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## Open reduction and internal fixation with k-wire of lateral condylar fracture in children

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### Abstract

**Background:** All of the foregoing information has prompted us to conduct a thorough investigation into this issue. In light of the foregoing, a study of open reduction and internal fixation with k-wire of a dislocated fracture of the lateral condyle of the humerus in children has been done.

**Materials and Methods:** The Department of Orthopaedics, Government Medical College and Hospital, Kota, conducted this follow-up investigation on a fracture of the lateral condyle of the humerus. The patients in this study had a fracture of the lateral condyle of the humerus and had visited this department between September 2016 and December 2018. The current study includes 50 cases of lateral condyle humerus fractures.

**Results:** The youngest patient of this series at the time of sustaining injury was 2 years and the oldest patient was 13 years. However, the majority of cases were between the age group of 3-12 years with an average age of 7.5 years. Males are predominantly affected in a ratio of 4:1. In the majority of the children, the mechanism of injury could not be ascertained. However, in 18 per cent cases, it was due to fall on an outstretched hand and in 12%, direct injury to the elbow. Sixteen children (32%) were treated conservatively. This included 3 children with minimum displacement and one child who had significant displacement but had an irritable elbow. All those children who had slight to marked displacement were treated by surgery.

**Conclusion:** Open reduction and internal fixation with k wire in displaced lateral condyle humerus in children yields good results with minimum complications of prominence lateral condyle and non-union lateral condyle humerus.

**Keywords:** children, K-wire, internal fixation, open reduction

### Introduction

The lateral condyle humerus fracture is the second most common paediatric elbow fracture, behind the supracondylar humerus fracture, and usually occurs between the ages of 4 and 6. "Push-off" and "pull-off" have been proposed as mechanisms. The avulsion or pull-off mechanism has more supporters than the push-off mechanism. Adducting the forearm with the elbow extended and the forearm supinated consistently resulted in a pull-off injury. The push-off mechanism has also been replicated by striking the palm with a forceful blow while flexing the elbow, causing the radial head to push off the lateral condyle. A direct strike to the olecranon can potentially cause a push-off injury. Lateral condylar fractures, unlike supracondylar humeral fractures, are rarely associated with neurovascular damage <sup>[1]</sup>.

Because of the pull of the extensor muscles of the wrist attached to it, a distinctive and typical fracture of the lateral condyle of the humerus occurs in youngsters, with the customary outward rotation of the distal fragment. Closed manipulation has a hard time reducing this fracture because of the rotational displacement of the tiny capitulum fragment <sup>[1]</sup>.

In the past, the treatment of this fracture has been contentious. The vast majority of surgeons now favour operational treatment of these fractures if they are significantly displaced, rather than attempting closed reduction as Watson-Jones recommends (1955). This fracture most commonly affects young children between the ages of three and thirteen, while instances beyond these two age groups are not uncommon <sup>[2]</sup>.

The capitulum epiphysis, as well as the lateral third of the trochlea, and a piece of humeral diaphysis, are all common features of all epiphyseal injuries, according to Robert (1936) and

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Watson Jones (1955) [2]. Although several authors hold opposing viewpoints on the mechanism of injury, it is widely agreed that indirect elbow trauma caused by a fall on an outstretched hand is the primary cause of this fracture [3].

After a fall, hyper-adduction of the partially extended elbow stretches the lateral collateral ligament and the common extensor attachment violently, resulting in a lateral condyle avulsion fracture. Only until the capsule of the elbow joint is torn does the condylar fragment rotate. As a result, the joint capsule plays a crucial role in both the development of the fracture's characteristic rotational displacement and its treatment, with a thorough surgical repair of the ruptured capsule serving as an extra support to internal wire fixation [4].

Because it does not create significant deformity, doctors commonly miss this fracture, and patients' attendants mistake it for a minor injury. If left untreated, this fracture can result in significant consequences such as cubitus valgus deformity, delayed ulnar nerve palsy, and limited elbow and forearm movements. All of the foregoing information has prompted us to conduct a thorough investigation into this issue. In light of the foregoing, a study of open reduction and internal fixation with k-wire of a dislocated fracture of the lateral condyle of the humerus in children has been done [5].

## Materials and Methods

The Department of Orthopaedics, Government Medical College and Hospital, Kota, conducted this follow-up investigation on a fracture of the lateral condyle of the humerus. The patients in this study had a fracture of the lateral condyle of the humerus and had visited this department between September 2016 and December 2018. The current study includes 50 cases of lateral condyle humerus fractures.

Cases were personally examined and probed, with a focus on the mechanism of injury and the duration of the injury. Before coming to the hospital, the patient was questioned if he had received any treatment, such as a massage. This was followed by a thorough clinical examination, which included looking for swelling, bruises, soreness, the relationship of three bone landmarks in the elbow region, movement at the elbow and forearm, and any nerve or vascular injuries.

Inclusion criteria:

1. Patients who have been diagnosed as fresh (less than 4 weeks) cases of Closed fracture lateral condyle humerus in children.
2. Fracture unilateral or bilateral.
3. Both males and females.
4. Age < 15 yrs.

General examination, local examination, neurovascular state, systemic examination, and for connected injuries such as head, chest-visceral injuries, and other associated skeletal injuries were all part of the clinical assessment. Radiographs of the lateral condyle of the humerus were collected in AP and Lateral

views, and a clinical and radiological diagnosis was made. Henry Milch characterized the type of displacement and degree of rotation of the condylar fragment in both horizontal and vertical axes (1956) [6]. Clinical examinations of these cases were performed to look for deformities, tenderness at the fractured site, movements at the elbow and forearm, carrying angle, stability at the elbow, ability to lift weight, arm and forearm length, and any epiphyseal damage causing growth disturbances, among other things. All the significant findings were noted in proforma. These cases were classified into two groups, who had reported here for treatment, depending upon the duration of injury

**Group I:** Cases which had been reported within 10 days of injury.

**Group II:** Cases which had been reported between 10th day and 30 days.

## Results

The youngest patient of this series at the time of sustaining injury was 2 years and the oldest patient was 13 years. However, the majority of cases were between the age group of 3-12 years with an average age of 7.5 years. Males are predominantly affected in a ratio of 4:1.

**Table 1:** Side Incidence

Side	Number of cases	Percentage
Right	21	42.00
Left	29	58.00
Total	50	100.00

Left sided involvement was slightly more common.

**Table 2:** Duration from Injury

Duration from injury (in days)	Number of cases	Percentage
Within 10	36	72.00
10-30	14	28.00
Total	50	100.0

Most of the children were brought to the hospital within 10 days of injury (72%).

**Table 3:** Mechanism of injury

Mechanism of injury	Number of cases	Percentage
Exactly not known	35	70.00
Fall on out-stretched Hand	9	18.00
Fall on flexed elbow causing direct injury	6	12.00
Total	50	100.00

In the majority of the children, the mechanism of injury could not be ascertained. However, in 18 per cent cases, it was due to fall on an outstretched hand and in 12%, direct injury to the elbow.

**Table 4:** Type of displacement and degree of rotation

Type of displacement and degree of rotation	Number of cases	Percentage
Un displaced fracture Minimal displacement without	12	24.00
Rotation of condylar fragment Mark displacement	11	22.00
Rotation of condylar fragment (Abduction strain)	27	54.00
Total	50	100.00

In 23 children (46%) the fracture was either un displaced or there was minimum displacement without rotation. 27 children (54%) had marked displacement of the fractured fragment with

rotation of varying degree.

**Table 5:** Type of treatment

Type of treatment	Number of cases	Percentage
Conservative	16	32.00
Operative	34	68.00
Total	50	100.00

Sixteen children (32%) were treated conservatively. This included 3 children with minimum displacement and one child who had significant displacement but had an irritable elbow. All those children who had slight to marked displacement were treated by surgery.

### Discussion

The degree of the original trauma and the time interval between the trauma and the start of definitive therapy are critical factors in determining the functional result of children with fractured lateral condyle of the humerus. Because a male child is more active in outdoor activity than a female child, the incidence of injury is higher in male children (80%), who are more prone to injuries. Left-sided engagement was more common (58%) than right-sided involvement (42%) for which no satisfactory explanation could be offered. The majority of the patients were between the ages of 3 and 12, with an average age of 7.5. The majority of authors make similar observations about age and gender.

A significant proportion of instances (28 percent) were reported to us after 10 days from the time of the original incident. This is because the patient or his attendant mistook the injury for a minor one and sought treatment from bone setters, which included massage and the use of anti-irritants.

In the current study, the exact mechanism of damage could not be determined in 70% of instances because children and their parents were unable to determine the exact mode of fall. In many cases, historical skiagrams were unavailable, and intense massage frequently masked the true clinical picture. However, in 18% of cases, the fracture was caused by a fall on an outstretched hand with longitudinal force transmission, most likely varus strain, while in 12% of cases, the fracture was caused by direct trauma to the lateral condyle. Smith (1927), Heyl (1935), Hardana, Nahedion, Froimson, and Brown (1971)<sup>[8-10]</sup> were unable to determine the precise mechanism of the fracture. Boyd and Altenberg (1944), Blount (1955), Tachdjian (1972)<sup>[11-13]</sup> considered it to be an injury caused by virus strain. This aspect of the subject needs further explanation.

Internal fixation is accomplished with Krischner's wire in this series. These wires have been found to be simple to introduce, ideal for holding the broken piece in place, and devoid of the risk of damaging the condylar epiphysis.

In late cases, Cotton (1902), Stimson (1917), Stone (1921), Smith (1927)<sup>[14-17]</sup> recommended removing the condylar fragment. Excision of the condylar fragment, according to Watson Jones (1955)<sup>[2]</sup>, generally causes an early and increasing cubitus valgus deformity and makes the joint unstable laterally. All surgeons now agree with this point of view. Despite the fact that we have no prior experience excising the condylar fragment, we believe excision will be successful.

In the present series, Krischner's wire used for internal fixation for displaced lateral condyle humerus in children show excellent and good results with minimum complication.

### Conclusion

Range of movement and stability at the elbow should be regarded as important criteria in final assessment. Minor degree of limitation of range of movement at elbow and forearm are

compatible with good end results. No major complications were encountered in the present series. However, prominence of lateral condyle was seen in eight cases treated by surgery and in two cases treated conservatively. Radiological non-union at the fracture side was noted in two cases treated by surgery and in two cases treated conservatively. These are the children who came late (more than 4 weeks) and there was sclerosis of fragments. The children having non-union may develop cubitus valgus deformity and tardy ulnar nerve palsy later or requiring surgery. Our follow up was short so significant cubitus valgus could not be detected. Ideal time for obtaining best results is within 10 days of original injury. The analysis of results of patients which were treated conservatively showed 75 per cent excellent. 18.75 per cent good and 6.25 per cent poor results. Patients which were operated upon showed 73.53 per cent excellent 23.53 per cent good and 2.94% poor results. The children showing poor results were brought to the hospital late and were treated by massage and counter irritants. Open reduction and internal fixation with k wire in displaced lateral condyle humerus in children yields good results with minimum complications of prominence lateral condyle and non- union lateral condyle humerus.

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