Distal Radioulnar Joint Dislocation as a Result of Ulnar Shaft Fracture in a child: A Case Report

Abstract
Ulnar shaft fracture with Distal Radio-Ulnar Joint (DRUJ) injury in children is rare. If the orthopedic surgeon doesn’t attention to radiologic findings, this unusual fracture-dislocation will be treated incorrectly that can harm to patient for inappropriate surgical planning. This pattern of injury should be differed from usual forearm fractures such as Monteggia or Galeazzi fractures-dislocation. We present the case of patient with ulnar shaft fracture and DRUJ dislocation in 10 years old man and discussed about mechanisms and treatment of this injury.

Keywords: Distal radioulnar joint dislocation (DRUJ), ulnar shaft fracture, unusual forearm fracture

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* Adel Ebrahimpour, MD;** Ali Fotouhi, MD;*** Arash Maleki, MD

Introduction
Isolated fractures of the ulnar shaft are common forearm injuries. This fracture usually is occurred after direct trauma to the ulna used to protection and commonly known as nightstick fractures. DRUJ injury occurred usually with radial fracture and sometimes with distal styloid ulnar fracture (1).

Distal radius and ulna articulated together in DRUJ that allow forearm rotation (supination and pronation) (2) there is some possibility for translocation during articulation area in radial notch (3). The main longitudinal forearm stabilizer is radial head, and secondary stabilizers are the triangular fibrocartilage complex (TFCC) and the interosseous membrane (IOM) (4). Radial shaft fracture with shortening and angulation, typically at the connection of the middle and distal thirds, is associated with ligament interruption and dislocation in the DRUJ. Described DRUJ dislocations with diaphasia radius fractures have been known for thoroughly 200 years (2). In other side, Monteggia fracture-dislocations denote a fracture of the proximal ulna with concomitant radial head dislocation (4). And the Essex-Lopresti injury occurs with assemblies of injuries at all 3 forearm stabilizing structures: the radial head, the IOM, and the DRUJ (TFCC).

Isolated fractures of the ulnar shaft are common forearm injuries. This fracture usually is occurred after direct trauma to the ulna used to protection and commonly known as nightstick fractures (1) in this fracture. None of the three forearm stabilizers isn’t torn. Ulnar shaft fracture with DRUJ injury hasn’t been reported yet and this pattern of injury does not adapt to the account for Monteggia or Galeazzi fractures-dislocation and Essex-Lopresti injury. We present the case of patient with ulnar shaft fracture and DRUJ dislocation in 10 years old male and discussed about mechanisms and treatment of this injury.

In physical examination, forearm tenderness without skin damage (ulceration or abrasion) was found. Transverse ulna fracture (anterior apex) combined with posterior distal ulnar radial joint (DRUJ) dislocation was found in radiographic imaging (Fig 1-A).

Case report
A 10 years old male patient presented to emergency department, Tehran, Iran in 2019 with right forearm deformity caused by falling down when playing soccer. He described that his upper extremity was tangled between a pit on soccer field and his knee at falling time.
First, closed reduction under general anesthesia in operation room was done two times, but the reductions were not acceptable, so ulna fracture was reduced with ulna approach and it was fixed with one plate. Fortunately, DRUJ was reduced simultaneously and it was stable. (fig1-B) Postoperative, forearm was immobilized in long arm splint for 6 weeks. After 6 weeks rehabilitation was started for 2 weeks. After 2 months, fracture site had not any pain at forearm rotation (supination and pronation) was same as another forearm without restriction (Fig1- C).

**Discussion**

The skeletal stability of the forearm comes from the participation of Radius and Ulna also forearm rotation is depended to these bones mobility in proximal and distal ends, so Proximal radioulnar joint (PRUJ) and DRUJ allow forearm rotation (supination and pronation)². On the other hand, the main longitudinal forearm stabilizer is radial head, and secondary stabilizers are the triangular fibrocartilage complex (TFCC) and the interosseous membrane (IOM)³. Bending forces can lead both-bone forearm fractures at the same level of diaphysis. In addition, these bending forces can result the proximal ulna is fractured and the radio-capitellar and proximal radioulnar joints (PRUJs) dislocate in the direction of the ulnar deformity (Monteggia fracture dislocation). After torsional forces with axial loading that occurred during a fall with a hyperpronated forearm and wrist extension, radius and ulna is broken at different levels or to Galeazzi fractures. In Galeazzi fractures, the force is generated through the radial shaft (this bone was fractured) and progresses distally rupturing the interosseous membrane and finally injuring the triangular fibrocartilage complex (TFCC), thereby rendering the distal radioulnar joint unstable.
Isolated fractures of the ulnar shaft are common forearm injuries. They most often result from a direct trauma to the ulna as the arm is elevated overhead to protect from a shock, they are commonly known as nightstick fractures. All of this four types of fracture are common but some rare cases were found in other reports such as Billy LK Wong et al reported a 71 years old male with simultaneous volar dislocation of radial head and dorsal dislocation of distal radio-ulnar joint without fracture which was a result of high energy trauma. But we haven’t found any case with ulna fracture associated DRUJ dislocation. A dorsal dislocation of the ulna in DRUJ can happen in three ways. The first is a forced pronation, the second a straight force on the ulna motivating it dorsally with fixed radius and carpal bones. The third mechanism of dorsal dislocation is a straight force on the radius motivating it palmary with the ulna held in a permanent position. In our case, fracture and dislocation were in ulnar side of forearm but radial side of forearm was intact, although usually, both sides injury were waited after forearm injury. Although isolated ulna fracture is common, associated injury in forearm was prospected to occur on radial side (radius fracture or radial head dislocation). On the other hand, DRUJ was associated with radius bone fracture. In this case ulnar fracture was occurring with DRUJ injury and distal ulna dislocation that hasn’t been reported yet. We haven’t any explain for its injury mechanism but radius elastic deformity can be explained this fracture type that deformity was resolved after force was eliminated. Also, two deformities had occurred in one bone (fracture in mid ulna and dislocation on DRUJ) that was unexpected. If physician doesn’t attend to imaging findings, the patient will be damaged for inappropriate surgical planning in this rare case.

**Conclusion**

Our case detected that unexpected fracture may be occurred and perfect attention to clinical and radiographic finding is necessary otherwise some mistakes may be occurred.

**References**