Case Report

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Management of Paediatric Monteggia Variant Fracture - Our Experience of Two Similar Cases

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Abstract

Introduction: The common mechanism of injury for Monteggia fracture is fall on outstretched hand with elbow extended and forearm in pronation causing a proximal fracture of ulna with dislocation of radial head. Monteggia injuries were classified by Bado into 4 sub-types based on the direction of displacement of the radial head and the presence of associated fracture (type 1 with anterior dislocation of radial head being most common). We managed two cases of Monteggia type 1 variant injury consisting of a fracture of the radial neck and anterior displacement of distal radial shaft without dislocation of the radiocapitellar joint.

Case report: We operated two children (5 and 9 years old respectively) with this Monteggia variant injury; displaced ulna shaft fracture with volar angulation, and fracture neck radius with anterior displacement of radial shaft. Ulna fracture was fixed by elastic nailing and radial neck fracture was managed by closed means (with or without fixation). At final follow up (2 and 7 years later respectively), both the children had excellent outcomes with good range of pronation and supination movements.

Conclusion: In the management of Monteggia equivalent lesions, an understanding of the direction of displacement of radial shaft will help in formulating the appropriate method of fracture reduction. Closed reduction of the radial neck fracture is preferred since the results of open reduction are poor especially in terms of regaining pronation and supination movements.

Keywords: Monteggia, Forearm fracture, Monteggia variant

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Introduction

Monteggia fracture (described by Giovanni Monteggia) is an uncommon injury in children. The incidence of paediatric Monteggia fracture is around 0.4 per cent of all forearm fractures [1]. The common mechanism of injury is fall on outstretched hand with elbow extended and forearm in pronation causing a proximal fracture of ulna with dislocation of radial head [2].

Monteggia injuries were classified by Bado into 4 sub-types based on the direction of displacement of the radial head and the presence of associated fractures [3]. The proximal radial physis represents a weak area in children. As the surrounding ligaments are stronger, forces tend to fracture the proximal radial physis (Salter Harris injury) instead of radial head dislocation in children [4, 5]. Monteggia variants consisting of a proximal ulna fracture with radial neck fracture have been described in the literature. Guven published a series of 13 Monteggia equivalent cases (seven patients with type 1 Bado equivalent lesion and six patients with Bado type 3 equivalents) [6]. Alrashidi described a Monteggia injury with comminuted radial head fracture with lateral dislocation in a 6-year-old patient [7]. Romulo described a Monteggia equivalent fracture with an ulnar shaft fracture, Salter Harris type 2 fracture of the radial neck and medial displacement of radial shaft.8 Li described the

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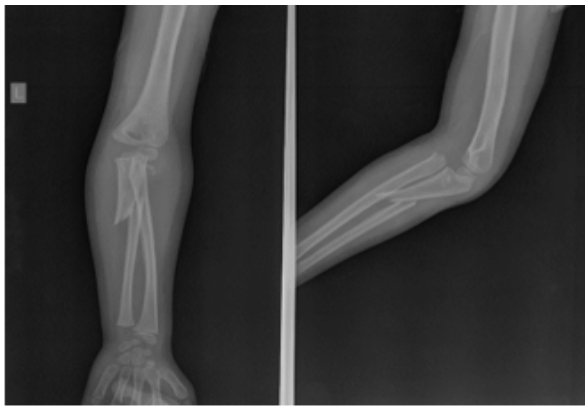

Figure 1: Pre op x ray (Case 1)

management of a Type 1 Monteggia equivalent lesion in a 14 month old boy [9].

We managed two cases of Monteggia variant injury consisting of a fracture of the radial neck and anterior displacement of distal radial shaft without dislocation of the radiocapitellar joint.

Case Report

Case 1:

A five-year-old girl presented with history of fall on the outstretched hand while playing. On examination, there was swelling and tenderness over proximal forearm and elbow. There was an apex volar deformity of the forearm. Forearm rotations and elbow movements were painful and restricted. The overlying skin was intact and there was no distal neurovascular deficit.

Radiographs of the forearm with elbow anteroposterior and lateral views showed a displaced proximal third ulna shaft fracture with apex volar angulation and a fracture neck radius with anterior displacement of radial shaft. (Fig. 1)

Case 2:

A nine-year-old boy with a history of fall from stairs at home 4 days previously. He developed pain, swelling and deformity over right forearm and elbow and was managed primarily with splinting at an outside centre. Forearm pronation and supination and elbow movements were restricted. There were no superficial wounds and distal neurovascular status was intact.

X-ray of the forearm done at an outside centre (lost from the records) showed a proximal ulna short-oblique fracture with volar angulation and radial neck fracture with anterior displacement of radial shaft.

Pre operative evaluation and Surgical technique

After preliminary management, both children were managed operatively.

Under general anaesthesia, the affected arm was draped on a radiolucent arm support in supine position. The fracture neck radius was reduced by closed manipulation with the Patterson technique. It involves traction over an extended-supinated forearm with simultaneous varus stress; thereafter the anterior displacement of distal radial shaft is reduced by direct pressure with elbow flexed. In the first case after reduction, the radial neck fracture was stabilised with a 1.8 mm Kirschner wire. In the second case, the fracture was found to be stable and hence we decided against internal fixation. In both cases, the ulna fracture was stabilised by elastic nailing. Final reduction was found to be satisfactory. An above-elbow slab was provided with 90 degrees flexion of elbow in the mid-prone position. The post-operative period was uneventful (Fig. 2, 3).

Follow Up

An above-elbow cast was maintained for a period of 6 weeks after surgery. Physiotherapy was started with gentle active assisted exercises till the child gained near-complete range of movements. On follow up, both children had full extension and

Figure 2: Immediate post op x ray (Case 1)

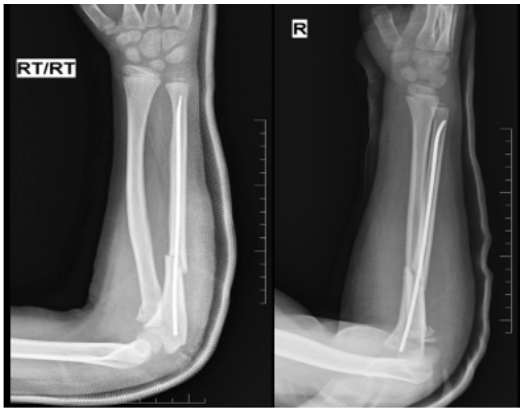

Figure 3: Immediate post op x ray (Case 2)

Figure 4: follow up Xray (after implant removal, after 2 years post op) (Case 1)

Figure 5: Range of motion at follow up after 2 years (Case 1)

Figure 6: Follow-up radiographs of the forearm at 7 years follow-up (Case 2)

Figure 7: Range of motion at 7 years follow-up (Case 2)

flexion of elbow comparable to the other side. Pronation and supination were 80 degrees and 90 degrees respectively.

The children were kept under regular follow up thereafter. There was no physeal growth disturbances on sequential x rays. In first case, there was local irritation due to the elastic nail at 4 month follow up. The nail was removed after confirmation of radiographic union. In the other case, the elastic nail was removed 15 months from the index procedure (Fig. 4, 5, 6, 7).

Discussion

The Monteggia variant seen in our study namely an apex-volar angulated fracture of the ulna along with fracture neck radius with anterior displacement of distal radial shaft has been described previously [9, 10, 11]. Attempts have been made towards modification of Bado classification for better understanding and classification of various monteggia equivalent lesions [12, 13].

Cepelik et al (2019) in their retrospective study series of 111 cases described Monteggia equivalent lesions as ulnar fracture at any level along with a displaced proximal radial fracture [13]. Most recently, a review by Xu et al (2021) discussed various previous classifications and proposed an updated classification into three types for pediatric Monteggia equivalent lesions (PMEL) [14]. Of these, subtype 3A best describes the fracture pattern in our two cases.

Younus et al (2019) described a fracture of the proximal ulna with an associated Type 2 Salter Harris fracture neck of the radius and radial shaft displaced anteriorly as a Bado type 4 Monteggia fracture dislocation [10]. On the contrary, we believe that the injuries of both of our cases are better described as a Type 1 Monteggia variant with a similar mechanism of injury where instead of a typical radial head dislocation, the injuring force caused a fracture of the radial neck with anterior displacement of radial shaft. This is substantiated by the fact that the principles of management here were like that of a Bado Type 1 Monteggia lesion.

In the second case, the radial neck fracture was quite stable and did not warrant internal fixation. The precedent to this has been mentioned in case report by Elkhouly et al (2018) where they managed a similar injury with internal fixation of ulna fracture along with closed reduction of the radial neck fracture [11]. Closed reduction of the radial neck fracture is preferred

since the results of open reduction are poor especially in terms of regaining pronation and supination movements [15, 16].

Conclusion

One needs to be aware of the pediatric Monteggia equivalent lesions. An understanding of the direction of displacement of distal radial shaft and to equate it to the type of radial head displacement as described in Bado classification could help us to follow the same principles of management, so that we can align the radial neck fracture better by closed means itself, keeping in view the poor results of open reduction of radial neck fracture.

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Declaration of patient consent : The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given the consent for his/ her images and other clinical information to be reported in the journal. The patient understands that his/ her names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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