

# Monteggia fracture-dislocation in children

A.P. GLEESON & T.F. BEATTIE

Accident and Emergency Department, Royal Aberdeen Children's Hospital, Aberdeen

## SUMMARY

Monteggia fracture-dislocations are uncommon in childhood. Correct early diagnosis is essential to avoid elbow dysfunction and the necessity for open reduction of the radial head. This retrospective analysis of 220 forearm fractures in children 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. Instruction in correct clinical and radiological examination of the elbow joint in children to junior A&E doctors, with early review of suspicious cases by senior medical staff, may help to reduce the incidence of missed Monteggia fractures.

**Key words:** diagnosis, dislocation, Monteggia fracture, radial head

## INTRODUCTION

Fracture of the ulna associated with an anterior dislocation of the radial head was first described by Giovanni Monteggia in 1814. Bado<sup>1</sup> coined the term 'Monteggia lesion', and further described Monteggia fractures according to variations of the fracture-dislocation. Bado Type I, the original Monteggia fracture, is the most common lesion seen in children. Type II describes a posterior dislocation associated with an ulnar metaphyseal fracture, with Type III being a lateral dislocation of the radial head. Type IV is the combination of both ulnar and radial fractures with an anterior radial head dislocation, and the Monteggia 'equivalent' describes more unusual varieties. Monteggia fractures are more commonly seen in adults but they are well described in children.

Following the misdiagnosis of one of these fracture-dislocations by an A&E department SHO at this hospital, a retrospective analysis of Monteggia fractures was undertaken to determine whether there had been similar cases that were misdiagnosed at first presentation and whether correct treatment was instituted at this time.

## SUBJECTS AND METHODS

Over the 5-year period of 1987 to 1992 forearm fractures admitted to this hospital were studied retrospectively. Analysis of these case notes enabled us to trace all patients with Monteggia fractures that had been admitted over this period. In addition, the radiographs taken at first presentation to the A&E department were analysed.

## RESULTS

A total of 220 children with forearm fractures were admitted over the 5-year period, and 12 Monteggia fractures were detected. There were six males and six females with a mean age of 6 years (range 1–6 years). All of these fractures occurred as a result of a fall. In the A&E department appropriate radiographs of the forearm including the elbow joint were taken in eleven of these patients, with one patient solely having a radiograph of the elbow joint. When the radiographs were analysed retrospectively, the Monteggia fracture was evident in all cases. There were eight Bado Type I fractures, one Type III with an associated impacted fracture of the distal radius, one Monteggia equivalent, and two cases of anterior radial head dislocation associated with plastic deformation of the ulna. Plastic deformation of bone is a recognized characteristic unique to children, the radiographic appearance of which is an abnormal curvature in a long bone. It is felt to be the stage in bone bending that leads to a greenstick fracture but, the force applied to the bone is removed before the fracture occurs and the bone is left with a characteristic bend.

The A&E department SHO made the correct diagnosis of Monteggia fracture in six of the 12 patients, the radial head dislocation being missed in all the other patients. Four of these latter patients were given a diagnosis of a fractured ulna, and the two patients with plastic deformation of the ulna were diagnosed as having a soft tissue injury and an elbow effusion respectively. An orthopaedic opinion was sought on three of these 'ulnar fractures' at

Correspondence:  
**A. Gleeson**,  
Registrar, Accident  
and Emergency  
Department Stockport  
Infirmary Wellington  
Road South Stockport  
SK1 3UJ, UK

presentation, and it was at this time that the correct diagnosis was made. The fourth 'ulnar fracture' was correctly diagnosed at presentation by the A&E consultant who also diagnosed the two cases of plastic deformation 24 h after initial presentation in one case, and after 6 days in the other patient.

In the radiographic reports supplied to the A&E department, three patients were misdiagnosed by the radiologist, the radial head dislocation again being missed in all three patients. Two were described as solely having a fractured ulna, and one was reported as having an elbow effusion.

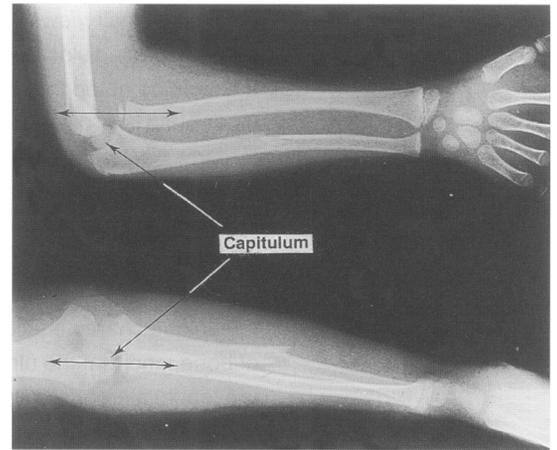
All the twelve patients had reduction of their dislocations under general anaesthesia, with 10 patients having successful closed reduction of the radial head dislocation. One patient had a compound injury that required open reduction and internal fixation. The radial head dislocation that was picked up 6 days after presentation could not be reduced by closed means and required an open reduction and K-wire fixation of the radial head.

## DISCUSSION

Monteggia fractures are rare, representing approximately 1% of all fractures and/or dislocations of the wrist and mid or proximal forearm.<sup>2</sup> The ulnar fracture is readily diagnosed but, the radial head dislocation is often missed.<sup>3,4</sup> The majority of radial head dislocations in children can be reduced with manipulation under general anaesthesia but, if the diagnosis is made late, open reduction is commonly required. This may involve repair or reconstruction of the annular ligament to prevent recurrent dislocation. Impaired elbow function, degenerative arthritis, and nerve palsies can result from persistent radial head dislocation.

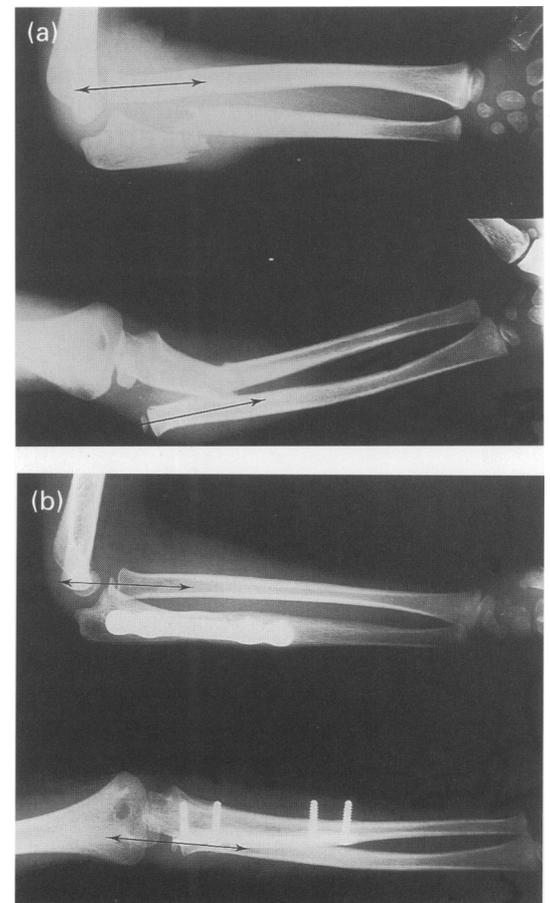
Monteggia fractures are missed for several reasons. Firstly, soft tissue swelling at the elbow joint may disguise an underlying radial head dislocation. Secondly, the radiographs may be inadequate for proper evaluation of the elbow joint although, this was not the case in this study. Thirdly, Monteggia fractures in children are missed because of poor interpretation of the radiographs. Evaluation of elbow radiographs in children is particularly difficult for junior doctors because of the multiple ossification centres, and thus appropriate instruction in this skill is necessary early in their attachment to the A&E department.

To avoid missing Monteggia fractures the following recommendations are made.



**Fig. 1.** Anterior Monteggia fracture: the radial head does not align with the capitulum on the lateral view.

- (1) One should ensure that true anteroposterior and lateral radiographs of the elbow/forearm are taken.
- (2) One should be aware that a line drawn through the radial shaft and head should align with the



**Fig. 2.** (a) Lateral Monteggia fracture, (b) normal alignment restored.

capitulum in all views. If it does not, then the radial head is dislocated (Fig. 1).

- (3) It should be noted that isolated fractures of the ulnar shaft are rare (two in our series of 220 forearm fractures) and when they occur, one should specifically look for a radial head dislocation. The joint above and below a fracture should be visualized.
- (4) Doctors should be aware that children have the unique characteristic of plastic deformation of bone, and that the ulnar fracture may not be present to alert one to the possibility of a radial head dislocation.
- (5) Doctors should not wholly rely on the radiologists report. Inadequate or inaccurate information on the radiograph request card may lead to a misdiagnosis on the part of the radiologist.
- (6) Early review of elbow injuries should be arranged by senior A&E staff where, in the absence of a fracture, the clinical signs indicate a significant injury or, where the only radiological abnormality seen is an elbow effusion.

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