

Unusual presentation of a radial neck fracture in a child

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ABSTRACT

Fracture of the radial neck are uncommon injuries. In children, they may present as radial neck fractures, a components of forearm fracture dislocations, or as isolated fracture dislocations. Here, we present an unusual and previously undescribed variant of radial neck fracture with dislocation of the radial head to the medial side and ulnar nerve injury. The fracture dislocation was openly reduced and fixed with a small fragment plate. The fracture healed with some loss of rotational movements. At short followup of 6 months patient had useful elbow function but ulnar nerve did not recover.

Key words: Fracture dislocation elbow, radial neck fracture, ulnar nerve injury, children

INTRODUCTION

Fractures of the radial neck are relatively uncommon injuries; the incidence in children is reported to be about 14%, but this includes all epiphyseal and metaphyseal injuries. Blount reports an incidence of 4.5% of all elbow fractures, whereas Lindham has reported an incidence of about 7% of all elbow fractures in their series.^{1,2} The degree of displacement can vary from minimal to complete displacement and rotation through 90°.

The radial head may be displaced in any direction, but the most common direction is lateral.²⁻⁴ In children, the commonest mode of injury is fall on the outstretched hand; associated lesions may include injuries to the olecranon, lateral epicondyle, medial epicondyle, or capitellum. Associated injuries may signify a more severe trauma to the elbow.²

We describe here a case of an unusual presentation of a radial neck fracture with dislocation and displacement of the radial head onto the medial aspect of the elbow, with ulnar nerve injury. This pattern has not been described

before in children, though an isolated mention has been made in adults.⁵

CASE REPORT

A 12-year-old male child presented to our emergency room with an injury to the elbow following a fall on the outstretched hand. He had a diffuse swelling around the elbow, with no external wounds. On examination there was diffuse swelling with a hard bony lump on medial aspect of the elbow. The radial head was not in place clinically. He had weakness of the flexors of the fifth and fourth digits of the hand with a hypoaesthesia in the distribution of the ulnar nerve.

A radiograph of the elbow showed a fracture of the radial neck with dislocation of the radial head onto the medial side. However radial head was intact [Figure 1].

The patient was taken up for open reduction on an emergency basis. The radial head was palpable in the subcutaneous plane and it was approached through a short curvilinear incision on the medial side centered over the displaced radial head, and the head could be delivered out. A separate lateral Kocher incision was used to approach the proximal radius; the radial head was repositioned anatomically and fixed with a mini fragment T plate, and the annular ligament was repaired. The stability was checked in the elbow. The ulnar nerve was not explored A posterior above elbow slab was used to protect the elbow for 3 weeks followed by active elbow mobilization.

Postoperatively, an ulnar nerve injury was confirmed on detailed examination once pain had come down and the child was more cooperative. The patient was started on indomethacin 25 mg empirically twice a day for 3 weeks.

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The patient was lost to followup from this time onward for the next few months. He reported back to the outpatient department at 6 months for review. He had a range of motion at the elbow from 30° to 130° with no supination and good pronation. He was satisfied with function. The ulnar nerve had not recovered [Figures 2-4]. The X-ray taken showed a suspicious developing proximal radioulnar synostosis and union of the fracture site. The implants were removed. He was advised an electromyography and nerve conduction study which he did not get done.

DISCUSSION

Radial head and neck fractures are relatively rarer injuries in children, constituting 4.5-14% of elbow injuries in children.^{1,2,6} Most fractures in this region occur as a type 2 Salter-Harris injury or as a fracture through the radial neck, an articular fracture being a rare occurrence. Jeffery (1950) for the first time described two types of radial head fractures in the immature skeleton depending on the type of displacement; his type 1 was characterized by lateral tilting of 30° or more, whereas type 2 had a posterior or backward rotation of the head through 90°. He also described the mechanism of causation of these injuries.⁶ He stated that a fall on the outstretched hand with a valgus force causing the capitellum to impact against the radial head could be the cause of type 1 injuries. This would imply that traction would cause associated injuries on the medial side like a medial epicondylar fracture or a ligamentous injury. Jeffery described the direction of displacement relative to the radial shaft to vary depending on the position of the forearm at the time of impact.³ Other authors have described radial neck fractures on the basis of angular displacement and age groups to analyze the effect of angular displacement on subsequent function.^{4,7} Nondisplaced fractures of the radial neck are comfortably treated without surgery, whereas more displaced fractures need surgery.

In this case, the degree of displacement was significant in that the radial head had breached the annular ligament and came out to lie medially, posterior as the ulnar nerve which was also injured. A nerve conduction study would have been useful to discern the type of nerve injury. The commoner mode of displacement is actually lateral and not to the medial side.⁷

The child being older and the radial head being completely dislocated medially, we felt that a K wire alone may not be sufficient treatment; hence, we opted for a plate fixation. Lesions like dislocation of the elbow and fractures of the epicondyle that may be associated with this injury were not noted in our case though we did document a tear of the annular ligament and the injury to the ulnar nerve.



Figure 1: X-ray anteroposterior and lateral views showing (a) the medially displaced radial head (b) intraoperative X-ray after open reduction and fixation with plate showing implant *in situ*

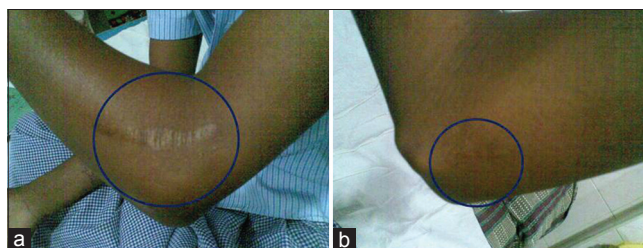


Figure 2: Clinical photograph showing (a) the dorsolateral scar (b) the medial scar



Figure 3: Clinical photograph showing pronation and supination after 6 months

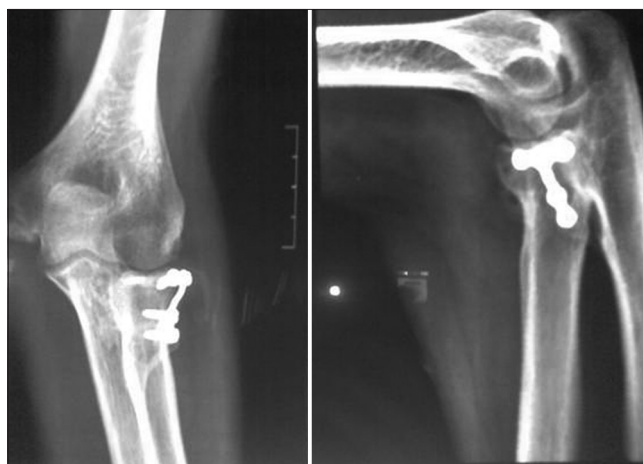


Figure 4: X-ray anteroposterior and lateral views at 6 months showing healing

We were not able to document any further changes of osteonecrosis at the radial head though we did find a loss of supination at the end of 6 months. Three cases of excision

of the radial head from the medial side were described in the adult population by El Ghawabi who noted that it (radial head) was lying in the flexor digitorum profundus: A track filled with organizing blood clot led to the humero-radial joint. The track passed deep to the contents of the cubital fossa through the deep fibers of the brachialis muscle.⁵ In our case, it appears that the radial head traversed a path through the posterior subcutaneous plane to reach the medial side. A track like the one described by El Ghawabi⁵ does not explain the ulnar nerve injury.

El Ghawabi⁵ also found it necessary to immobilize these patients for about 3 weeks, and on long term followup found marked limitation of pronation and supination. This is the only reference we found to a pattern of injury similar to the one we described in this case report. We did not look for or find a track nor was there a superficial skin lesion suggesting the path of injury. The restriction of supination in our case may have been related to the use of a plate that may have acted as a mechanical block.

We believe that in our case, the fall on the outstretched hand could have led to one of two events, a compression on the lateral side and a distraction on the medial side, similar to that described by Jeffery,⁶ which led to the radial neck fracture, followed by a pivot like movement around the ulna which could have dislocated the radial head and jettisoned it to the medial side. The second possible mechanism is similar to the one described by Jeffery⁶ wherein dislocation occurs with or without a radial neck

fracture and is reduced spontaneously on elbow movement, but the radial head remains behind in a dislocated position. The second mechanism seems more likely and seems to explain the ulnar nerve injury also.

This case report documents a hitherto undocumented pattern of dislocation of the radial head after a radial neck fracture in the pediatric age group.

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