Complex Pediatric Elbow Injuries: Uncommon Cases

H Sharma*1, R Ayer2, G R Taylor2

H Sharma,* FRCS, hksharma1@aol.com

R Ayer2, MBBS, raviayer@aol.com

G R Taylor2, FRCS(Orth), graeme.taylor@suht.swest.nhs.uk

1 Department of Trauma and Orthopaedics, Western Infirmary, Glasgow,

G11 6NT, UK

2 Department of Trauma and Orthopaedics, Southampton General Hospital, Southampton,

SO16 6YD, UK

*Corresponding author:

Mr Himanshu Sharma

44 Abercorn Road

Newton Mearns

Glasgow

G77 6NA

UK

Tel: + 44 141 639 3697

Fax: + 44 141 201 2466

Email: himanshusharma1@hotmail.com

[Abbreviated title: Complex Pediatric Elbow Injuries…]
Complex Pediatric Elbow Injuries: Uncommon Cases
Abstract

**Background:** There are limited evidences available in the literature describing complex elbow trauma in the pediatric population. We described four cases of uncommon pediatric elbow injuries. The difficulties encountered with their diagnosis and management is discussed with relevant literature review.

**Case presentation:** A short series of four cases on complex pediatric elbow trauma, comprising of fracture lateral condyle associated with olecranon fracture (two cases), fracture lateral condyle in association with posterior dislocation of elbow (one case) and intercondylar-transcondylar fracture (one case) are presented. The average age was 9.25 years. All the patients were male. All patients sustained a direct elbow trauma. We used the hybrid treatment i.e. anatomical reduction and open pinning for the fixation of the lateral condyle fracture, while treating undisplaced olecranon fracture non-operatively. Concomitant elbow dislocation was managed by closed reduction, assessing the stability under general anaesthesia, followed by open K-wiring of the lateral condylar fracture fixation. The average duration of stay for K-wire was 4.3 weeks. All the patients had uneventful recovery with an excellent outcome after a mean follow-up of 34.5 months.

**Conclusions:** Complex pediatric elbow injuries are quite unusual to encounter, the management of such fractures can be technically demanding. We found the hybrid treatment i.e. anatomical reduction and open pinning for the fixation of the lateral condyle fracture, while treating undisplaced olecranon fracture non-operatively was quite safe and effective. Similarly,
concomitant elbow dislocation was successfully managed by closed reduction followed by open K-wiring of the lateral condyle fixation.

**Key words:** Pediatric orthopaedic, Complex pediatric elbow trauma, Lateral condyle fracture, Olecranon fracture, Posterior dislocation of elbow.
Background

Complex pediatric elbow injuries are quite unusual and their management can be technically demanding. There are limited evidences available in the literature describing complex elbow trauma in the pediatric population. The elbow anatomy and multiple growth centres, appearing at different time period complicate the diagnosis and management of complex elbow trauma. McLearie and Merson (1954) published a review of five patients with lateral condyle fracture in association with posterolateral elbow dislocation [1]. Tachdjian (1990) described a case of medial elbow dislocation associated with fracture lateral humeral condyle [2]. More recently, postero-medial dislocation of the elbow with lateral condyle fracture was described in four children by Kirkos et al [3]. Postero-medial dislocation of the elbow with associated intra-articular entrapment of the lateral epicondyle has been reported by Pouliart and De Boeck [4].

This study aimed to describe four cases comprising of fracture lateral condyle in association with posterior dislocation of elbow (one case), fracture lateral condyle with olecranon fracture (two cases) and intercondylar-transcondylar fracture (one case). The difficulties encountered with their diagnosis and management is discussed with relevant literature review.
Case presentation

Between September 1999 and September 2001, we retrospectively reviewed case notes and radiographs of a consecutive series of 4 complex pediatric elbow trauma cases treated at a University Teaching Hospital in the UK.

All the 4 patients were male. The average age was 9.25 years (range, 6 to 12 years). There were three right sided and one left sided injury. All patients sustained a direct elbow trauma. We used the hybrid treatment i.e. anatomical reduction and open pinning for the fixation of the lateral condyle fracture, while treating undisplaced olecranon fracture non-operatively. Concomitant elbow dislocation was managed by closed reduction, assessing the stability under general anaesthesia, followed by open K-wiring of the lateral condylar fracture fixation. A contralateral comparison elbow radiograph was done in two cases and found to be helpful as the fracture line may be difficult to see on the theatre films. The average duration of stay for K-wire was 4.3 weeks. The details of all four cases are summarised in Table 1. A close clinico-radiological follow-up at one and two weeks postoperatively was instituted to help in early diagnosis of the loss of reduction. All the patients had uneventful recovery with an excellent outcome after a mean follow-up of 34.5 months (range, 29 to 39 months).
Discussion

There are limited evidences available in the literature describing complex elbow trauma in the pediatric population. The current short series of four cases on complex pediatric elbow trauma is reported and an excellent outcome in all the patients was observed.

Traumatic dislocation of the elbow is a rare injury in children constituting 3-6% of all elbow injuries. It can infrequently be associated with lateral humeral condyle fracture [1,5]. In the current series, the elbow stability was assessed under general anaesthesia. The elbow dislocation was reduced by closed manipulation. The fixation of lateral condyle fracture is of prime importance, as it constitutes Salter Harris type IV injury. The evidences support prompt open reduction and internal stabilisation of the lateral humeral condyle fracture to get the best results [6,7]. Growth plate and articular surface should be aligned and restored. Missing or inadequately treated lateral humeral condylar fracture can lead to non-union, abnormalities in carrying angle, a prominence of lateral humeral condyle, cubitus valgus and tardy ulnar palsy [8]. Open reduction and internal fixation of lateral condyle fracture was carried out with the help of 2 to 3 Kirschner wires by lateral approach. The optimum time for removal of kirschner wire is controversial in the literature, ranging from 3 to 8 weeks [7,8]. In this series, the average life span of K-wire was 4.3 weeks (range, three and a half to 5 weeks). This was largely due to the allocation of fixed weekly clinic day.

Coexisting olecranon fracture in the case 2 and case 3 were undisplaced and were successfully managed non-operatively. For displaced olecranon fractures, the mechanical properties of the
tension band wiring and threaded pin has recently been found to be superior over smooth pin in the fixation of olecranon fractures [9]. Intercondylar-transcondylar fracture is more commonly seen in the adult elbows. Although, this fracture pattern was minimally displaced in case 4, a percutaneous pinning was performed in order to prevent further displacement. All the patients had an uneventful recovery with an excellent outcome by Hardacre functional rating system² for evaluation of the results (i.e. no loss of motions, no alteration in the carrying angle, and no symptoms).
Conclusions

In summary, complex pediatric elbow injuries are quite unusual to encounter, the management of such fractures can be technically demanding. We found the hybrid treatment i.e. anatomical reduction and open pinning for the fixation of the lateral condyle fracture, while treating undisplaced olecranon fracture non-operatively was quite safe and effective. Similarly, concomitant elbow dislocation was successfully managed by closed reduction followed by open K-wiring of the lateral condyle fixation. We believe that a contralateral comparison elbow radiograph is helpful as the fracture line may be difficult to see on the theatre films. Postoperatively, a close clinico-radiological follow-up helps in early diagnosis of the loss of reduction.
Competing interests

None declared
Authors' contributions

Each author has equally contributed. HS collected the data and written up the manuscript, RA helped in scrutiny of the paper and illustrations. GRT had the idea and granted permission to use his four patients data for preparing the manuscript.
References


Legends to Figures

**Figure 1a and 1b:** Preoperative anteroposterior and lateral radiographs of the elbow revealing fracture lateral condyle in association with posterior dislocation of elbow.

**Figure 2a and 2b:** Postoperative anteroposterior and lateral radiographs of the elbow revealing internal fixation of the lateral condyle fracture with the help of K-wires. The elbow dislocation was reduced first by closed technique.

**Figure 3a and 3b:** Preoperative anteroposterior and lateral radiographs of the elbow revealing Milch type II fracture lateral condyle associated with undisplaced olecranon fracture.

**Figure 4a and 4b:** Postoperative anteroposterior and lateral radiographs of the elbow revealing internal fixation of the lateral condyle fracture with the help of K-wires. Olecranon fracture was treated non-operatively.

**Figure 5a and 5b:** Preoperative anteroposterior and lateral radiographs of the elbow revealing intercondylar-transcondylar fracture.

**Figure 6a and 6b:** Postoperative anteroposterior and lateral radiographs of the elbow revealing internal fixation of the intercondylar-transcondylar fracture with the help of K-wire.

**Table 1:** Patient details with regard to demography, diagnosis, treatment and outcome.
Additional files provided with this submission:

Additional file 1: Table 1 Complex pediatric elbow.doc : 29KB
http://www.biomedcentral.com/imedia/8155774075253120/sup1.doc