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OUTCOME OF OPERATIVE MANAGEMENT OF NEGLECTED LATERAL CONDYLAR FRACTURE IN CHILDREN

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ABSTRACT

BACKGROUND: Fracture lateral Condyle of Humerus is the 2nd commonest fracture in children around the Elbow joint. It is called the Fracture of necessisity. It is famous for its complications like N/U, M/U & growth arrest with elbow Deformity. These are Intra articular fractures caused by fall with varus force on the elbow. It is most common at the age of 6-7 years. Its management is controversial especially in late, neglected cases.

OBJECTIVE: To determine the outcomes of open reduction and internal fixation of lateral condylar fractures of humerus in children presented between 3 and 9 weeks.

MATERIALS AND METHODS: It was descriptive case study of 27 patients presented with more than 3 weeks of fracture and displacement of more than 2 mm from September 2013 to March 2015 admitted through OPD at Orthopedics Unit of Saidu Teaching Hospital Swat, Department of Orthopedics, Khyber Teaching Hospital Peshawar and Department of Orthopedics and Spine Surgery Ghurki Trust Teaching Hospital Lahore. Detailed history, clinical examination and investigations were done after proper consent. Pre operative diagnosis was made on antero posterior and lateral views of plan x rays. Fractures were managed with open reduction and internal fixation and were followed regularly on OPD basis and outcome was documented using Hardacre criteria. The results were analyzed using SPSS 17.0.

RESULTS: There were 27 patients with mean age of 7±2.7years.66.7% were male and 33.3 % were female .55.6% of patients involved non dominant hand while remaining dominant hand.14 patients were initially managed by bone setters,7 managed by parents as home remedies,2 missed by physician and 4 displaced in cast.77.78% of patients presented between 3-5 weeks shows excellent result, between 5-7 weeks 33.33% shows good results,55.56% shows excellent and 11.11% shows poor results ,between 7-9 weeks ,11.11% shows excellent, 44.44% shows good and poor results..

CONCLUSION: Open reduction and internal fixation is good option for patients presented after 3 weeks having excellent results up to 7 weeks .Moreover it can be done even after weeks, but the rate of complications increases as time passes more.

KEY WORDS: Lateral condylar fracture, children, Open reduction and internal fixation.

INTRODUCTION

Fractures of the lateral humeral condyle of humerus in children are very common and second only to the supracondylar fracture of the humerus in occurrence [1,2].This fracture is a subject of controversial as regards to surgical approaches, choice of implants, period of immobilization and management of neglected cases.[3]Fractures of the lateral condyle of the humerus occurring at the age of mostly 6-7 years and constitute around 13%–18% of all elbow injuries.[4] The lateral condyle functions as the origin of the extensor muscle mass as well as the lateral collateral ligamentous complex. The most common mechanism of injury occurs when a varus force is applied to the elbow, causing the extensor muscles and lateral collateral ligaments to avulse the lateral condyle[5] The occurrence of the functional loss of the range of motion of the elbow is much greater with this fracture because the fracture line extends into the articular surface.[6] The most common cause of missing

lateral condylar fracture is due to its presentation on x-rays which is usually not clear. [7]The severity of the fracture is graded from 1 to 3. A fracture without displacement is graded 1 Grades 2 and 3 represent moderate and severe displacement, respectively[8]. The degree of displacement depends on the preservation of the articular hinge. If the hinge is intact the condylar fragment shows only a lateral tilt. If the fracture is complete the fracture can be rotated completely up to almost 180 degrees[9].

The fracture is classified into two types by Milch in 1964 .In mich type I, the fracture line enters the joint lateral to the ridge between the trochlea and capitellum while in Milch type II, the fracture extends into the trochlear groove[6].Many controversies are present according to its management, The reason behind this is that the conservative treatment potentially yields poor functional outcome while surgical treatment also carries significant risks of postoperative complications such as avascular necrosis (AVN) of the lateral humeral condyle and residual postoperative deformity[10]. Displaced fractures are associated with a high rate of nonunion. Non displaced fractures or those displaced ≤2 mm are managed with cast immobilization and frequent radiographic follow-up. Fractures displaced >2 mm are managed with surgical fixation[11]. Marcheix PS in his study concluded that the conservative treatment is good for fractures less than 1mm only[12].

Early studies advice against doing ORIF if the fracture is older than 4 weeks The main issue was stripping of vascularity leading to AVN and the prevalent thought was that any issue arising from nounion or malunion were much easier to handle than surgical management of delayed cases. Recently recommended that a minimal to moderate displacement can be operated but a severally displaced delayed lateral condyle may require extensive soft tissue dissection and might not be advisable[11].

The treatment goal in lateral condylar fracture is union without residual deformity. However, growth disturbance may occur despite initial anatomic reduction and secure fixation[13].

The aim of this study was to demonstrate the radiological and functional outcome of open reduction and internal fixation of fractures lateral condyle of humerus in children who presented between 3-9 weeks in our setting as no work has been done in this regard previously in our hospital and the data regarding the outcomes would scarce. The main factor favoring operative management is excellent functional outcome, high union rate and low complication rate.

MATERIAL & METHODS

The study was multicenter conducted at department of Orthopedics, Saidu Teaching Hospital, Swat Department of Orthopedics, Khyber Teaching Hospital Peshawar and Department of Orthopedics and Spine Surgery Ghurki Trust Teaching Hospital Lahore .The study included 27 patients admitted through OPD with neglected lateral condylar fracture between Sep 2013 to Mar 2015. It was Descriptive case series and sampling technique was Non probability consecutive sampling.

Inclusion Criteria:

- Fracture of more than 3 weeks confirmed through history and radiological examination
- Both genders.
- Age less than 15 years
- Displacement of more than 2 mm.

Exclusion Criteria:

- Pathological fractures
- Open fractures
- Age more than 15 years
- Displacement of less than 2mm
- Fracture of more than 9 weeks confirmed through history.
- Associated fractures

The study was conducted after approval of the ethical committee of the institution. Fully informed, understood and voluntary consent was obtained. Patients were informed regarding the benefits and hazards of the procedure. Confidentiality of the data was ensured.

Data of all patients were collected on a proforma. Detailed history was taken including the past medical and surgical history. Detailed examination including air-way, breathing and circulation, general physical examination and abdomino-pelvic examination was done in each patient. Investigations including x-ray elbow antero posterior and lateral view of involved side, hemoglobin %, full blood count and heptitis B & C screening was done.

After administration of general anesthesia, patient was put in supine position, cleaning and draping of the involved limb was done. Fracture was exposed/ approached through lateral incision and reduced and fixed with K-wires. After surgery, the patient was shifted to the ward and kept there for 1-2 days with administration of IV antibiotics. Post-operative X-rays (both AP and lateral views) were taken. And the patient advised to do a range of motion post operatively. All patients underwent a common protocol of 3 weeks padded cramer wire splint immobilisation followed by range of motion exercises intermittently for a further 2 weeks. At 4 weeks the k wire was removed. The patient was allowed to do range of motion exercises without splint protection at 5 weeks. The first follow-up visit was after two weeks and subsequent visits were conducted on a monthly basis all patients were followed up for a period of one year. At one year the final assessment was done on the basis of the Hardacre criteria. Radiologically avascular necrosis, malunion, non-union and heterotropic ossification were specifically looked at during follow-up, clinical and radiological assessment was done.

Data was analyzed by using SPSS 17.00. Continuous variables like age were described in terms of mean ± standard deviation. Categorical variables like sex, Side of limb, timing of presentation, initial management and outcome were described in terms of frequencies and percentages. Data was stratified by gender and analyzed with respect to outcomes variable.

RESULTS

Total samples of 27 patients were included to determine the frequency of different outcomes of neglected lateral condylar fracture in children. Mean age of the patients was 7.0±2.3 ranging from 4 to 15 years. 18(66.7%) were male while 9(33.3%) were female.Mean time of presentation since injury were 6.2 weeks (3-9 weeks range).Male to female ratio were 2:1.(Table 1)

Table 01: Descriptive Statistics of sex

Sex	Number	Percent
Male	18	66.7
Female	9	33.3
Total	27	100

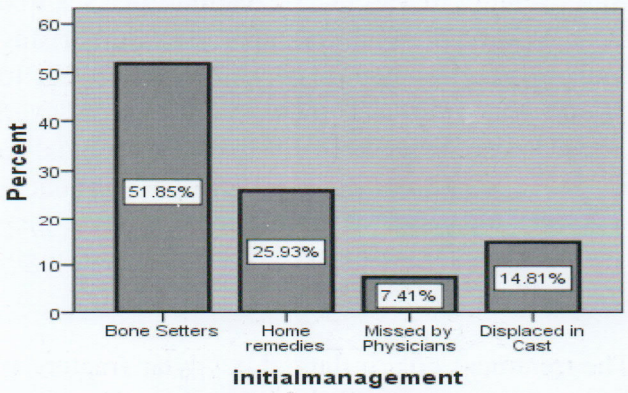
The patient who had dominant arm involvement were 12(44.4%) while those who having non dominant arm involvement were 15(55.6%).(Table 2)

Table 02: Frequency of side involved

Side of limb	Number	Percent
Dominant	12	44.4
Non Dominant	15	55.6
Total	27	100

The initial management were different in different patients. 14(51.85%) of the patients were initially managed by bone setters, 7(25.93%) were initially managed at home through different remedies, 2(7.14%) were missed by the physicians while 4(14.81%) were displaced in cast. (Figure 1)

Figure 1;Percentages of initial management



Different patients presented with different intervals. Between 3-5 weeks 10(37.04%) of the patients presented, between 5-7 weeks 9(33.33%) of the patients presented while between 7-9 weeks 8(29.63%) of the patients presented. (Figure 2)

Figure 2;Percentages of patients presentation at various intervals

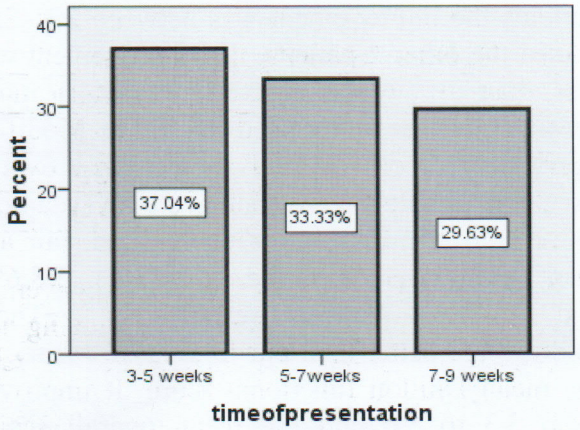
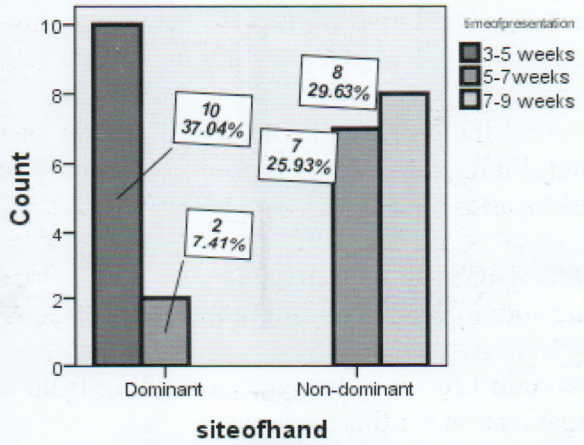


Figure 3 shows that 10(37.04%) of the patients with dominant arm involvement presented within 3-5 weeks while no patient presented at same period with non dominant side involvement. Similarly 2(7.41%) of the patients presented with in 5-7 weeks with dominant side involvement while 7(25.93%) of non dominant side presented in the same period. Between 7-9 weeks 8 (29.63%) of the patients with non dominant side presented at this period while no patient with dominant side presented at such late interval.

Figure 3.Crosstab of time of presentation and Arm involvement



Outcome were measured by using the Hardacre criteria. Excellent results were found in 19(59.26%) patients, good results were found in 8(29.63%) patients while 3 (11.11%) patients only have fair results. At the final follow up the mean final carrying angle was 6-7 degrees. The range of motion improved by an average of 65degrees to 110 degrees. (Table 3)

Table 03: Outcome using the Hardcare Criteria

Outcome	Number	Percent
Excellent	16	59.26
Good	8	29.63
Fair	3	11.11
Total	27	100

DISCUSSION

Lateral condylar fracture is the fracture of necessity. In developing countries like Pakistan due to many reasons it is common to see the late presentation of lateral humeral condylar fractures in children. The management of lateral humeral condylar fractures who presented late is controversial whether to operate or to manage it as conservative. This controversy started from Wilson in 1936 and Bohler in 1966 who preferred open reduction in all late cases of fracture lateral condyle humerus, while Speed and Macey in1933 considered open reduction and internal fixation in only selected cases[1]. Early diagnosis and proper treatment is the mainstay of management.

In this study the mean age of the patients was 7±2.3 ranging from 0-15 years. Mean duration of hospital stay in days was 2.21±1.11. 18(66.7%) were male and 9(33.3%) were female. Male to female ratio were 2:1. The presenting complaints in our study were pain, swelling, deformity of arm, prominence of fracture area and elbow stiffness. The pain was the most common presenting in 29.63% of the patients. In study of Anil Agarwal et al in India they having the same findings like our findings of mean age, male dominancy and pain as presenting complain in

most patients.[3] Kumar N et al[14] having more females as compared to males.

Different patients having different mechanism of injury. Most common were fall from height which were present in 13?(48.15%) of the patients. Similar findings were noted in Ajay study[1] and some other study[15]. The study conducted in Pakistan, the main mechanism of injury were fall during sports.[9]

In our study we divided the patients on the basis of Milch classification.18 patients having Type 1 while remaing having Type 2 fracture. Shyam K Saraf[4] and Anil Agarwal[3] study in India there were more Milch type 2 fractures as compared to our study.

The non dominant hand was mostly involved in the fractures in our study. Similar findings were found in other studies also[9].

In our study the maximum number of patients presented within 3-5 weeks. In Shyam K Saraf et al[4] study, 5 patients presented between 3–4 weeks, nine between 5–8 weeks and seven between 9–12 weeks post injury. Similarly in Anil[3] study maximum patients presented between 5-8 years.

The most important findings in our study were that 83.33% of the patients who were having dominant side injury presented early within 3-5 weeks while only 16.67% presented between 5-7 weeks but no patient presented after it. But those who were having non dominant side involvement presented between 5-9 weeks but not between 3-5 weeks. According to initial management, most of the patients initially went to bone setters; it's because of social trend, low cost, beliefs, fear of hospital and family advices. Similar findings were found in Shabir AD [6]et al study and k Muhammad[9] study. In Shyam K saraf[4] study in India, Nine patients presented to didn't receive any treatment elsewhere, whereas the other 12 patients had a plaster cast applied elsewhere.
Several studies concluded the functional outcomes on the basis of different criteria. We use the Hardacre criteria for the functional outcome.59.26% of our patients shown excellent result. Shyam[4] et al use the Modified Aggarwal et al criteria. According to their results, five patients had excellent result, six had good result, six had fair result, and four had poor result. Significant increase (by 40°–80°) in the total range of flexion/extension movements at final follow-up was noticed in 16 patients; in 3 patients the improvement was between 20°–25°, and in the other 2 patients the improvement was less than 10° while in our study it is much greater. Another study used the above Modified agarwal et al criteria and showed that overall excellent results were achieved in majority (73.9%, n= 17) of patients while good, fair and poor results were reported in 3(13%), 2(8.6%) and 1(4.3%) patients respectively[10]. These findings are better than our findings.T J Liu[2] use the mean Dhillon functional score. It improved from 3.3 to 5.6 and the mean overall scores improved from 5.6 to 8.5. Kumar N et al[14] used the Liverpool elbow scoring system. In the present series, all fractures united with 92% excellent, 5% good, and 3% poor results.

The small sample size of the study, late presentation upto 9 weeks only and follow up for 1 year were the major limitation of the study .Further studies needed to evaluate the functional outcome in children especially that presented beyond 9 weeks.

CONCLUSION

The authors conclude that nonunion fracture lateral condyle of humerus in children can be successfully treated even if neglected for a period up to 7 weeks after the initial injury. We therefore, recommend open reduction and internal fixation of all displaced fractures of the lateral humeral condyle presenting within 3 to 8 weeks after injury

CONFLICT OF INTEREST
The author has no conflict of interest.
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