CASE REPORT

Volar dislocation of the distal radio–ulnar joint without fracture: A case report and literature review

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Summary Volar dislocation of the distal radio–ulnar joint without an associated fracture is an uncommon injury. The signs and symptoms may be subtle leading to the injury being missed. A high index of suspicion is necessary when examining a painful wrist in the absence of a fracture. We present a case report and literature review of the management and outcome of this injury.

Introduction
Dislocation or subluxation of the distal radio–ulnar joint (DRUJ) is usually associated with fractures of the radius and ulna. Isolated distal radio–ulnar joint injury is uncommon, with dorsal dislocation occurring more frequently than volar. It is an injury that can be missed initially due to subtle signs and interpretation of inadequate radiographs.4,9,10 The clinician should have a high index of suspicion as early diagnosis and treatment gives a favourable outcome. We present a case of volar dislocation of the distal radio–ulnar joint without an associated fracture, and a review of the literature.

Case report
A 46-year-old right-handed man presented to our Accident and Emergency department complaining of left sided wrist pain and inability to rotate his forearm after sustaining an injury whilst playing rugby that afternoon. The injury occurred whilst attempting a tackle although the exact mechanism was unclear. Examination revealed limited pronation/supination and pain and swelling around the distal radio–ulnar joint with a palpable deformity on the volar aspect of the wrist. No neurovascular compromise was found. Antero-posterior and lateral radiographs of the forearm and wrist showed a volar dislocation of the distal radio–ulnar joint with no fracture (Figs. 1 and 2). Attempted closed reduction in the Emergency department was unsuccessful. He was admitted and taken to theatre where the dislocation was reduced closed under general anaesthesia by applying direct pressure over the distal ulna whilst pronating the forearm. The DRUJ was stabilised with one percutaneous Kirschner wire (Figs. 3 and 4). He was placed in a short arm plaster for four weeks followed by supervised physiotherapy. Out-patient magnetic resonance imaging was performed to exclude an injury to the Triangular Fibrocartilage Complex (Figs. 5 and 6). When reviewed two years after the injury the patient has remained asymptomatic with full pronation and supination of the forearm Figs. 7 and 8. He has a full time job as a company director and continues to play rugby.

Discussion
Desault was the first to describe a simple anterior dislocation of the distal end of the ulna in a cadaver in 1777. Since then occasional cases have been reported. Volar dislocation could...
be caused by extreme supination of the forearm upon a fixed hand, due to a simple fall, weight-lifting, direct blow to the wrist and playing rugby. In the case presented here, the exact mechanism is unclear.

Patients can present with a forearm locked in full supination whilst in others the range of motion may only be partially reduced or even normal. Examination can reveal a gutter on the dorsal aspect of the wrist with the head of the ulna being palpable on the volar surface but may also show no evidence of deformity. Standard antero-posterior and lateral radiographs of the wrist should be obtained. The relationship of the distal ulna to the distal radius is important when obtaining lateral radiographs and can alter significantly if the forearm is rotated between 10 and 20° away from neutral. Therefore, lateral radiographs should be taken with the forearm in neutral rotation and 90° of elbow flexion. Optimal positioning of patients with reduced wrist movement after injury might not be possible and may therefore cause the injury to be missed on the radiographs. Some authors suggest obtaining radiographs of both wrists in analogous

Figure 1  Volar dislocation on lateral radiograph.

Figure 2  Volar dislocation on antero-posterior radiograph.

Figure 3  Intraoperative lateral image after reduction.

Figure 4  Intraoperative image with Kirschner wire stabilisation.
rotation. Others have used computed tomography as well as radiographs to diagnose DRUJ dislocation/subluxation. Mino et al. correlated the radiographic appearances with computed tomography of 15 wrists. They showed that computed tomography diagnosed a dislocation/subluxation of the DRUJ in four out of nine wrists that were initially deemed to have normal lateral radiographs. They concluded that if optimum positioning of the wrist and forearm for a lateral radiograph is not possible either due to pain or cast immobilisation, then computed tomography is the examination of choice to identify DRUJ incongruence. This view is supported by King et al. although they state that CT of the DRUJ may be normal despite disruption of the dorsal and palmar radioulnar ligaments and the triangular fibrocartilage.

Once the diagnosis is made in an acute setting, closed manipulation can be attempted in the Emergency department with adequate analgesia/sedation. If reduction is not achieved then the patient should be taken to the operating theatre to have manipulation under anaesthesia. Reduction is achieved by manually applying pressure over the prominent ulnar head whilst pronating the forearm. The Image Intensifier can then be used to confirm this. Usually the reduction is stable and further plaster-of-Paris cast is all that is required. If the reduction is deemed unstable, a percutaneous Kirschner wire or Steinman pin can be used to temporarily transfix the DRUJ whilst in plaster. In our case, we used a short arm plaster for four weeks followed by physiotherapy. The period of immobilisation required varies between three and six weeks although an above elbow cast is recommended for those injuries where the DRUJ is not transfixied. In those situations where the DRUJ is deemed unstable and is transfixied with a Kirschner wire, below elbow immobilisation is satisfactory. For those injuries where the diagnosis has been missed and subsequent treatment delayed, closed reduction under anaesthesia is generally required. Furthermore, closed reduction is still possible up to seven weeks after the injury.

Early diagnosis and treatment gives a favourable outcome although good function can still be achieved with a delay in treatment of up to seven weeks. Dameron reported two cases where treatment was delayed by six and seven weeks, respectively. A satisfactory outcome was only achieved after resection of the distal ulna 18 months post injury. Chronic volar dislocation of the DRUJ can be treated by excision of the distal ulna with a satisfactory outcome.
The distal ulna lies in close association with the triangular fibrocartilage complex (TFCC). It is firmly attached to the base of the ulna styloid and ulnar border of the radius. It is this close association that makes it susceptible to damage with volar dislocation of the DRUJ. It has been stated that the TFCC has to be damaged for dislocation to occur.\textsuperscript{7} The treating clinician should be aware of this and suspect TFCC damage if symptoms fail to resolve after immobilisation and subsequent physiotherapy.

**Conclusion**

Isolated volar dislocation of the distal radio–ulnar joint is uncommon and may have subtle clinical signs. A high index of suspicion is required when assessing patients with a painful wrist where no fracture has been identified. CT scanning should be used to aid diagnosis if plain radiographs are inadequate. Early diagnosis and treatment is the key for a good outcome although those injuries where diagnosis is missed and treatment delayed can still have a successful outcome up to seven weeks after the injury.\textsuperscript{9}

**References**