Simultaneous dislocation of proximal and distal radio-ulnar joints: a case report

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ABSTRACT

Simultaneous dislocation of the radial head and distal radio-ulnar joint is rare. We report a 71-year-old man with volar dislocation of the radial head and dorsal dislocation of the distal radio-ulnar joint, and discuss the injury mechanism and its management with closed reduction.

Key words: radius fractures; ulna fractures

INTRODUCTION

Simultaneous dislocation of the radial head and distal radio-ulnar joint in adults is rare. This pattern of injury does not conform to the description of Monteggia or Galeazzi fractures or Essex-Lopresti fracture-dislocation. We report a 71-year-old man with volar dislocation of the radial head and dorsal dislocation of the distal radio-ulnar joint.

CASE REPORT

In October 2011, a 71-year-old man presented to our hospital after falling backward from a ladder at a height of 1.5 meters and landing on his left side. His left forearm was held in pronation, with the elbow in flexion and the wrist in dorsiflexion. The left wrist was swollen and tender on palpation. Pronation and supination of the forearm were absent, whereas elbow and wrist movements were restricted by pain. There was no neurological or vascular injury.

Radiographs revealed an anterolateral dislocation of the radial head and dorsal dislocation of the ulnar head, with 10 mm of positive ulnar variance (Fig. 1). A small avulsion fracture fragment of the radial head was also noted. There were no other fractures and the ulnohumeral articulation remained intact.

Closed reduction was performed under general anaesthesia. The forearm was fully supinated, with the elbow in 90° flexion and direct pressure over the radial head. Once the radial head was reduced, the distal radio-ulnar joint was reduced automatically in full supination. The radial head and distal radio-
ulnar joint were stable on full supination but unstable in neutral position. An above-elbow cast was applied with the arm in full supination.

The patient was followed up with weekly radiographs to monitor any loss of reduction. The cast was removed after 6 weeks, and physiotherapy started. At 6-month follow-up, the patient had regained normal handgrip strength, full wrist movement, and full supination of the forearm (but pronation was up to 60°). The range of motion of the elbow was 10° to 120° of flexion (Fig. 2).

**DISCUSSION**

Isolated radial head dislocation is rare and usually associated with a proximal ulnar fracture (Monteggia’s fracture) or elbow dislocation. Distal radio-ulnar joint dislocation is often associated with fractures of the distal radius, radial shaft (Galaezzi’s fractures), radial head, and/or radial neck (Essex-Lopresti’s injury). Four cases of simultaneous dislocation of the proximal and distal radio-ulnar joints have been reported.1–4 One was a dislocation of the radial head and distal radio-ulnar joint associated with complete elbow dislocation.1 Another was a 12-year-old injury,

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**Figure 1** Radiographs showing an anterolateral dislocation of the radial head and dorsal dislocation of the ulnar head with 10 mm of positive ulnar variance, and a small avulsion fracture fragment of the radial head.

**Figure 2** Radiographs of the left elbow and forearm at 6-month follow-up.
with instability of the elbow and wrist joints (injury mechanism was not described). Two others involved double volar dislocations of the proximal and distal radio-ulnar joints, and a criss-cross injury mechanism was proposed, with the interosseous membrane acting as a pivot between the 2 forearm bones.

In the current case, the radial head displaced anterolaterally and the ulnar head displaced dorsally. Continued hyperpronation may have been the main force to dislocate the proximal and distal radio-ulnar joints. As the patient fell backward onto a dorsiflexed wrist, pronated forearm, and an extended elbow, rotation of the body over the affected arm fixed to the ground may have created further pronation. This would also generate varus strain to the elbow, eventually disrupting the annular ligament and the posterior border of the quadrate ligament and dislocating the radial head anterolaterally. An intact distal radio-ulnar joint could have provided a stable fulcrum. As the patient’s body rotated, further hyperpronation would disrupt the dorsal portion of the triangular fibrocartilage and the dorsal radio-ulnar ligament resulting in dorsal subluxation of the ulnar head. This would also be aided by pulling of the pronator quadratus on the distal ulna. Once the radius separated from the ulna at both the wrist and elbow levels, axial loading along the longitudinal axis of the forearm would lead to disruption of the interosseous membrane and thereby proximal translation of the radius and positive ulnar variance or distal ulnar head migration. This injury therefore differs from an Essex-Lopresti injury, where axial compression acts as the primary force to fracture the radial head and neck, resulting in proximal migration of the radius and subluxation of the distal radio-ulnar joint.

In terms of the sequence of the dislocations, it is hypothesised that the radial head dislocation precedes the distal radio-ulnar joint dislocation. When the hand is free to rotate, the axis of rotation passes along the line from the radial head to the ulnar styloid. The radius rotates around the ulna in an arc of 150°, accompanied by limited movement of the ulna (dorsal in pronation and volar in supination). When the hand and wrist are fixed, the radial movement is restricted and the axis of motion moves toward the distal radius and the rotational movement passes to the ulna. This provides a larger lever arm at the distal radio-ulnar joint for the ulnar head to dislocate. Should the distal radio-ulnar joint dislocate first, further hyperpronation would not strain the proximal radioulnar joint enough to dislocate, particularly with its short-lever arm, as the distal ulna would move freely, allowing hyperpronation. Moreover, varus strain exerted at the elbow from hyperpronation also allows the radial head to dislocate while the ulna is fixed to the ground at the wrist joint.

The injury mechanism in radial head dislocation is commonly due to the hyperpronation force, and reduction is therefore achieved by supination. The proximal radio-ulnar joint is most stable in supination, where the contact between the radius and ulna is maximal, and the interosseous membrane, annular ligament, and anterior fibres of the quadrate ligament are all taut, thus drawing the radial head snugly against its notch in the ulna. Nevertheless, an anterior dislocation of the radial head with extreme supination of the forearm can be reproduced in a cadaver.

The rotational position of the forearm at presentation is the key to determining the direction of reduction. Our patient presented with pronation deformity, and thus supination was needed for reduction. Similarly, a supination manoeuvre was performed for reduction of the radial head for a patient whose forearm was in hyperpronation.

In dislocation of the distal ulna, the injury mechanism is usually hyperpronation causing a dorsal dislocation or hypersupination and then a volar dislocation. Hence, reduction can be carried out by supination and pronation, respectively. Closed reduction under anaesthesia should be attempted first before proceeding to open methods. Reconstruction of ligamentous structures should be reserved for chronic cases with symptomatic instability.

DISCLOSURE

No conflicts of interest were declared by the authors.

REFERENCES

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