

## Pediatric Monteggia Equivalent Type I Fracture

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### Case Report

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### Abstract

Monteggia fracture is a term used to describe a proximal ulna fracture accompanied by radial head dislocation. However in pediatrics, the incidence is rare and misdiagnosis as both of them alone occurs often. In our case, 6-year-old boy was visited to the emergency medical care center because of pain in his right elbow which had broke out after slipping down from a 70cm-high-block. On intial simple radiography, we noted an elbow sprain, that proved to be a misdiagnosis later and, we applied a long arm splint. After discharge, pain was lasted especially at the moment of supination and pronation of the wrist joint, so that led revisit. At the radiologic studies, ulnar bow sign was shown, and pediatric Monteggia equivalent type I fracture was diagnosed. On the result of the diagnosis, open reduction was performed after trying C-arm intensifier assisted closed reduction. The patient is followed up at outpatient clinic. There is no complication on range of motion or change on the morphology. Therefore, bewareing of not over looking Monteggia fracture on patient of ulnar fracture or radial head dislocation on pediatrics.

**Keywords:** Monteggia; Hyperpronated; Capsulorrhaphy

### Introduction

Monteggia fracture is a term used to describe a proximal ulna fracture accompanied by radial head dislocation. Bado [1] classified Monteggia fractures as types 1-4 based on the direction of radial head dislocation, and also described 'Monteggia equivalents' with clinical features similar to those of Monteggia fractures. It is reported that type I Monteggia fractures are induced by a direct blow(direct blow theory), slipping down with a hyperpronated forearm(hyperpronation), or slipping down on a hyper flexed elbow joint regardless of the rotation of the forearm [2-5].

Monteggia fractures in children are rare and satisfactory results can be achieved in most cases when it

is diagnosed early. However, cases that are not detected early are quite common and can be misdiagnosed as proximal ulna fracture or radial head dislocations because of minimal dislocation of the radial head or fracture of the proximal ulna [1]. In this report, we describe a case of a pediatric Monteggia equivalent type 1 fracture caused by a direct blow injury that was initially misdiagnosed as a simple elbow sprain.

### Case Report

A 6-year-old boy visited our emergency medical care center because of pain in his right elbow. Pain onset was associated with slipping down on his right side from a 70cm-high-block to a floor covered with cushions on the same day of the visit. The patient did not have a specific

medical history, but reported tenderness, mild swelling, and severe pain during motion of the elbow joint, around the right radial head.

On initial simple radiography, we noted an elbow sprain, that proved to be a misdiagnosis later and, we

applied a long arm splint (Figure 1). After discharge, however, pain on the radial head and wrist joint persisted when the wrist joint was supinate or pronate. The patient was admitted 12 days after the accident, and underwent open reduction.



**Figure 1A**



**Figure 1B**



**Figure 1C**



**Figure 1D**

Pre-operative radiologic imaging studies indicated an ulnar bow sign and anterior translation of the radial head (Figure 2). After failed C-arm intensifier assisted closed reduction, we performed open reduction. Joint capsule impingement was observed between the radial head and capitulum during surgery, which disrupted reduction of

the radial head. Therefore, we tried reduction after removing the impinged capsule, and implemented capsulorrhaphy wrapping to the radial head. After the procedure, maintenance of reduction was observed while extension and flexion by C-arm intensifier (Figure 3).

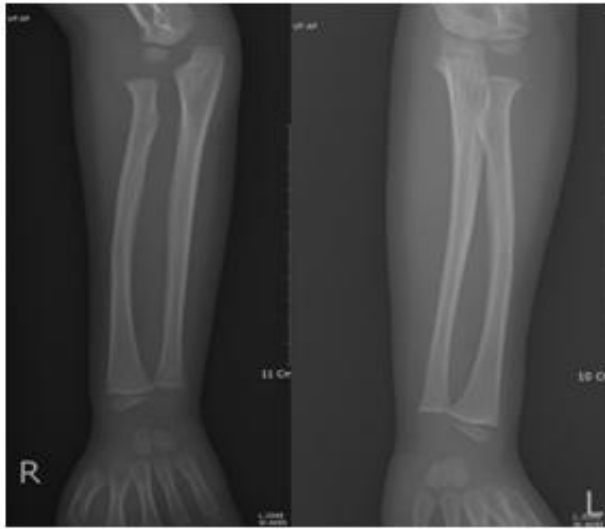
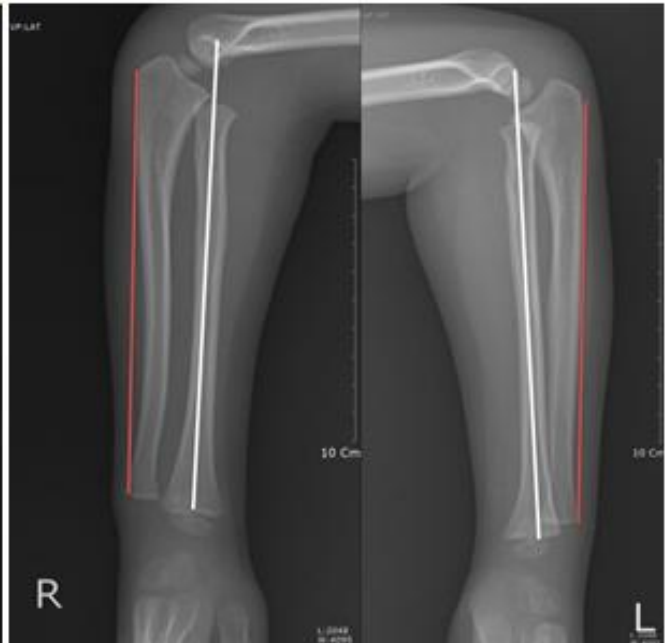
**Figure 2A****Figure 2B****Figure 2C****Figure 2D**



Figure 3A

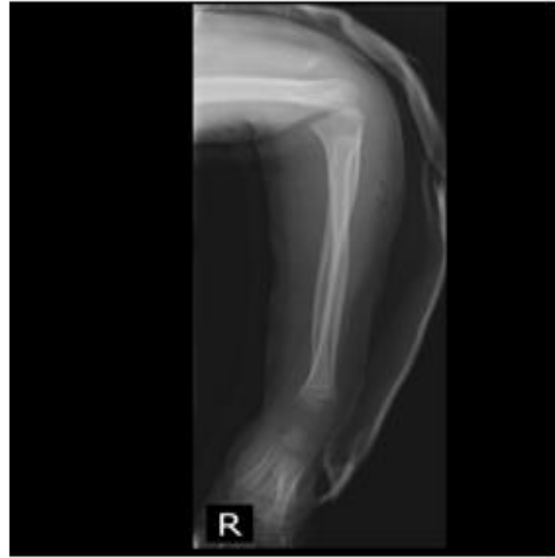


Figure 3B



Figure 3C



Figure 3D

The patient was discharged without any specific complications, and is being followed up at our outpatient clinic. The long-arm splint was removed two weeks postoperatively, at which point progressive elbow active

motion was initiated. Until 1 year after the surgery, there was no alteration of range of motion or morphology (Figures 4 and 5).



Figure 4A



Figure 4B



Figure 4C



Figure 5A



Figure 5B



Figure 5C



Figure 5D

## Discussion

The incidence of Monteggia fractures is relatively low, comprising – 7% of ulnar fractures, less than 5% of forearm fractures, and 2% of pediatric elbow fractures [6,7].

Unlike Monteggia fractures in adults, it is commonly overlooked in children because of the absence of early and accurate diagnosis. The reasons for this include its rare incidence, soft tissue swelling, incomplete ossification of the radial head, and plastic deformation without radial head dislocation on initial radiography [6,7]. Lincoln et al. [8] defined the absence of plastic deformity as the straight line of the posterior border of the ulna from the olecranon to the metaphysis of the distal ulna on the lateral view of radiography. In addition, according to Giustra et al. [9] the line between the shaft of the radius and the radial head passes through the center of the capitulum when the radial head is located at the normal position on all imaging.

The mechanisms of the type I Monteggia fractures are not entirely understood; however three theories have been proposed. First, crushing can be supposed when condition such as hematomas are detected posterior to the ulnar fracture area [2]. Second, type I Monteggia fractures can occur in patient with excessive internal rotation [5]. Third, fractures can be induced at the point of slipping down and pushing down by hyper extended elbow joint regardless of forearm rotation [4]. In addition to those three mechanisms, Faundez et al. [10] advocated that laxity of the annular ligament can induce Monteggia equivalent type I fractures even though it is rare.

In the cases of pediatric type I Monteggia fractures, good results are expected with closed reduction and long arm splint application in most cases, without operative treatment if the radial head is properly aligned and the ulna fracture is reduced with its length preserved. However, complete fractures can be unstable after closed reduction. Therefore, intramedullary K-wire fixation is recommended in complete short oblique and transverse ulna fractures or in radial fractures. Long oblique or comminuted fractures, which may develop shortening and mal alignment even with intramedullary fixation, are best stabilized with plate and screw fixation [1,2,4].

Complications in patient with Monteggia fractures are reported as valgus deformities of the wrist joint, re-dislocation of the radial head, mal union or nonunion of the ulna, injury of the median nerve or radial nerve and union between the proximal radius and ulna [6,9]. David-West et al. [11] suggested that it is very important to use

K-wire fixation between the radial head and capitulum of humerus before reconstruction of annular ligament, to prevent re-dislocation of radial head. Dormans et al. [12] recommend K-wire fixation through the radius and ulna because K-wire fixation between the radius and capitulum of the humerus can snap the K-wire. Furthermore, Shim et al. [6] proposed that improving the stability of the radial head by exhaustive reconstruction of the annular ligament is a much better surgical method.

Our case shows that the radial head is properly aligned and the ulna fracture was not combined. We performed reduction and implemented capsulorrhaphy wrapping of the radial head. Radial head dislocation did not occur when elbow joint motion was performed and the patient is being followed up without any complications after discharge.

Treatment results in pediatric patients with acute Monteggia fractures expected to be better than in adults. However when it is neglected for more than 4 weeks, results are not clinically satisfactory and a higher incidence of complications is reported even when surgical treatment is performed [6].

Therefore, accurate diagnosis of pediatric Monteggia fractures at the time of injury is important. Caution should be exercised to avoid overlooking Monteggia fractures in patient with ulnar fractures or radial head dislocations, because prompt and accurate treatment is an important element of prognosis.

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