Type III monteggia equivalent injury with compartment syndrome in an 8 year old child: A case report

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ABSTRACT

A rare case of a type III Monteggia fracture equivalent with compartment syndrome is reported here. Literature is very scanty about this rare combination of injuries which we are discussing. Timely intervention can lead to a satisfactory outcome even in these complex injuries.

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1. Introduction

More than 100 variants of Monteggia fracture dislocation have been described. This is a case report and description of management of type 3 variant Monteggia fracture dislocation with ipsilateral fracture of ulnar diaphysis at middle and distal fourth junction, fracture of radius in distal one fourth and dislocation of radial head accompanied with compartment syndrome.

2. Case report

An 8 year old male presented in our emergency following history of fall on his outstretched right hand and sustained an injury to the right forearm and ipsilateral elbow. After the injury patient took treatment in his village in the form of an above elbow slab. He presented to our emergency department 2 days after sustaining injury with the complaints of severe pain in right upper limb. On general physical examination, his vitals were stable and he did not have any other comorbidity. On removing the slab there was gross swelling in the right forearm, elbow and hand. There was deformity in the distal one third of the forearm, blood filled blisters were present in the middle and distal forearm. The forearm compartments were tense and stretch test was positive. There was bruising around the right elbow and upper forearm but the overlying skin

was not breached. The capillary refill of the digits of right hand was sluggish as compared to opposite side. There was hypoesthesia in median nerve distribution of hand.

Roentgenograms showed a segmental fracture of ulna diaphysis, both in middle and distal one third, fracture of radius in distal one third and dislocation of radial head (Fig. 1).

The child was taken to emergency operation theatre where a forearm fasciotomy was done using a volar curvilinear incision. After releasing the forearm compartment, distal one third fracture of radius was fixed with K wire through the volar fasciotomy incision. The radial head was exposed using Boyd's approach. The radiocapitellar articulation was reduced and a radiocapitellar K wire was put. The segmental fracture of the ulna was fixed with a K wire after giving an ulnar incision centered on the distal ulnar fracture site. The proximal ulnar fracture site was not opened. The fasciotomy wound was left open and after antiseptic dressing, limb was immobilized in an above elbow resting plaster in 90° elbow flexion and in full supination of the forearm.

Post operatively the capillary refilling of the digits improved. However the post operative radiograph showed the bending of the radiocapitellar K wire and subsequent subluxation of the radial head (Fig. 2). The ulnar K wire had missed the proximal ulnar fracture site as it was passed in a closed technique in the absence of an image intensifier.

Patient was again taken after 15 days in operation theatre where reexploration of the radiocapitellar articulation was done through the previous Boyd's approach. The bent K wire was removed and radiocapitellar congruity was restored. The radiocapitellar

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Fig. 1. Preoperative radiograph of fracture of ulnar diaphysis at middle and distal fourth junction, fracture of radius in distal one fourth and dislocation of radial head.

Fig. 2. Radiograph after 1st surgery.

articulation was stabilized with 2 K wires (Fig. 3). The forearm fasciotomy wound was covered with split skin grafting. Patient was discharged after 6 days of 2nd operation on antibiotics. Follow-up radiographs showed evidence of fracture healing and wound healing was also satisfactory. By 3 weeks hypoesthesia in median nerve distribution had resolved. The K wires were removed after 8 weeks and elbow manipulation was done under general anesthesia at the same sitting.

At the latest follow-up 8 months after injury, the radiograph showed bridging callus both at the radius and ulna. The radiocapitellar articulation was also maintained. (Fig. 4). Clinically he demonstrated full flexion, extension and near full supination at

Fig. 3. Radiograph after 2nd surgery. The radiocapitellar articulation was stabilized with 2 K wires.

Fig. 4. Radiograph after 8 months showing bridging callus both at the radius and ulna. The radiocapitellar articulation was also maintained.

right elbow joint as well as full extension and flexion at right wrist. Pronation was 0°–40°. All wounds have healed except for distal ulna incision where he has developed a keloid scar (Figs. 5–7).

3. Discussion

The peak incidence of Monteggia fracture occurs in the age range of 4–10 and represents 0.4% of all forearm fractures.¹ The mechanism of injury causing two or more level fracture in forearm is not well understood.^{2–4} Theodorou et al. cautioned for the need to include the both end of forearm bone in radiological examination of Monteggia lesion as they reported 11 out of 46 children (26%) having an associated fracture of lower end of ipsilateral radius and ulna.⁵ Simultaneously proximal and distal forearm fractures are very rare. Previous such combinations reported include: Type-I Monteggia with ipsilateral fracture of distal radius epiphyseal injury³; type II Monteggia fracture with fracture separation of the distal radial physis⁶; type III Monteggia injury with ipsilateral distal

A

A

B

B

Fig. 5. Clinical picture showing patient A) Flexion B) Extension after 8 months of surgery.

radius and ulna fractures²; olecranon fracture and distal radial epiphysis⁷; type IV Monteggia injury with distal diaphyseal fracture of the radius⁸; eleven cases of *Monteggia fracture dislocation with fracture of the ipsilateral radius and ulna⁵; one case of three epiphyseal fractures (distal radius and ulna and proximal radius) and a diaphyseal ulnar fracture in the same forearm⁹; one case of humeroulnar dislocation with proximal radioulnar disruption with fracture of the radial shaft, without dislocation of radiocapitellar joint¹⁰; Type III Monteggia injury with ipsilateral type II Salter-Harris injury of the distal radius and ulna in a child¹¹; one case of combined type III Monteggia injury with ipsilateral Type II Salter-Harris injury of distal end radius with a metaphyseal fracture of

Fig. 6. Clinical picture showing patient A) Supination B) Pronation after 8 months of surgery.

the distal third of the ulna and one case of a closed fracture of atypical Type I Monteggia hybrid lesion with proximal ulna fracture extending into the olecranon involving the articular surface.¹²

There has been only one case report of compartment syndrome with Monteggia fracture dislocation. However the patient was diagnosed after tissue necrosis and forearm infection and compartment syndrome was missed initially.¹³ To the best of our knowledge this is the only case report dealing with acute compartment syndrome along with Monteggia type 3 variant with ipsilateral segmental fracture of ulnar diaphysis, both at middle and distal one third, and fracture of radius in distal one third.

K wire usage has complications which includes pin loosening, pin tract infection and pin bending which was seen in our case. Percutaneous radial head pinning ensures maintenance of superior radio-ulnar articulation. Although previous studies have raised

A

B

Fig. 7. Clinical picture showing patient A) Flexion B) Extension at wrist after 8 months of surgery.

concern about the possibility of injury to the capitulum and subsequent damage to the physis at the capitulum and radial head,¹¹

this complication was not noticed in our limited followup. In our patient there was a bending of radiocapitellar wire initially possibly due to the non anatomic reduction of the segmental fracture of ulna. The subsequent use of 2 K wires to hold the radiocapitellar alignment proved successful in our patient. Hence anatomical ulnar reduction and radiocapitellar stabilization is essential. Now the patient is symptom free at 8 month follow-up with osseous union and healing of all wounds.

Conflicts of interest

The authors declare that they have no conflict of interest.

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