

CASE REPORT

ISOLATED AVULSION FRACTURE OF THE CORONOID PROCESS REQUIRING OPEN REDUCTION IN A PAEDIATRIC PATIENT : A CASE REPORT

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Coronoid process fractures are reported to occur from avulsion by the brachialis muscle or to be associated with elbow dislocations. We report a rare case of coronoid process fracture due to avulsion by the anterior bundle of the medial collateral ligament rendering the elbow unstable.

In children, small fracture fragments of the coronoid process (types 1 & 2) are in reality often much larger but the actual size is not appreciated radiographically, as the coronoid process contains considerable amounts of cartilage. If the fragment is seen to be significantly displaced it may have resulted from avulsion by important structures such as the medial collateral ligament and open reduction is required to stabilise the elbow.

Keywords : elbow ; trauma ; children ; coronoid process.

Mots-clés : coude ; traumatisme ; enfant ; apophyse coronoïde

INTRODUCTION

Isolated fractures of the coronoid process in children are rare. If encountered as a seemingly isolated lesion, these fractures are thought to result from pure avulsion by the brachialis muscle or are secondary to an elbow dislocation that reduced spontaneously (3, 10).

We report the case of a child with coronoid process fracture that occurred due to avulsion by the anterior bundle of the medial collateral ligament (AMCL) necessitating open reduction and repair to achieve a stable elbow.

CASE REPORT

A 40-month-old girl presented to the trauma unit with a painful, swollen elbow. Her mother described a valgus stress injury to her extended right elbow. On examination there was marked swelling, bruising and tenderness on the medial side of the elbow. Plain radiographs (fig. 1)



Fig. 1. — Anteroposterior and lateral radiographs of elbow showing avulsion fracture of the coronoid process (Regan-Morrey type II) displaced proximally. Note the positive posterior fat pad sign

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Fig. 2. — Postoperative radiographs at 4 months follow-up. The coronoid tip fracture has united.

revealed a type II (Regan & Morrey) fracture of the coronoid process. The fragment of coronoid was displaced proximally and lay just inferior and posterior to the medial epicondyle. Examination under general anaesthesia revealed excessive opening of the elbow medially on applying a valgus stress. Attempts at closed reduction of the fracture, in either flexion or extension (10) failed. Open reduction was thus performed exposing the fracture through a medial approach. The fragment, which consisted mostly of cartilage was noted to be much larger than its dimensions on the radiographs. The anterior bundle of the medial collateral ligament (AMCL) was attached to this fragment and had caused the fragment to displace proximally rendering the elbow unstable to valgus strain. The fragment was reduced to its anatomical position and secured with a non-absorbable periosteal suture. The elbow was immobilised in an above-elbow plaster of Paris cast for two weeks and then actively mobilised. At final follow-up after four months, radiographs of the elbow (fig. 2) revealed a united fracture. The child lacked only 5° of extension and had an elbow stable to valgus stress. She did not attend for further follow-up and at a telephonic interview the parents reported that she had regained the full range of painless movement of the injured elbow after six months.

DISCUSSION

Regan and Morrey classified coronoid fractures into three types (8, 9). Type I fractures involve the coronoid tip. Type II fractures involve up to 50% of the coronoid process. Type III fractures involve more than 50% of the coronoid process. Anatomical (2), biomechanical (4) and clinical (1) studies have confirmed the usefulness of this classification in predicting outcome and in determining management. Regan and Morrey recommended avoiding open reduction for type I and type II fractures (9). However, Terada *et al.* (11) reported the importance of open reduction of type I fractures, associated with elbow dislocations, to make the elbow stable by restoring the integrity of the anterior capsule. The case reported highlights the necessity of open reduction of type II fractures in order to restore continuity of the AMCL.

Up to the age of six years, the coronoid process is mostly epiphyseal and is composed of physal cartilage at the distal end of a tongue extending from the apophysis of the olecranon. The coronoid process is ossified by the advancing edge of the metaphysis (3).

The AMCL is an important stabiliser of the elbow against valgus stress (7). It originates posterior to the axis of rotation of the elbow on the inferior aspect of the medial epicondyle (6). In adults it inserts distally about 18.4 mm dorsal to the coronoid tip (2).

Cage *et al.* (2), in a cadaveric study of soft tissue attachments of the coronoid process, reported that only in type III fractures would the AMCL be attached to a free bone fragment.

The avulsed fragment in our patient was much larger than that visible on radiographs. The AMCL had avulsed at its distal attachment together with a fragment of the coronoid process. The fragment lay widely displaced, posterior and inferior to the medial epicondyle, rendering the elbow unstable to valgus stress.

In children, small fracture fragments of the coronoid process (type I and type II) are in reality much larger, but their actual size is not always appreciated radiographically, as the coronoid process contains considerable amounts of cartilage. If the

fragment is seen to be significantly displaced, the fracture may result from avulsion by important stabilising soft tissue structures, such as the AMCL, and open reduction will be required.

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SAMENVATTING

A. GADGIL, R. ROACH, N. NEAL, N. MAFFULLI. *Geïsoleerde afrukking van processus coronoides ulnae bij een kind. Bespreking van een geval waarbij open reductie noodzakelijk bleek.*

Afrukkingen van processus coronoides ulnae door de m. brachialis zijn gewoonlijk het gevolg van elleboogluxatie. In dit geval ontstond de ellebooginstabiliteit door een afrukking van het anterior gedeelte van het mediaal collateraal ligament. Bij het kind is het afrukkingsfragment van een type I en II fractuur veel groter dan radiologisch vermoed omdat een groot deel van het processus nog kraakbenig is. Bij een afrukking met grote verplaatsing zijn vermoedelijk ook belangrijke structuren zoals het mediaal collateraal ligament in het mechanisme betrokken en kan men zich verwachten aan een open reductie.

RÉSUMÉ

A. GADGIL, R. ROACH, N. NEAL, N. MAFFULLI. *Fracture-avulsion isolée de l'apophyse coronoïde de l'ulna imposant une réduction à ciel ouvert chez l'enfant. Présentation d'un cas.*

Les fractures de l'apophyse coronoïde résultent d'une avulsion par le muscle brachial ou se rencontrent associées à une luxation du coude. Les auteurs rapportent un cas rare de fracture de l'apophyse coronoïde en rapport avec une avulsion par le faisceau antérieur du ligament collatéral médial, responsable d'une instabilité du coude. Chez l'enfant, les fragments osseux dans un arrachement de l'apophyse coronoïde de type I et II sont souvent beaucoup plus volumineux que ne le montre la radiographie, car l'apophyse coronoïde est en bonne partie cartilagineuse. Si l'on constate un déplacement important du fragment, il peut traduire une avulsion par des structures anatomiques importantes comme le ligament collatéral médial, et une réduction à ciel ouvert s'impose pour stabiliser le coude.