

A Segmental Fracture of Humerus with Ipsilateral Forearm Fracture: A Rare Variant of Pediatric Floating Elbow Injury

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ABSTRACT:

Introduction: Simultaneous segmental humerus fracture with ipsilateral forearm is an uncommon injury and scarcely mentioned in the literature. **Case report:** We present a case report on such a complex injury in a 9-year old child after falling down from the first floor of his house while playing. The injury pattern consist of ipsilateral supracondylar fracture humerus with distal humerus and ipsilateral distal forearm fracture. Open reduction and pinning of the both injuries was obtained. **Conclusion:** Ipsilateral multiple fractures in children often result from high energy trauma and are associated with complications. Immediate reduction and fixation is required. If satisfactory reduction cannot be achieved by closed technique, open reduction should be considered to avert additional soft tissue injury and forthcoming complications.

Keywords: forearm injuries • humeral fractures • multiple fractures • radius fractures • ulna fractures

INTRODUCTION:

Pediatric upper extremity injury involving displaced fractures of both the distal humerus and the distal forearm (the so-called floating elbow) is the result of a high energy trauma.¹ The combination of ipsilateral segmental humeral fracture with forearm injury is rarely mentioned injury in literature. Any segmental fracture represents a high velocity injury. We describe the possible mode of injury and its management. Despite the severity of injury, the clinic-radiological outcome is satisfactory. An informed consent has been taken from the parent's

guardian before preparing this manuscript.

CASE REPORT:

A 9 years old boy was brought to the emergency department of our hospital with an alleged history of fall from a tree (15 ft high) while playing. He fell on an outstretched hand with semi flexed elbow. Besides the limb injury, rest of clinical findings were unremarkable. Swelling, deformity and bruises were noticed over the arm and ipsilateral wrist (Fig 1A). Distal neurovascular structures were normal. Plain radiographs of the left upper limb revealed extension type displaced supracondylar fracture with distal humerus shaft fracture and ipsilateral Salter Harris type II epiphyseal injury of distal radius ulna fracture (Fig 1B).

The child was posted for surgery the same day of presentation because of his worrisome features of injuries and swelling. Closed reduction and internal fixation was planned under general anesthesia. The patient's limb was placed on a radiolucent table in supine position. First, closed reduction the distal forearm fracture was attempted but because of its

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Fig 1: (A) Clinical photograph of injured limb; (B) AP and lateral plain radiographs notable for type III supracondylar humerus fracture and ipsilateral distal shaft fracture with dorsally displaced distal radius and ulna; (C) Postoperative posteroanterior and lateral radiographs show stable fixation of the distal radius with cross k wires; (D) Similarly, elbow radiographs show stable anatomical fixation of the distal humerus with three lateral Kirschner wires; (E) Six weeks postoperative elbow radiographs with abundant callus formation and interval healing of the all the fractures fracture; (F) Four months clinic visit with a good elbow function (note cubitus varus).

irreducibility, an open approach of distal radius was carried out. A cross K-wire was used to stabilize the forearm fracture (Fig 1D). Probably due to the swelling around the elbow, closed reduction of the elbow injury was not possible, so an open reduction using lateral Kocher approach was done and fracture was fixed with three lateral K-wires. And an additional

K wire was inserted to stabilize the distal humerus fracture. (Fig 1C). The wound was closed over a suction drain and splinted. The limb was vigilantly watched for impending compartment syndrome. The surgical wound healing was uneventful. At 6 weeks, K-wire removal was done at the clinic and radiographs showed fracture healing on all the

three sites (Fig 1E). At four months follow up, full range of motion at elbow and wrist were achieved. A cubitus varus of 180 was measured in comparison to the normal elbow (Fig 1F). However, the parents were not much bothered about the deformity and agreed for a corrective osteotomy later.

DISCUSSION:

The concurrent multiple ipsilateral fractures of the upper extremity in children is a rarity. Approximately 2–13% of supracondylar fractures are associated with an ipsilateral forearm fracture.¹ Most of forearm injuries are in the distal region. With fractures in arm and forearm, the elbow is effectively dissociated from the rest of the limb, hence the 'floating elbow'.^{1,2} It is an uncommon phenomenon to have an additional injury in either forearm or arm along with this 'floating' pattern. Probably a 'symbiosis effect' operates here.³

The patient had a Gartland type III supracondylar fracture with ipsilateral distal humerus shaft fracture extending towards the supracondylar region. The ipsilateral forearm fracture was a Salter Harris II injury. The mode of injury seems to be fall on outstretched hand with wrist dorsiflexed, forearm pronated, and elbow in variable degree of flexion. The fracture in lower shaft makes it very unusual due to short lever arm.

Such high-energy injuries may be associated with open fractures, compartment syndrome, and neurovascular complications.^{4,5} The mere presence of both fractures, despite what may be an innocuous appearance when seen as an isolated injury, suggests a significant force, not consumed by the initial

fractured bone alone. The force for such bizarre trauma must have been a significant one. These multiple ipsilateral fractures and surrounding soft tissues share and dissipate the energy of impact and harbor the other concurrent fracture from extreme severity with possibility of vice-versa.³ Thus, either impact energy is distributed among various fractures (along with soft tissues) or at most, one site suffers major fracture and other sites get shielded suffering minimal fracture and soft tissue disruption.³ However, in our case all of the injuries were closed and major neurovascular structures were intact.

Such disproportionate multiple fracture is an indicator of a high energy injury and requires aggressive operative management. If satisfactory reduction cannot be achieved by closed technique, open reduction should be considered to avert additional soft tissue injury and forthcoming complications.

Further, the universal principle of examining and imaging one joint above and below, for any suspected long bone fractures must not be underrated. The patient achieved satisfactory results and parents were contented with its outcome.

CONCLUSION:

The recent experience of treating such an unusual variant of pediatric floating elbow injury at our institution reemphasizes the need of aggressive management to achieve satisfactory results and deter potentially devastating potential complications.

Conflict of interest : None declared.

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