CASE REPORT

Paediatric fracture dislocation of the forearm:
an unusual presentation

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SUMMARY

Traumatic injuries of the elbow in children pose a diagnostic challenge. They demand precise knowledge of radiographic anatomy, growth characteristics of healthy and injured bones as well as specific fracture dynamics in this age group. Dislocation of the elbow is rare in children, accounting for 3–6% of all childhood elbow injuries. Fractures at the distal humerus and proximal forearm have been extensively discussed in the literature. We describe a unique case of a 4-year-old child presenting with a traumatic radial head fracture and ulnar dislocation not previously reported. Diagnosis and recognition of the injury pattern was fundamental in the successful management of this case. We recommend the use of CT with three-dimensional reconstructions, to fully understand the fracture pattern and dictate subsequent reduction manoeuvres during closed manipulation. Thus preventing open surgical techniques and their associated morbidities.

CASE PRESENTATION

A right hand dominant 4-year-old boy fell onto his outstretched hand while playing on a climbing frame at school. In A&E the child was in pain, reluctant to use his arm, with soft tissue swelling around the elbow. The child was otherwise fit and well.

INVESTIGATIONS

Initial radiographs confirmed a joint effusion and posterior fat pads with no clear diagnosis (refer to figure 1). A CT was requested, with three-dimensional (3D) reconstruction which showed an undisplaced radial head compression fracture with associated ulnar dislocation. By comparing the humeral transcondylar axis as illustrated in figure 2, to the alignment of the proximal ulna and radial head on axial section we suspected an ulna–humeral dislocation, with 3D reconstructions confirming the ulna rotated around the axis of the radial head (refer to figure 3).

BACKGROUND

This particular injury with this type of fracture configuration has not been previously reported.

In this case the radial head was fractured with an associated ulnar–humeral and ulnar–radial head dislocation, which has not been previously classified in the literature.

The Monteggia fracture and its equivalent describe an ulnar fracture combined with radial head dislocation/fracture. Our findings are different and this is not a divergent dislocation as the radial head is congruent.

Treatment: closed reduction

With close scrutiny of CT images, the patient underwent an examination under anaesthetic and successful manipulation to reduce the dislocation. The CT images guided reduction manoeuvres successfully, with confirmation of stability and restoration of movement intraoperatively. Postreduction radiographs confirmed adequate position (figure 4). Postoperatively the arm was immobilised in an above elbow cast for 6 weeks, with the elbow flexed 90°. Three months on in clinic the child had full range of motion. At 1 year follow-up the child

Figure 1 Anteroposterior and lateral radiographs identified a joint effusion with elevation of anterior and posterior fat pads. A comminuted radial head fracture with fracture fragmentation of posterior aspect of olecranon.

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Figure 2 Axial CT images of the right elbow. In a normal elbow the humeral transcondylar axis is parallel to a line drawn through the lateral most aspect of the radial head and medial aspect of the proximal ulna. Here the ulna has rotated around the axis of radial head.

has progressed well with radiological fracture union and pain-free range of motion.

OUTCOME AND FOLLOW-UP

At 3 months follow-up clinic, the child had full range of motion with stability and good function.

At 1 year follow-up the child has progressed well with radiological fracture union and pain-free range of motion.

DISCUSSION

There is often diagnostic uncertainty with paediatric traumatic elbow injuries reflected by the highest diagnostic error rate in the elbow joint for paediatric trauma.¹ The history is often unreliable and radiographs can be difficult to interpret leading to misdiagnosis and delay in appropriate treatment.¹ If there is any doubt in diagnosis we recommend a CT.

Dislocation is more frequent in the paediatric patient as the 'locking in' has not matured yet, there is relative hyperextension and capsular laxity compared to the adult elbow.²

A number of injuries have been characterised in the orthopaedic literature. Monteggia injuries and their variants comprise an ulnar diaphysis fracture and radial head dislocation. A divergent dislocation involves disruption of all three joints comprising the elbow; the radiocapitellar, ulnotrochlear and the radioulnar joints.³⁻⁴ To our knowledge this is the first report of this type of fracture dislocation pattern, describing a congruent radial head fracture and associated ulnar dislocation. This is not a Monteggia-type injury as the ulnar is dislocated or a divergent

dislocation as the proximal radius is congruent with the humeral capitellum, making this a unique injury pattern.

A radial head fracture is rare owing to its cartilaginous composition in children accounting for 1% of paediatric elbow injuries, predominantly occurring in the older child following a fall on an outstretched hand with valgus moment and associated with dislocation of the elbow.³⁻⁵ Padman *et al* describes a fracture of this nature, most commonly Salter-Harris IV, and the need to accurately differentiate from a normal variant. The discussion regarding definitive treatment of paediatric radial head fractures is beyond the scope of this article, with emphasis on CT to identify complex elbow injuries and also reporting a unique paediatric elbow injury.

In our case routine plain radiographs did not confirm the diagnosis and a CT was requested. The transcondylar axis, illustrated in figure 2, is a line drawn from the medial epicondyle to the lateral epicondyle of the humerus. A line from the most lateral aspect of the radial head to the most medial point of the proximal ulna should be parallel in the transverse plane. If not, as in our case the joint is subluxed or dislocated.

Although not a routine test in acute paediatric trauma, CT scan added valuable information in this case defining the injury pattern, facilitating closed reduction manoeuvres and most importantly avoiding open reduction, internal fixation and the associated morbidities from surgery. CT has been found to alter management in paediatric traumatic elbow injuries. Chapman *et al*⁶ assessed 31 children with positive fat pad signs in the absence of fracture on plain radiographs. Reporting a sensitivity

Figure 3 Three-dimensional CT reconstruction of the right elbow. The radial head fracture can be seen, with mal-alignment of the ulna as it has rotated anticlockwise about the axis of the radial head.

Figure 4 Intraoperative image intensifier images postmanipulation and reduction.

and specificity of 92% and 79%, respectively.⁶ The authors conclude, additional imaging altered management in 13% of patients and is particularly useful in radial head and lateral condyle fracture diagnosis.

Competing interests None.

Patient consent Obtained.

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Learning points

- ▶ It is not uncommon for paediatric elbow trauma to pose a diagnostic challenge.
- ▶ Consider ulnar dislocation in the differential diagnosis.
- ▶ CT imaging aids diagnosis, particularly in radial head fractures or more subtle injuries while guiding definitive management.
- ▶ Specific assessment of transcondylar axis identifies ulnar dislocation.

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