

Original Article**Outcome of paediatric lateral condyle humerus fractures treated operatively**

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ABSTRACT

Background: Paediatric lateral humeral condyle fractures account for 17 % of the distal humeral fractures. Displaced and rotated fractures require appropriate reduction and stabilisation.

Aims: The aim of the present study was to review the results of patients with a displaced lateral humeral condyle fracture treated with open reduction and internal fixation (ORIF).

Material and methods: We prospectively reviewed 30 children operated for lateral humeral condyle fractures at a single institution over a period of 3 years. Age distribution, fracture classification, mode of fixation, time to union, complications and final outcomes at the latest follow-up were reviewed.

Results: Total 30 patients of lateral condyle fractures were identified in which there were 18 male and 12 female patients. Average age was 8.07 years. 10 were Milch type II and 20 Milch type I. According to the Jacob's classification, 05 were type I and 17 were type II and 08 were type III. All fractures were treated with open reduction and fixation with K-wires except one which was treated with CRIF. Average time to radiological union was 6.1 weeks. Radiological hypertrophy of the lateral condyle was present in 4 cases (13.33 %). 3 patients developed a pseudo-cubitus varus deformity.

Conclusion: Our results demonstrate that fracture union and excellent final outcomes can be expected in all patients using our protocol, whereby all patients with a displaced fracture are managed by ORIF with K-wire fixation, with the wires only being removed after there is evidence of radiological union.

Key words: Paediatric lateral condyle fractures, ORIF, Radiological union

INTRODUCTION

Lateral condyle fractures of the distal humerus are the second most common fractures at the elbow in the paediatric population usually between the ages of 6–10 years old making up 5–20 % of fractures in children. The diagnosis is difficult many times because of the cartilagenous nature of the fracture fragment. The Milch classification [1] is widely used, and they are; type I and type II according to whether the fracture exited through the capitellar–trochlear groove or through the trochlear, respectively. A Jacob I is non-displaced, II is displaced by 2 mm, but not malrotated, Type III is displacement with malrotation [2]. The aim of lateral humeral condyle fracture treatment is to achieve accurate anatomical reduction to prevent pseudoarthrosis, malunion and

deformities. Undisplaced stable fractures are treated in cast immobilisation with observation. Articular fractures that have a hinge may be treated with closed reduction and percutaneous pinning. An arthrogram may help to define articular congruity and adequacy of the reduction. Fractures that are unstable, malrotated and displaced by over 2 mm usually undergo open reduction internal fixation usually with smooth K-Wires[3]. There is always a dilemma as to how much displacement and fracture instability is required before open reduction and internal fixation (ORIF) is indicated. The aim of the present study was to review the results of patients with a displaced lateral humeral condyle fracture treated with ORIF over a 3-year period at a Guru

Govindsingh hospital, Jamnagar during September 2013 to January 2016.

METHODOLOGY

Study area, duration: A prospective, all inclusive, non-controlled, non-randomized, non-blinded study of 30 cases of lateral condyle humerus fracture in paediatric age group treated by K-wire fixation was done from September 2013 to January 2016 at Shri M.P.Shah Government Medical College & Guru Govindsinh Government Hospital, Jamnagar, Gujarat, India.

Inclusion criteria:

- Males and females both are included.
- Age < 12 years.
- Patients treated with open reduction only.

Exclusion criteria:

- Patients with co morbid illness.
- Patients presenting with a delay of more than 2 weeks from injury

Initial assessment of the patients was performed in the Trauma centre of our Institution. The injured limb was examined for deformity, wounds and neurovascular integrity. Antero-posterior, lateral and internal oblique radiographs of the elbow were routinely performed. Fractures were classified using the Milch as well as the Jacob classification. The acceptable displacement for conservative management in an above elbow plaster of Paris (POP) cast was up to 2 mm. All fractures were treated by a Consultant Orthopaedic Surgeon as emergency theatres facility allowed access. Paediatric tourniquets were used in all procedures. The fracture was identified and reduced via a dorsolateral (Kocher's) approach to the distal humerus, through the interval between brachioradialis and triceps. The joint surface was visualised and accurately reduced with minimal dissection of soft tissues from the distal fragment in order to reduce the risk of avascular necrosis of the capitellum. The reduction was stabilised with two divergent or parallel K-wires that were buried inside the skin. Subsequently, an above elbow splint in neutral position was applied. Patients were followed up weekly until radiological union of the fracture was evident, and thereafter, the wires and the splint were removed in the outpatient department with the use of local anaesthetic. Following the removal of splint, all

patients were mobilised with intensive physiotherapy focusing on elbow full range of movement (ROM). At the final follow-up, the patient's outcome was assessed clinically for ROM and deformity and radiologically. Also, the patients were asked about any residual pain and whether or not they were happy performing daily life activities and sports. The results were graded according to the criteria suggested by Hardacre et al.

Ethical clearance: Approval to perform our study was obtained by the Institutional Ethics Committee for Human Research.

RESULTS

This is a prospective study of 30 cases of fracture of lateral condyle of humerus in paediatrics patient include incident, fracture classification, and complication of long term of more than 6 months.

Table1: Distribution of cases according to age

AGE(years)	FREQUENCY (% , n=30)
2-5 years	6(20%)
6-9 years	14(46.66%)
10-12 years	10(33.33%)

In our study majority of patient are between 6-9 years of age group (mean age=8.07 years) and minimum and maximum being 4 and 12years respectively.

Table2: Distribution of cases according to sex

SEX	FREQUENCY (% , n=30)
Male	18(60%)
Female	12(40%)

In our study, out of 30 patients there were 18 males (60%) and 12 females (12%).There is preponderance of male.

Table 3: Classification of fracture(MILCH'S)

MILCH TYPE	FREQUENCY (% , n=30)
Type I	20(66.66%)
Type II	10(33.33%)

Table 4: Classification of fracture (JAKOB'S)

JAKOB'S TYPE	FREQUENCY (% , n=30)
Type I	08(26.66%)
Type II	17(56.66%)
Type III	05(16.66%)

In our study, out of 30 patients 20 were of Milch type 1 while 10 patients were of Milch type 2; whereas according to Jakob's classification there were 8 patients of undisplaced type I, 17 patients of minimally displaced type II and 5 patients of completely displaced type III.

Table-5: Late complications at final follow up

	Complication	Frequency (% n=30)
Clinical	Pain	00
	Stiffness	01
	Infection	00
	Cubitus varus	03
	Cubitus valgus	00
	Tardy ulnar nerve palsy	00
Radiological	Non union	00
	Malunion	01
	Spur formation	04
	Altered carrying angle(Ulna-humeral angle)	03
	Altered Baumann's angle	03
	Altered diaphysis- metaphyseal angle	03

Only 2 patients developed superficial pin site infection as part of immediate complication which was managed conservatively in form of oral antibiotics and proper wound care. No patient developed any deep infection, septic arthritis or loosening of K-wire at final follow up.

Out of 30 patients, 4(13.33%) patients developed lateral spur formation. 3 patients (10 %) out of 30 developed a true cubitus varus. 2 patients (6.66%) out of 30 patients developed osteonecrosis.

Table 6: Result according to fracture classification (n=30)

Milch type	Excellent	Good	Poor
Type I	19(63.33%)	00	01(3.33%)
Type II	07(23.33%)	02(6.66%)	01(3.33%)
	26(86.66%)	02(6.66%)	02(6.66%)

In 1971, Hardacre et al. presented their criteria for grading the outcomes following treatment of lateral humeral condyle fractures, taking into consideration symptoms, range of motion and deformity. In our study results are evaluated according Hardacre criteria. Out of 30 patients 26 (86.66%) patients had

excellent outcome, 2 had good outcome, 2 had poor outcome.

DISCUSSION

In our study majority of patient are between 6-9 years of age group (mean age=8.07 years) and minimum and maximum being 4 and 12years respectively. Whereas in Patwardhan series [4] out of 38 patients maximum patients (20) were from 2-5 years age group.

In our study, out of 30 patients there were 18 males (60%) and 12 females (40%). There is preponderance of male whereas in Andreas series [5] out of 105 patients there were 76 male and 29 females.

In our study, out of 30 patients 20 were of Milch type 1 while 10 patients were of Milch type 2; in similar study by Andreas[5] out of 105 patients there were 13 Milch Type I and 92 Milch Type II fracture.

In our study, according to Jakob's classification there were 8 patients of undisplaced type I, 17 patients of minimally displaced type II and 5 patients of completely displaced type III similarly in Andreas series[5] no patients of type I, 38 patients of Type II and 67 patients of Type III.

Bony overgrowth (lateral spurring) over the lateral condyle is a distinct radiological finding commonly seen in children following a fracture of the lateral condyle of the humerus. A recent study by Pribaz et al [6]. Consisting of 212 lateral condyle fractures treated by various methods, demonstrated that 73 % of the patients developed some degree of lateral spur. In our series, 4 cases (13.33 %) of the patients developed lateral spurring. As a sequel of lateral spurring, 2 of our patients developed a pseudocubitus varus deformity at the elbow. Although the patients were able to feel the spur, it was pain free and did not affect their range of movements nor interfered with their daily activities and sports.

In our study, 1 patient (3 %) out of 30 developed a true cubitus varus. whereas in Andreas series 4 patients out of 105 developed true cubitus varus.

In our study 2(6.66%) out of 30 patients developed osteonecrosis. Whereas no patient developed osteonecrosis in Andreas series [5].

In 1971, Hardacre et al. presented their criteria for grading the outcomes following treatment of lateral humeral condyle fractures, taking into consideration symptoms, range of motion and deformity.

In our study results are evaluated according Hardacre criteria. Out of 30 patients 26 (86.66%) patients had excellent outcome, 2 had good outcome, 2 had poor outcome whereas in Andreas series (105 cases) [5] 101 patients had excellent outcome, 4 patients had good outcome and no patient had poor outcome.

CONCLUSION

Our results demonstrate that fracture union and excellent final outcomes can be expected in all patients using our protocol, whereby all patients with a displaced fracture are managed by ORIF with K-wire fixation, with the wires only being removed after there is evidence of radiological union. Physiotherapy as soon as possible after the immobilisation period is important as it has been shown to be related with fewer complications, fewer residual symptoms and faster gains in range of motion and strength.

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