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OUTCOME OF LATERAL CONDYLE HUMERUS FRACTURE IN CHILDREN TREATED WITH OPEN REDUCTION AND K-WIRE FIXATION

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ABSTRACT

Background: Lateral condyle humerus fractures in are the second most common fracture after supracondylar fracture in children. It is often ignored, mismanaged and presents late to tertiary care centers. The objective of this study was to evaluate functional outcome of lateral condyle humerus fracture treated with ORIF with K-wire. **Patients and method:** It is a prospective study performed at Orthopaedics department of Nishtar Medical University and hospital, Multan. The study was conducted in duration of 2 years from 2015 to 2017. We admitted 45 patients, presented upto 1-12 weeks injury of lateral condyle humerus fracture. Fracture were classified according to Milch Classification. Clinical outcomes were assessed through Hardacre criteria. **Results:** We enrolled 45 patients in total. Out of which, 40 patients completed treatment and follow up. The mean age of patient in our study was 6.5 years. Twelve (30%) patients presented within 3 weeks of fracture, 17 (42.5%) within 3-5 weeks, 8 (20%) within 6-8 weeks, and 3 (7.5%) within 9-12 weeks. There was no major complication like neurovascular damage or post-op infection observed. Mean removal time of K-wire was 5.2 weeks. Thirty two patients (80%) reported excellent outcome, 6 (15%) good outcome, and remaining 2 (5%) ended with poor outcome. **Conclusion:** We concluded that ORIF with K-wire fixation overall has excellent outcome in patients with displaced lateral condyle fracture of humerus presenting within 12 weeks of injury in term of union rate and no complication.

KEYWORDS: ORIF, open reduction, K-wire, Outcome, Union.

INTRODUCTION

Lateral condyle humerus fracture found to be the second most common upper limb fracture among children of 5-7 years of age. According to different studies, 10-17% fractures of upper limb consist of lateral condyle fracture of humerus.[1-3]

The fracture usually occurs due to fall on extended elbow, causing pull of extensor muscles leading to avulsion of lateral condyle of humerus. The fracture starts from lateral epicondyle, this fracture usually involves capitellum epiphysis, fragment of humeral metaphysis, and lateral part of trochlea. The attached extensor muscles avulse the fragment from its bed, causing displacement which varies from a downward, lateral and usually backwards with or without rotation of the fragment. The fractured surface in the typical case is turned outward so that it appears subcutaneous.[4]

Types of fracture can be classified as Milch Type 1 and Type 2. Milch Type 1; usually stable, fracture line travels lateral to trochlear groove resembling Salter Harris type 4. Milch type 2; are most frequent and extends in trochlear bone resembles as type II Salter Harris.[5]

If these fractures left untreated or managed late, the patient may lose elbow movement and encounter complications like, closure of epiphyseal growth plate, malunion, nonunion, cubitus valgus, and ulnar nerve palsy.[3-4]

Various treatment options are available according to the type and degree of dislocation. Conservative treatment methods have reported higher incidence of poor outcomes due to loss of reduction in plaster leading to insistent pain, nonunion, malunion and decreased ROM in elbow.[6-7] Fracture of less than three weeks duration can be treated successfully by surgical procedures. The issue arises when patient presents late due to financial reasons, local quacks, lack of knowledge, lack of competent orthopedic surgeons, and faulty initial treatment etc. These problems leads to difficulty in treating due to dislocation of fractured part as a result of pull the extensor muscles, closure of epiphyseal growth

plate and possibility of damage to neurovascular supply.[8]

The objective of lateral condyle humerus fracture management is to obtain healing of fracture and to prevent malunion, nonunion and improve functionality. ORIF with K-wire can help us to achieve this goal[9]. Studies suggested that ORIF methods for unstable lateral condyle humerus fracture has excellent outcome in unstable, displaced and rotated fracture.[3-4]

Many studies showed immobilization of the elbow and fixation with K-wires for an average period 4-6 weeks following the open reduction of the displaced fractures has good prognosis.[4,10] There are some opponents, who claims that operative methods may endanger the vascular supply of dislocated segment by surgical manipulation leading to avascular necrosis of fragment.[9,11, and 12] Our best practices and experiences of ORIF with K-wire in unstable, displaced fractures were remains excellent in terms of various results such as range of motion, carrying angle and post-operative pain.

PATIENTS AND METHOD

This was a prospective observational study performed at Orthopaedics department of Nishtar Medical University and hospital, Multan. The study was conducted in duration of 2 years from 2015 to 2017. We admitted 45 patients, presented upto 1-12 weeks injury of lateral condyle humerus fracture to Orthopedic OPD and or referred from surgical emergency department. Complete history and clinical examination was performed along with necessary laboratory and radiological investigations i.e. antero posterior and lateral radiograph. Out of 45 patients, 2 denied of surgical treatment and 3 lost to follow up.

Fracture classification was done by Milch classification.

Milch Type 1; usually stable, fracture line travels lateral to trochlear groove.
Milch type 2; are most frequent and extends in trochlear bone.

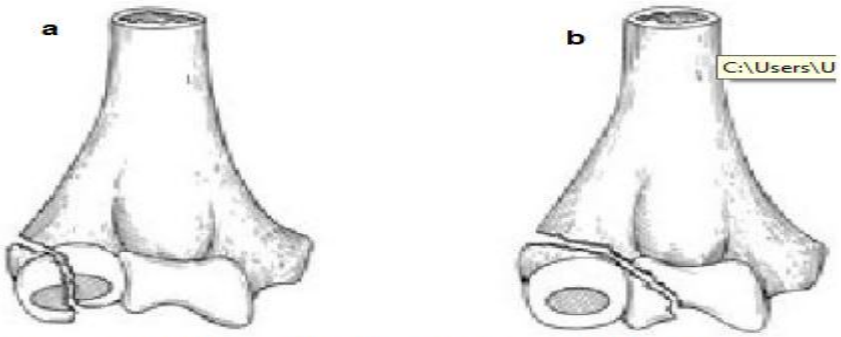

Figure 1 Milch classification: (a) Type 1 (b) Type 2

Figure 2: Milch Type 1 fracture.

Figure 2: Milch type 2 fracture.

Clinical outcomes were assessed through **Hardacre et al**[3] criteria.

Excellent results
There will be complete range of motion with no symptoms and alteration in carrying angle.

Good results
There is deficit range of motion with loss of extension < 15 degrees. Mild deformity in angle, no arthritic or neurological pain.

Poor results
There will be loss of function, marked deformity in carrying angle, arthritic and neurological pain. Presence of avascular necrosis.

Whole surgical procedure was explained to the parents and written consent was taken. Open reduction and K-wire fixation was done for all patients. Slab and soft dressing over elbow was kept upto 3 weeks. Pins were removed after successful union i-e visualization of callus formation at fracture site on the AP and lateral views of radiographs. K-wires removed after 4 to 6 weeks. No neurovascular damage was observed following the injury.

Patients presented with displaced, unstable unilateral fracture, and with failure of conservative treatment were included in the study. Multiple bone fractures, fracture of same elbow at multiple site, and fracture manageable by conservative treatment were excluded.

RESULTS
We enrolled 45 patients in total. Out of which, 40 patients completed treatment and follow up, 2 denied surgical treatment and 3 lost the follow up. There were twenty four male (60%) and sixteen female (40%). The mean age of patient in our study was 6.5 years. Twelve (30%) patients presented within 3 weeks of fracture, 17 (42.5%) within 3-5 weeks, 8 (20%) within 6-8 weeks, and 3 (7.5%) within 9-12 weeks. There was no major complication like neurovascular damage or post-op infection observed. Mean removal time of K-wire was 5.2 weeks. Thirty two patients (80%) reported excellent outcome, 6 (15%) good outcome, and remaining 2 (5%) ended with poor outcome.

Table 1: frequency of different variables.

Variables	Numbers	%age
Sex		
Female	16	40%
Male	24	60%
SITE		
Right Elbow(Dominant)	28	70%
Left Elbow	12	30%
Mean age	6.5 years	

Table 2: Treatment outcome according to Hardacre et al criteria. n=40

Union Rate	Frequency	%age
Excellent outcome	32	80%
Good outcome	6	15%
Poor outcome	2	5%
Total	40	100%

Table 3: Fracture presentation time.

Time of presentation	Frequency	Percentage
less than 3 weeks	12	30%
3-5 weeks	17	42.5%
6-8 weeks	8	20%
9-12	3	7.5%

Table 4: Mean duration of treatment steps.

Mean union time	5 weeks
Mean Immobilization Time	5.1 weeks
Mean removal of K-wire	5.2 weeks

(a) (b)

Figure 3: (a) pre operate 6 week fracture. (b) post operate k-wire fixation.

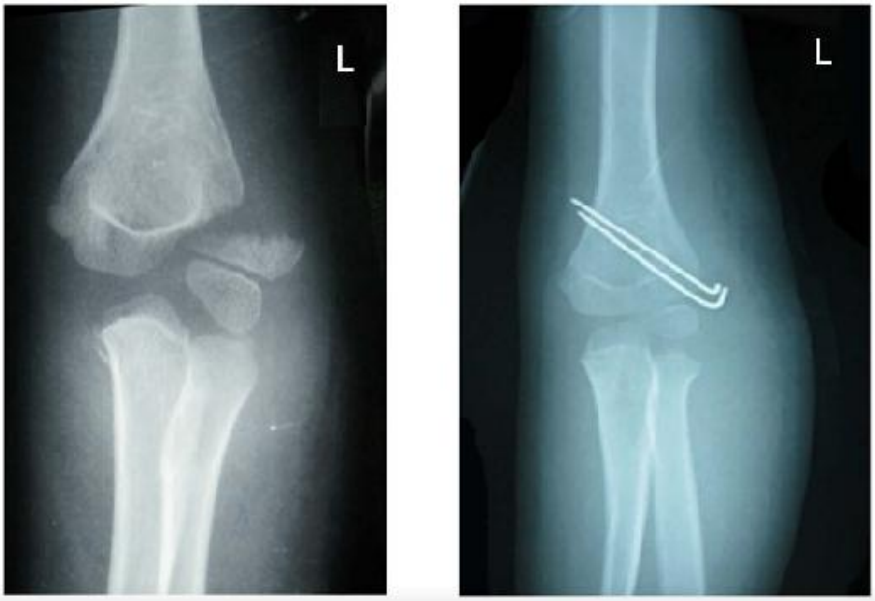

Figure 4: initial injury 5 week. (a) pre operate (b) post operate.

DISSCUSSION

In our society road traffic accidents, falls, and sport injuries are very common. Among these injuries lateral condyle humerus fracture is one of the most common fracture in children. We have noticed that in rural areas such fractures are often ignored or treated by local quacks by conservative means. Orthopedic surgeon always have been controversial regarding treatment of displaced lateral condyle fracture in patient with late presentation i.e. whether it should be treated with closed reduction or open reduction.[13] Open reduction and internal fixation is considered Gold standard for treatment of displaced and unstable fracture.[3,14] Those who favors closed reduction, they hypothesized that ORIF can leads to further complication and avascular necrosis of fragment.[12] According to studies internal oblique or 20 degree rotated AP view radiograph is more useful to see different dimensions for diagnosis than simple AP and lateral X-ray.[15] Although MRI and High resolution ultrasonography are more reliable but they are expensive and not easily available everywhere.[11,15,16]

According to outcome criteria proposed by Hardacre et al[3] in 1971, we observed excellent outcome in 32 (80%), good 6 (15%), and poor in 2 (5%) patients. We observed no neurovascular bundle injury in our study. All patients were managed by open reduction and K-wire fixation. Shen et al[17] performed study in 13 patients presenting within 4 weeks of fracture, observed good functioning of elbow joint. Similarly, Mazurek and Skorupki treated old nonunion fracture through K-wire fixation and observed good result after 6 months

treatment.[18] Sail et al[19] and leonidou et al[20] showed results similar to our study and advocates in favor of open reduction and internal fixation in all dislocated lateral condyle fracture with no complication.

Ali and Tahir fixed 3-12 weeks old, eighteen lateral condyle fracture with K-wire with average follow up duration of 15 months and reported excellent results in 5 patients, good in 3, fair in 6, and poor in 4. They concluded that ORIF is an effective treatment in fractures of lateral condyle of humerus in children presenting between 3 to 12 weeks after injury.[21] However, the results become poorer with increase in duration after injury and the grade of displacement. Saraf and Khare[22] fixed 5-12 weeks old, 16 lateral condyle fracture with K-wire with average follow up duration of 9 months. They observed excellent results in 6 patients, good in 6, and poor in 4.

There is another controversy exists regarding K-wires removal time. In our study, K-wire were removed after 4-6 weeks with evident gaining of union. Similarly, Leonidou, Andreas, et al[20] removed the K-wire only after radiological union. The mean radiological union time in their study was 4.6 weeks. On the other hand, Thomas et al.[23] proposed that 3 weeks of K-wire stabilization is enough for the fracture to heal. The problems and the resulting complications may not be as bad when the patient presents within 12 weeks of the injury, as careful dissection and modifications in the surgical technique can provide a satisfactory reduction without compromising the blood supply.[24]

Current study of forty cases of unstable and displaced fracture with ORIF and K-wire fixation. Therefore in light of current study, results recommended as early fixation is much more perfect and sensitive method to get the union as well as to avoid the complications but must not be desolation despite the results. Such kind of cases must be treated with ORIF, which present up to twelve weeks for the reason that elbow is really nice for union in children. It should be attempted as soon as possible in favor of best results.

CONCLUSION

After performing this study we reached at a conclusion that ORIF with Kirschner wire overall has excellent outcome in patients with displaced lateral condyle fracture of humerus presenting within 12 weeks of injury in term of union rate. We found this technique safer with no avascular necrosis was observed. The outcome becomes poor with delaying treatment after fracture and degree of displacement.

Limitations

Sample size and duration of follow up was short.

No conflict of interest by authors.

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