CASE REPORT ON CUBITUS VARUS DEFORMITY AS A COMPLICATION OF UNITED MEDIAL CONDYLE OF HUMERUS FRACTURE- A RARE FRACTURE IN CHILDREN

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PRESENTATION OF CASE
A 9-year-old boy was brought to our hospital with deformity and inability to fully flex his left elbow in February 2017. This occurred following injury to this elbow on 10/12/2013 due to fall on outstretched hand. As per documents presently available with him, his injury was diagnosed as fracture of medial condyle of left humerus at another tertiary care teaching hospital. (Figure 1). He was treated by closed reduction and percutaneous internal fixation with two k wires inserted from medial side followed by above elbow POP slab. (Figure 2a, 2b). POP slab and k wires were removed after four weeks and the patient was put on physiotherapy home programme. However, the patient did not continue clinical radiological followup at that hospital in subsequent period of time.

He had no pain or tenderness or swelling on presentation to us. There was cubitus varus deformity of left elbow associated with internal rotation of the left forearm. (Figure 3). Medial supracondylar ridge was thickened. The relationships of three bony points of tip of the olecranon, medial & lateral epicondyle were altered. Elbow range of motion was 0-0-100. (Figure 4). There was no limb length discrepancy & distal neurovascular status was intact. ROM of ipsilateral shoulder and forearm were within normal limits.

AP and lateral view of x-rays of elbows of both sides were done for comparison. The medial condyle of humerus fracture had united. But the medial condyle was ill developed and there was medial subluxation of radius and ulna. Baumann’s angle decreased compared to other side. (Figure 5a, 5b). After thorough counselling of patient and parents, under general anaesthesia, supracondylar lateral dose wedge osteotomy and internal fixation with two k wires was done through lateral approach. (Figure 6a). The k-wires were inserted parallel to each other from lateral side under c-arm fluoroscopy guidance and above elbow POP cast was applied. (Figure 6a, 6b). Patient was clinicoradiologically followed up regularly at two weeks interval. At six weeks, POP cast and k wires were removed (Figure 7a, 7b) and the patient was put on ROM and strengthening exercises under supervision of physiotherapists. (Figure 8, 9a, 9b, 9c, 9d).

DIFFERENTIAL DIAGNOSIS
In children, cubitus varus deformity of the elbow following trauma can commonly result as a sequel of misdiagnosed, untreated or inadequately treated supracondylar, lateral condyle, medial condyle and physeal injury of distal humerus.

CLINICAL DIAGNOSIS
Clinically, it was a case of left-sided cubitus varus deformity with internal rotation of left forearm with posteromedial subluxation and restricted movement of left elbow in a 9-year-old boy following closed reduction and percutaneous k wire fixation for medial condyle of humerus fracture more than 3 years ago.

Figure 1. Fracture of Medial Condyle of Humerus in Preoperative X-ray

Figure 2a, b. Post-operative X-ray (AP & Lateral) of Internal Fixation of Fracture Medial Condyle
Fractures of the medial condyle of humerus behave as the mirror image of lateral condyle fractures.[1] These fractures are rare in skeletally immature children, accounting for less than 1% of fractures involving the distal humerus.[2] Many of the large series of elbow fractures in the literature and early fracture texts do not mention fractures of medial condyle of humerus in children as a separate entity. Blount[3] described only one such fracture in his classic text. In Faysse and Marion's[4] review of more than 2,000 fractures of the distal humerus in children, only 10 fractures involved the medial condyle.
Most series[4,5] show medial condylar fractures occurring somewhat later than lateral condylar fractures. A review of 38 patients in nine series,[6,7,8,9,10,11] in which the specific ages were given showed that 37 patients were in the age range of 8 to 14 years. Thus, this fracture seems to occur most often after the ossification centres of the medial condylar epiphysis begin to appear. However, a medial condylar fracture can occur as early as 6 months of age, before any ossification of the distal humerus has appeared.[10,11] Although falling directly on the point of the flexed elbow is implicated as mechanism of injury,[7,10,12,13] yet in some series,[14,15,16] many patients sustained this injury when they fell on their outstretched arms implicating that this is an avulsion injury caused by a valgus strain at the elbow.

Clinically and on radiographs, a fracture of the medial condylar physis is most often confused with a fracture of the medial epicondyle.[17] A high index of suspicion is necessary to avoid missing a displaced, intra-articular medial condylar fracture in the young. In both types, swelling is concentrated medially, and there may be valgus instability of the elbow joint. In a true medial condylar fracture; however, there is varus instability in addition as well.[1]

In older children with a large metaphyseal fragment, involvement of the entire condyle is usually obvious on radiographs. However, in younger children, in whom only the epicondyle is ossified, fracture of the medial condylar physis may be erroneously diagnosed as an isolated fracture of the medial epicondyle.[8,9,11]

Whereas medial epicondyle fractures are often associated with elbow dislocations, usually posterolateral but with medial condylar physeal fractures, the elbow tends to subluxate posteromedially[8] because of the loss of trochlear stability.

Any metaphyseal ossification with the epicondylar fragment suggests the presence of an intra-articular fracture of the medial condyle. A positive fat pad sign indicates that a fracture of the medial condyle is likely.[10,11] Isolated fractures of the medial epicondyle are extra-articular and usually do not have positive fat pad signs. When the diagnosis is a real possibility, especially in a child with no ossification of the trochlea, examination with anaesthesia, arthrography, and/or MRI is required.

Kilfoyle[19] described three fracture displacement patterns that can be helpful in determining appropriate treatment. In type I, the fracture line in the medial condylar metaphysis extends down to the physis. In type II, the fracture line extends into the medial condylar physis. The intra-articular portion, as it is in precocious cartilage, is often not recognised. The medial condylar fragment usually remains undisplaced. In type III, the condylar fragment is both rotated and displaced. The metaphyseal fragment includes the intact medial epicondyle along with the common flexor origin of the muscles of the forearm. These flexor muscles cause the loosened fragment to rotate so that the fracture surface is facing anteriorly and medially and the articular surface is facing posteriorly and laterally.[6,7] Rotation of the fragment is especially accentuated when the elbow is extended.

The major complication is failure to make the proper diagnosis. This is especially true in younger children, in whom a medial condylar fracture can be confused with a displaced fracture of the medial epicondyle. [1] Leet et al[20] reported complications after 33% of twenty one medial condylar fractures, including osteonecrosis of the trochlea, non-union and loss of reduction. Untreated displaced fractures usually result in non-union with cubitus varus deformity.[15,21] These patients are at high risk for loss of motion, function, pain, and eventual arthrosis. Delayed union has been reported in patients treated with insecure fixation or simply placed in a cast.[19] Some disturbance of the vascular supply to the medial condylar fragment may occur during open reduction and internal fixation or at the time of initial injury. Several investigators have reported subsequent avascular changes in the medial condyle of the trochlea.[5,15,19] Both cubitus varus and valgus deformities have been reported in patients whose fractures united uneventfully. The valgus deformity appears to be caused by secondary stimulation or overgrowth of the medial condylar fragment. Some simple stimulation of the medial epicondyle's prominence may also produce the false appearance of a cubitus valgus deformity. Cubitus varus appears to result from decreased growth of the trochlea, possibly caused by a vascular insult.[1]

**DISCUSSION OF MANAGEMENT**

In types I and II fractures, enough residual internal stability is usually present to allow the fracture to be simply immobilised in a cast or posterior splint.[4,5,10,14,15] However, union may be slow in them. In fractures treated promptly, results have been satisfactory.[10] Because there is usually more displacement in older children, the results of non-operative treatment in this age group are not as satisfactory as those in younger children, who tend to have relatively nondisplaced fractures.[10]

For displaced fractures, open reduction with internal fixation is the most often used treatment method.[5,10,14,15,19,22] The fracture fragment can be approached by a posteromedial incision that allows good exposure of both the fracture site and the ulnar nerve. Fixation is easily achieved with smooth K-wires or with screws in older adolescents. Two wires are necessary because of the sagittal rotation forces exerted on the fracture fragment by the common flexor muscles. El Ghwabi[16] reported frequent delayed union and non-union in fractures that were not rigidly stabilised.

The cubitus varus deformity is distinctive on x-ray as evident by decreased Baumann's angle on AP view. Osteotomy is the only way to correct a cubitus varus deformity with a high probability of success. Cubitus varus deformity in addition to cosmetic appearance, result in elbow discomfort, pain, tardy posterolateral rotational instability, increased risk of lateral condyle fractures and late ulnar nerve palsies which may be indications for correction of deformity with a supracondylar humeral osteotomy.[25,26,27,28,29,30,31,32,33]
REFERENCES


