

## Case Report



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## Introducing and Treating a Pediatric Monteggia Intermediate-Type 3 and 4 Fracture: A Case Report

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### Abstract

Bado based his classification of Monteggia fractures on the direction of the radial head dislocation. We present a case of a Monteggia fracture that is an intermediary between Bado type 3 and 4 occurring in a 4-year-old Indian girl. It is a fracture of the proximal ulna and radial shaft, along with a lateral dislocation of the radial head that was treated with retrograde elastic nailing of the radius first, then the ulna. Our case report is unique because this fracture pattern has not been presented earlier in literature. Interestingly, what presented as a both bone forearm fracture, on careful examination, was a Monteggia fracture. Our report aims to help other surgeons identify and treat this complex injury, in addition, increase awareness of this rare Monteggia variant.

**Keywords:** Monteggia, paediatric forearm fractures, elbow injuries.

### Introduction

Monteggia lesions account for 1% of all upper limb fractures in children [1]. Bado described the Monteggia lesion as “a double bone injury, characterized by radial dislocation and a fracture of the ulna” and introduced a classification system based on the direction of the radial head dislocation [2]. Monteggia-equivalent lesions of type 1 and 2 injuries have been described. An equivalent lesion is a fracture that has the same mechanism of injury, with a similar radiographic pattern and method of treatment Bado type 3 injury is a fracture of the ulna with lateral dislocation of the radial head. Type 4 is a fracture of the ulna, anterior dislocation of the radial head and fracture of the radial shaft. Our report presents a case of Monteggia fracture that is intermediary between types 3 and 4 (Fig. 1). Types 3 and 4 are the rarest of the Monteggia injuries with an incidence of 15% and 5%, respectively. We describe a fracture of the proximal ulna with a radial shaft fracture and lateral dislocation of the radial head. It is a combination of the lateral radial head dislocation described in type 3 and radial shaft fracture described in type 4 injuries.

### Case Report

A right hand dominant 4-year-old girl was referred to us with a 2-day-old diagnosis of a right sided both bone forearm fracture. (Fig. 1). She had a history of fall from a height of 1 meter with her arm outstretched and pronated. Her X-rays showed a mid-diaphysis fracture of both the radius and ulna. On further examination of her anteroposterior X-ray, we noticed a transverse fracture of the proximal 1/3<sup>rd</sup> ulna

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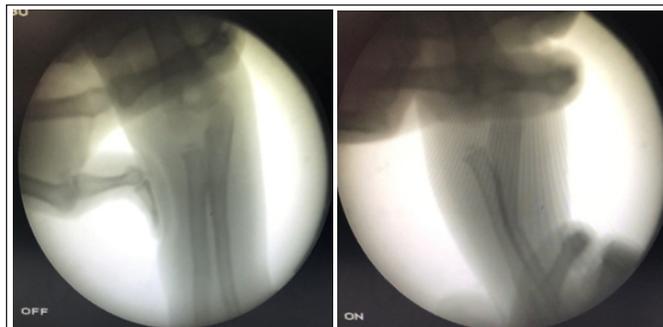
**Figure 1:** Initial pre-operative X-ray. Anteroposterior view shows the lateral dislocation of the radial head, which is missed in the lateral view.

with a transverse radial shaft fracture and lateral dislocation of the radial head. The radiologist had failed to report the radial head dislocation, and thus, the Monteggia pattern of the fracture.

Examination under anaesthesia revealed an unstable fracture pattern with the radial head dislocating after provisional reduction (Fig. 2). The radius was therefore stabilized using a 2.0 mm titanium elastic nail System (TENS) that was inserted in a retrograde direction (Fig. 3). This step converted the fracture pattern into a Bado type 3 injury. It also relocated the radial head into the joint. A 2.0 mm TENS nail was then inserted retrograde to fix the ulna fracture. The elbow joint was regularly viewed under fluoroscopy to ensure that there was no subluxation of the joint while inserting the nail. The elbow joint was stable through the entire range of motion. The patient was placed in a slab in supination and 90° elbow flexion. Range of motion exercises were started at 3 weeks post-surgery. At 6 weeks, she had full range of motion and no residual pain (Fig. 3 and 4). The implants were removed at 6 months with no post-operative complications (Fig. 5).

**Discussion**

Our case report is unique for two reasons. Firstly, the fracture pattern is an overlap of Bado’s type 3 and 4 pattern, which, to the



**Figure 2:** Intra-operative fluoroscopy images, showing reduction of the radial head on applying external pressure (a), but as soon as the pressure was removed, the head redislocated (b).

best of our knowledge, has not been presented before. Secondly, although it presented as a both bone forearm fracture, scrutiny of the X-rays revealed a Monteggia fracture. Bado described equivalent lesions for type 1 and 2 fractures. Because mechanism of injury and radiographic pattern allows for this sub-classification, case reports have been published over time to include fractures that may be considered equivalents to the Monteggia fracture. Ravessoud et al described a type 3 equivalent: an oblique fracture of the ulna with varus alignment and a displaced lateral condylar fracture [3]. Arazi et al. described a type 4 equivalent: Fractures of the distal humerus, ulnar diaphysis and radial neck [4]. Bhandari and Jindal reported a type 4 case with a posterolateral dislocation of the radial head, and they suggested a subclassification of Monteggia type 4 injuries [5]. They described type 4a injuries a fracture of both the radius and ulna with anterior dislocation of the radial head, type 4b a posterior dislocation, a type 4c a lateral dislocation, and 4d a combination of the previous three. If we were to classify this fracture according to their classification, this would be a type 4c. They stabilized only the ulna fracture with 2 mm square nails, and they had opened the injury at the fracture site. After fixing the ulna, the radial head reduced and was stable. We stabilized both fractures without the need for open reduction in our patient.

Missing Monteggia fractures and then having to treat them later is difficult and leads to less than perfect results [6]. Majority of



**Figure 3:** 6 Months post-operative X-rays.



**Figure 4:** 6 Months follow-up showing full range of motion.



**Figure 5:** Post-operative X-ray after removing implants at 6 months.

radial head dislocations can be reduced under general anaesthesia if diagnosed adequately in time. When missed, open reduction may be required. A retrospective study of 220 paediatric patients by Gleeson and Beattie A.P. Gleeson shows that 50% of Monteggia fractures were misdiagnosed by accident and emergency (A&E) department senior house officers (SHOs) and 25% were misdiagnosed by senior radiologists [7]. Aggressively increasing awareness of Monteggia fractures in surgeons and radiologists during their early training years will reduce the incidence of missed Monteggia fractures. We also recommend one should always look at the elbow in any fractures of the forearm and always ensure that true anteroposterior and lateral X-rays are taken of the elbow and forearm.

### Conclusion

Due to the low incidence of this fracture, there has not been an established algorithm on how to fix these types of fracture. Until evidence-based reports are published, management of this fracture should be guided by the surgeon's judgement. Our case report may help other orthopaedic surgeons identify and treat this rare and complex injury, and in addition, increase awareness of the existence of this variant of Monteggia fracture.

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

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