Isolated Volar dislocation of the distal radio-ulna joint: A case report and review of the literature

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Citation

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Abstract

Dislocation of the distal radio-ulna joint is an uncommon injury especially when it is not associated with any fractures. Isolated volar dislocation is a rare orthopaedic injury requiring a high index of suspicion to diagnose. Only a few case reports have described the management of these volar dislocations with open reduction and repair in the last 60 years. Successful outcomes have been reported from open reduction, ligament repair and pining 3. This is believed to be the first case report that describes open reduction and fixation with percutaneous wires with no repair to an isolated dislocation of the distal ulna.

CASE SUMMARY

A 26 year old professional rugby player was involved in a tackle injuring his right wrist during a league match. He sustained a direct blow to the ulna aspect of his pronated forearm with his elbow held in flexion. He attended the Accident and Emergency (A&E) Department with severe pain and swelling. On clinical examination there was an obvious deformity with an absence of the ulna styloid prominence and a visibly narrowed wrist. There were minimal movements in his wrist with absent pronation and supination. Radiological examination revealed an isolated dislocation of the distal radio-ulna joint with shortening of the ulna (Figure 1).

Figure 1

Figure 1: AP and Lateral X-ray demonstrating an isolated dislocation of the distal radio-ulna joint with shortening of the ulna.

He was managed in A&E initially with a back slab and elevation. Computed tomography (CT) scan confirmed the plain film findings and reported a small avulsion fragment from the distal ulna measuring 6mm. Three days post injury, close reduction was attempted in theatre under general

anaesthesia under Fluoroscopic guidance. As this was unsuccessful, he proceeded to have an open reduction with Kirschner wire fixation and an above elbow back slab (Figures 2,3).

Figure 2

Figure 2: AP X-ray following fixation with K-Wires.

Figure 3

Figure 3: Lateral Views following fixation with K-wires.

The Kirschner wires were removed 25 days later and he was referred to the physiotherapy department. He subsequently had a MRI scan that did not demonstrate a tear in the triangular fibrocartilage complex (TFCC).

DISCUSSION

There are 3 reported mechanisms causing isolated volar dislocation of the distal radio-ulna joint. These include hypersupination of the forearm when the hand is fixed, a direct dorsally applied force to the distal ulna, and a pronation injury to the hand when the forearm is fixed. In this case the second mechanism describing a direct dorsal force seems most likely, although a component of hypersupination of the forearm maybe involved [2,6,7].

Careful history and examination along with a high index of suspicion is required to diagnose this injury complex. Clinical examination would reveal the absence of the ulna styloid prominence resulting in a narrowed wrist in comparison to the other side with palmar fullness at the ulna aspect of the wrist [2,7]. These characteristic findings maybe obscured by swelling and haemorrhage into the soft tissue especially in late presentations [1,6]. Movements of the wrist maybe restricted, painful or merely uncomfortable and the forearm can be locked in supination as seen in our patient [1,2]. Associated ulna nerve symptoms maybe present [6].

Anteroposterior and lateral radiographs may assist the diagnosis process however pain and restricted movement may result in the inability of the patient to maintain the required position. Anteroposterior views are obtained by flexing the elbow and abducting the shoulder to 90. A volar distal radio-ulna dislocation will result in an overlap of the distal radius and ulna due to the pull of the pronator quadratus as apposed to widening of the joint as seen in dorsal distal radio-ulna dislocations [4]. In a true lateral radiograph, a straight line would be able to be drawn through the capitate which sits at the base of the 3rd metacarpal articulating with the lunate followed by the radius with the distal radius superimposed on the ulna. The films would be obtained by flexing the elbow to 90 with the arms by the chest and forearm held in neutral position. The X-ray beam is then centered between the two styloid processes [5]. Volar distal radio-ulna dislocation would reveal the distal ulna displaced anteriorly compared to the radio carpal mass. A computed tomography (CT) should be considered in cases where radiological examination is inconclusive or there is difficulty in obtaining the required view. CT scan can provided additional information of the injury complex as

well as diagnose the dislocation in any position of the rotated forearm [5].

Most cases of volar dislocations that are reported in the literature are managed with closed reduction and cast immobilization. Forceful manipulation of the joint and hyperpronation of the forearm usually reduces the dislocation [1]. Occasionally in order to successfully reduce the dislocation, Dameron describes the need for manual pressure on the ulna on a medial and dorsal direction while pronating the forearm because of the pull of the pronator quadratus muscle [1]. Open reduction may be necessary if the head of the ulna is locked under the radius or if there is an obstruction produced by the overlying an interposed TFCC [3,5].

Very few cases of patients with isolated volar dislocation of the ulna, requiring open reduction have been reported. These are summarised in table 1.

Figure 4

Table 1

Reference	Age / Sex	Styloid fracture	Mechanism	Interval before treatment	Primary Treatment	Secondary treatment	Result
Dameron TB, 1972[1]	55, F	No	Fell from stool, Probable direct dorsal force	5 days	Open reduction, suture torn triangular cartilage	Cast immobilization	Satisfactory
Paley D et al, 1986[6]	57, M	No	Direct dorsal force from truck	>26 days	Open reduction, division of TFC, Ulna head excision	Cast immobilization 6 weeks	Decreased grip strength, Full range of movement
Takami S et al, 2000[7]	20, M	Yes	Fell while playing football, unknown mechanism	2 days	Pronator Quadratus release, Ulna reduction and repair of pronator quadratus	Above elbow cast immobilization 4 weeks	Full return of strength and function.
Quah et al, 2007	26, M	No	Rugby tackle, direct dorsal force	3 days	Open reduction, K-wire fixation	Above elbow cast immobilization 4 weeks	Satisfactory

As described earlier, the volar displacement is caused by the pull of pronator quadratus. Takami reports releasing pronator quadratus from its lower ulna attachment to facilitate reduction. In the reported cases of distal radio-ulna joint dislocation, damage to the triangular fibrocartilage complex (TFCC) is frequently described. Newman, reported MR imaging showing, a tear in the TFCC with disruption of its radial attachment. Paley reports a similar pattern of radial attachment tear, interposed over the dorsum of the ulna head, preventing closed reduction. Takami reports avulsion of the TFCC, at the base of the ulna styloid, similar to this reported case. Dameron reviewed 11 cadaveric wrists, and found it impossible to completely dislocate the distal radio-ulna joint either volarly or distally with out cutting at least a proportion of the TFCC. However, our patient's subsequent MR scan did not reveal any tear to the TFCC therefore making it possible to completely dislocate the distal radio-ulna joint without any disruption to the TFCC. Although TFCC ruptures have been regularly reported either on imaging, open reduction, and cadaveric studies, variation in opinion exists on whether TFCC repair is required.

In conclusion, we feel that fixation with Kirschner Wires without ligament or TFCC repair can be considered as the treatment of choice as it has brought about satisfactory results in our patient. The gold standard in managing isolated volar dislocation of distal ulna is still debatable as there have been only a few cases reported in the literature.

References

1. Dameron TB. Traumatic dislocation of the distal radio-ulnar joint. Clin Orthop. 1972; 83: 53-63.
2. Gale DW and Parmar H. Isolated, volar dislocation of the distal ulna without an associated forearm fracture. J. R. Coll. Surg. Edinb. 1994; 39: 196-197.
3. Howard RF, Slawski DP and Gilula L. Isolated palmar Radiocarpal Dislocation and Ulnar Translocation: A case Report and Review of the Literature. J Hand Surg. 1997; 22: 78-82.
4. Mittal R, Kulkarni R, Subsposh SYA and Giannoudis. Isolated volar dislocation of distal radioulnar joint: how easy to miss! Eur J Emerg Med. 2004; 11: 113-116.
5. Newman KJH and Toh CT. Volar dislocation of the ulna head: torn triangular fibrocartilage demonstrated on MRI scan. Injury. 1994; 25: 259-261.
6. Paley D, Rubenstein J and McMurtry RY. Irreducible dislocation of the distal radio-ulnar joint. Orthop Rev.1986; 15(4): 228-31.
7. Takami S, Takahashi S and Ando M. Isolated palmar dislocation of the distal radioulnar joint in a football player. Arch Orthop Trauma Surg. 2000; 120: 598-600

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