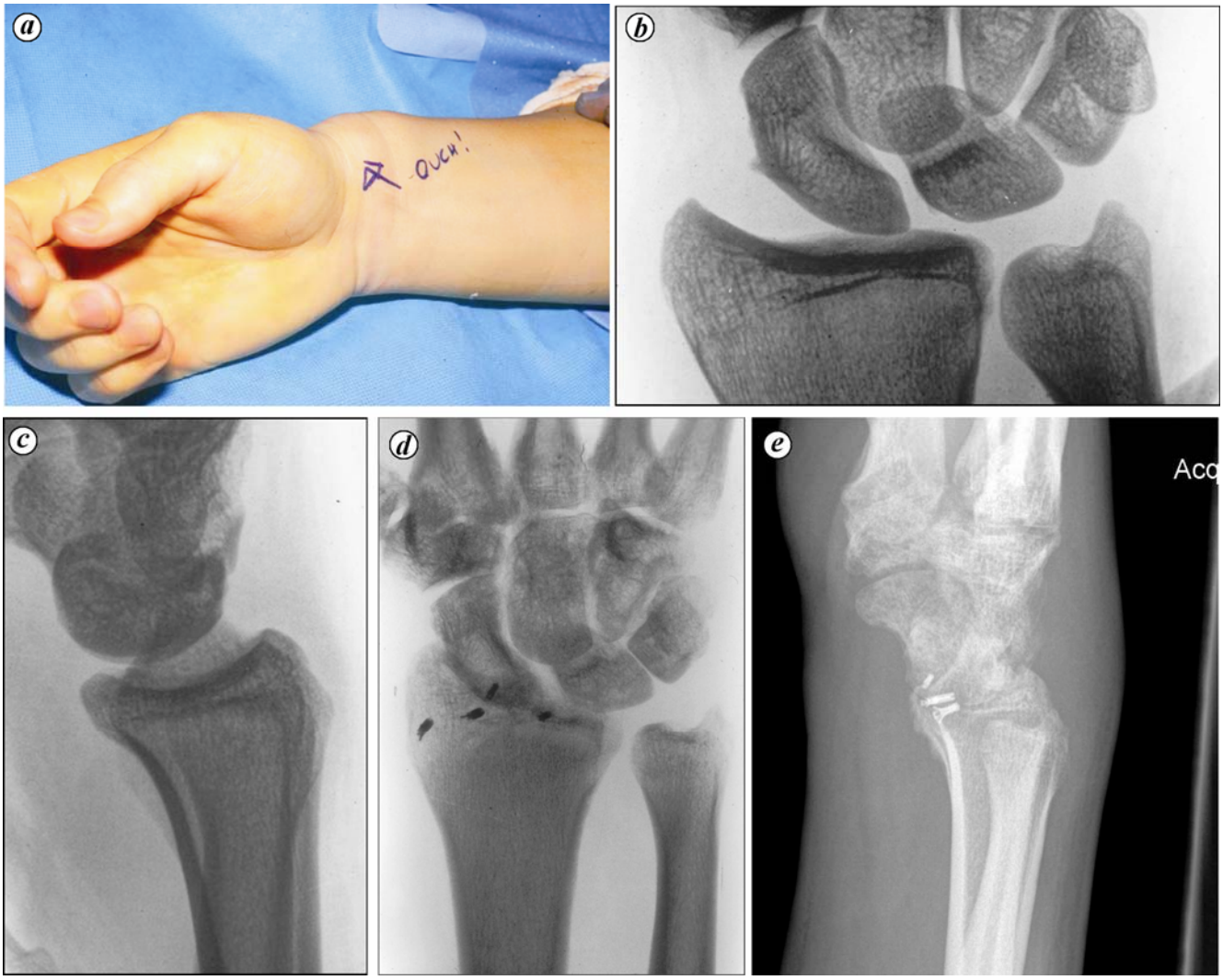

Figure 2. A 21-year-old man presented two months after a wrist sprain sustained playing hockey. He complained of persistent pain, dysfunction, and deformity. **a**, This intraoperative view demonstrates the apparent deformity on presentation. **b** and **c**, Posteroanterior and lateral radiographs demonstrate ulnar translocation of the carpus, with slight volar subluxation as well. **d** and **e**, Final posteroanterior and lateral views demonstrate narrowing of the radioscaphoid articulation and possible arthrodesis.

and (previously unrecognized) scapholunate dissociation which they treated with closed reduction and percutaneous pinning. After 12 and 18 months however, they noted increase of scapho-lunate dissociation and development of a dorsal intercalated segment instability deformity. They now consider this treatment inadequate and recommend open reduction and pinning through both volar and dorsal approaches with primary ligament repair.

Dumontier et al. [4] reviewed 27 cases of radiocarpal dislocations; only 2 of them were pure radiocarpal dislocations and both had secondary ulnar translation. Both were treated with closed reduction and percutaneous fixation but had recurrence of translocation. The author recommends repair of the radiocarpal ligaments through a volar approach, and K-wire fixation of the lunate to the radius for two months.

Rayhack [2] reviewed 8 cases of ulnar translocation of the carpus but did not mention associated osseous injuries. They state that there might be a relation between occurrence of scapholunate dissociation and ulnar translation as the mechanism of injury seems to be the same. Treatment of 4 of their cases was through combined volar and dorsal approaches, fixing the radiocarpal ligaments and pinning the radiocarpal joint percutaneously. Recurrence of ulnar translation occurred in 6 out of 8 cases, and a radiocarpal arthrodesis was eventually performed in 3. The authors are pessimistic regarding ligamentous repair and favor consideration of immediate radiolunate fusion. Jebson et al. [5] advocates radiolunate fusion for cases of delayed presentation or after unsuccesful ligament repair.

We report our two patients to encourage awareness of this injury and to emphasize the importance of early rec-

ognition and treatment of pure isolated ulnar translocations[1-3, 8]. In our opinion, the radiocarpal ligaments should be repaired and the radiocarpal joint immobilized with temporary transarticular Kirschner wire immobilization for at least six weeks. Radiolunate arthrodesis can be reserved for failed ligament repairs.

References

1. Stabler A, Baumeister RG, Szeimies U, et al. (1994) Rotatory palmar subluxation of the lunate in post-traumatic ulnar carpal translocation. Skeletal Radiol 23(2):103–106
2. Rayhack JM, Linscheid RL, Dobyns JH, et al. (1987) Post-traumatic ulnar translation of the carpus. J Hand Surg [Am] 12(2):180–189
3. Bellinghausen HW, Gilula LA, Young LV, et al. (1983) Post-traumatic palmar carpal subluxation. Report of two cases. J Bone Joint Surg Am 65(7):998–1006
4. Dumontier C, Meyer zu Reckendorf G, Sautet A, et al (2001) Radiocarpal dislocations: classification and proposal for treatment. A review of twenty-seven cases. J Bone Joint Surg Am 83-A(2):212–218
5. Jebson PJ, Adams BD, Meletiou SD (2000) Ulnar translocation instability of the carpus after a dorsal radiocarpal dislocation: a case report. Am J Orthop 29(6):462–464
6. Fennell CW, McMurtry RY, Fairbanks CJ (1992) Multidirectional radiocarpal dislocation without fracture: a case report. J Hand Surg [Am] 17(4):756–761
7. Berger RA, Bishop AT, Bettinger PC (1995) New dorsal capsulotomy for the surgical exposure of the wrist. Ann Plast Surg 35(1):54–59
8. Penny WH 3rd, Green TL (1988) Volar radiocarpal dislocation with ulnar translocation. J Orthop Trauma 2(4):322–326
9. Moneim MS, Bolger JT, Omer GE (1985) Radiocarpal dislocation--classification and rationale for management. Clin Orthop Relat Res (192):199–209
10. Gilula LA, Weeks PM (1978) Post-traumatic ligamentous instabilities of the wrist. Radiology 129(3):641–651
11. Bilos ZJ, Pankovich AM, Yelda S (1977) Fracture-dislocation of the radiocarpal joint. J Bone Joint Surg Am 59(2):198–203
12. Freeland AE, Ferguson CA, McCraney WO (2006) Palmar radiocarpal dislocation resulting in ulnar radiocarpal translocation and multidirectional instability. Orthopedics 29(7):604–608
13. Arslan H, Tokmak M (2002) Isolated ulnar radiocarpal dislocation. Arch Orthop Trauma Surg 122(3):179–181
14. Böhler L (1930) Verrenkungen der Handgelenke. Acta Chir Scand 67:154–177
15. Henry AK 1973 Exposure of the whole shaft of radius from in front with extensions to median and ulnar nerves. In *Extensile exposure* (ed. Edinburgh) London: Churchill Livingstone; 2nd edn, pp. 100–107
16. DiBenedetto MR, Lubbers LM, Coleman CR (1990) A standardized measurement of ulnar carpal translocation. J Hand Surg [Am] 15(6):1009–1010
17. Siegel DB, Gelberman RH (1991) Radial styloidectomy: an anatomical study with special reference to radiocarpal intracapsular ligamentous morphology. J Hand Surg [Am] 16(1):40–44
18. Ilyas AM, Mudgal CS (2008) Radiocarpal fracture-dislocations. J Am Acad Orthop Surg 16(11):647–655
19. Berger RA, Landsmeer JM (1990) The palmar radiocarpal ligaments: a study of adult and fetal human wrist joints. J Hand Surg [Am] 15(6):847–854
20. Viegas SF, Patterson RM, Ward K (1995) Extrinsic wrist ligaments in the pathomechanics of ulnar translation instability. J Hand Surg [Am] 20(2):312–318
21. Howard RF, Slawski DP, Gilula LA (1997) Isolated palmar radiocarpal dislocation and ulnar translocation: a case report and review of the literature. J Hand Surg [Am] 22(1):78–82