



ISSN (P): 2521-3466
ISSN (E): 2521-3474
© Clinical Orthopaedics
www.orthoresearchjournal.com
2020; 4(4): 14-17
Received: 06-08-2020
Accepted: 09-09-2020

Syed Faisal Afaque
Department of Paediatric
Orthopaedics, King George's
Medical University, Lucknow,
Uttar Pradesh, India

Ajai Singh
Department of Paediatric
Orthopaedics, King George's
Medical University, Lucknow,
Uttar Pradesh, India

Outcome of Cancellous screw vs K wire fixation for management of neglected lateral condyle fracture of humerus in children

Syed Faisal Afaque and Ajai Singh

DOI: <https://doi.org/10.33545/orthor.2020.v4.i4a.240>

Abstract

Introduction: This study compares the outcome of two treatment modalities of fixing neglected lateral condyle fracture of humerus in children in terms of clinical and radiological outcomes.

Materials and Methods: All patients presenting to our institution were screened for eligibility by clinico-radiological evaluation. Patients were randomized into two groups i.e. Cancellous screw (CS) fixation (group I) and K wire fixation (group II). Patients were treated by open reduction and internal fixation using CS or K wires of appropriate size accordingly. (21 patients in group I and 19 patients in group II). Bone graft was used in all patients to promote osteosynthesis. Average follow up of patients was 18 months (range 11-22 months). Final outcome was measured in terms of clinicoradiological union, immobilization time, loss of reduction, gain in range of motion and functional outcome measured by Liverpool elbow score.

Result: 21 patients were in group I (CS) and 19 patients were in group II (K wire). Mean age for group I and II was 7.9 and 7.5 years. Mean delay in presentation for group I and II was 14.9 and 13.2 weeks. Mean gain in range of motion (at final follow up as compared preoperatively) for group I and II was 23.5 and 17.8. Mean duration of immobilization for group I and II was 11.3 and 9.6 weeks. Mean LES score was 8.7 and 8.3 in group I and II. Union was seen in 37 cases. Three patients had pre mature physal closure. Pin tract infection was seen in 4 patients in group II which healed by dressing and antibiotics. No patient had ulnar nerve palsy.

Conclusion: Both techniques provide stable fixation, union and good functional outcome and there was no difference in the LES, however less immobilization and improvement in range of motion was seen in Group I (CS)

Keywords: Lateral condyle, non-union, Cancellous screws

Introduction

Lateral condyle fractures of humerus are one of the common fractures occurring in children^[1]. Most common age group being 5-10 years of age.¹ It is considered as one of the most neglected fractures mainly due to missed diagnosis by orthopaedic surgeons or due to ignorance by parents^[2-5]. Lateral condyle fractures if not managed properly or left neglected can lead to complications. There is a difference of opinion in the management in patients who present late. Some prefer fixation with correction of deformity and transposition of ulnar while some prefer osteosynthesis^[6, 7, 8, 9]. It has also been found that some prefer both the procedures^[10, 11]. In view of fixation, two most common modalities are the mainstay; cannulated screw and K wire which always has remained a dilemma with treating surgeon. So, this study compared the clinical outcome of the two fixation modalities in a child presenting with neglected lateral condyle fracture of humerus after 4 weeks of injury.

Materials and Methods

40 patients presenting to our institution were screened for eligibility by clinico-radiological evaluation. Patients who presented after 4 weeks of trauma were marked as late presenters. Patients were randomized into two groups using excel random number generation technique; CS fixation (group I) and K wire fixation (group II). Injured limb was examined for deformity, abnormal mobility and neurovascular status.

Corresponding Author:
Syed Faisal Afaque
Department of Paediatric
Orthopaedics, King George's
Medical University, Lucknow,
Uttar Pradesh, India

Plain X-ray of AP and lateral views were taken. Patients were treated by open reduction and internal fixation using CS or K wires of appropriate size accordingly after taking proper consent for study. (21 patients in group I and 19 patients in group II). Kocher's lateral approach was used as surgical approach. After exposure, metaphyseal nibbling was done to create space for realignment, excess cartilage was trimmed until metaphyseal bleeding was seen and bone graft was used in all patients to promote union. Reduction was achieved and fragment was fixed with CS or K-wire and above elbow slab was applied. K wire was retained for until 6 weeks. After 2 months, slab was removed, elbow mobilization was started depending upon signs of union. Patients were followed up at every 6 weeks. Final outcome was measured in terms of clinic-radiological union, immobilization time, loss of reduction, gain in range of motion and functional outcome measured by Liverpool elbow score.

Results

Out of 40 patients (28 boys and 12 girls), 21 patients were in group I (CS) and 19 patients were in group II (K wire). Left elbow was affected in 24 patients 16 were affected on right. Six patients were lost to follow up. Mean age for group I and II was 7.9 and 7.5 years. Mean delay in presentation for group I and II was 14.9 and 13.2 weeks. According to Milch classification, 15 were type I and 21 were type II. Union was seen in 37 cases.

Preop assessment for deformity (valgus/varus) was not possible due to flexion deformity. Ten patients presented with pain, four presented with lateral condyle prominence and three presented with swelling around elbow. 4 mm partially threaded cannulated screws were used in group I. Two K-wires were used in all the patients of group II. Bone graft was used in all the patients to enhance osteosynthesis. Above elbow slab was applied in all the patients in 90 degrees of flexion. Mean duration of immobilization for group I and II was 9.6 and 11.3 weeks. Slab immobilization was significantly more in K wire group than in cancellous screw fixation group. Following slab removal, elbow range of motion exercises were started. Mean gain in range of motion (at final follow up as compared preoperatively) for group I and II was 23.5 and 17.8. Average follow up of patients was 18.2 months (range 11-19 months) in group I and 20.5 months (range 12-22 months) in group II. Mean carrying angle at final follow up was 6.9 in group I and 9.8 in group II. Mean LES was 8.7 and 8.3 in group I and II with no significant difference. 3 patients had pre-mature physal closure, two from group I and one from group II. Pin tract infection was seen in 4 patients in group II which healed by dressing and antibiotics. No patient had ulnar nerve palsy. Union was achieved in all the cases of both groups. There was no displacement after K wire removal in any of the patients.

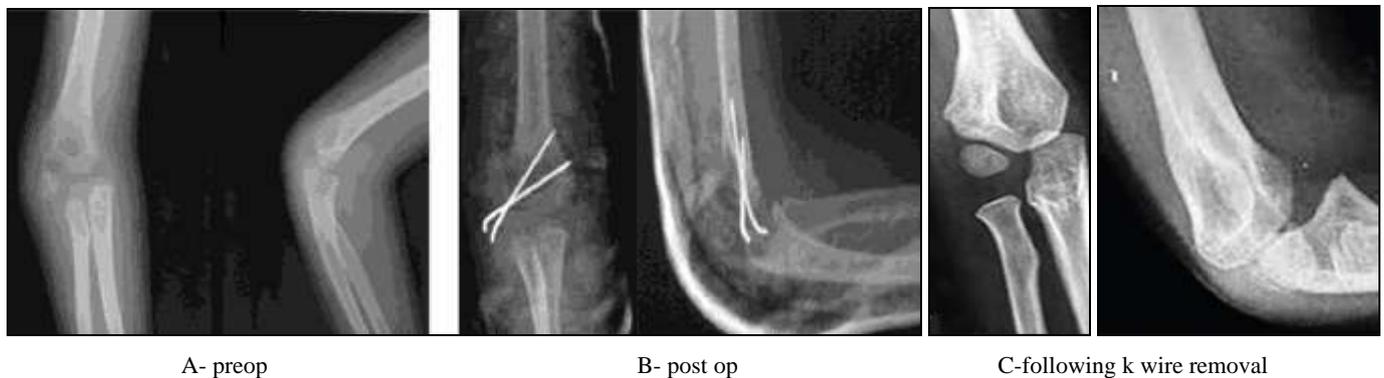


Fig 1: Plain radiograph of 7 year old boy managed by ORIF with K wires



Fig 2: Plain radiograph of 7 year old boy managed by ORIF with Cancellous screws

Table 1: Comparison of parameters in both groups

S. No	Parameter	Group I (CS)	Group II (K wire)	P value
1	Number of patients	21	19	0.8
2	Female	8	4	0.8
3	Male	15	13	0.7
4	Left elbow	10	14	0.7
5	Right elbow	6	10	0.3
6	Mean age in years	7.5	7.9	0.4

7	Mean delay in presentation	14.9	13.2	0.06
8	Mean follow up in months	18.2	20.5	0.7
9	Mean duration of slab immobilization in post op period in weeks	9.6	11.3	<0.01
10	Milch type I	8	7	0.8
11	Milch type II	13	12	0.8
12	Carrying angle at final follow up	6.9	9.8	.003 (<0.05)
13	Mean gain in range of motion at final follow up	23.5	17.8	0.02 (<0.05)
14	Liverpool elbow score	8.7	8.3	0.8
15	Premature physal closure	2	1	0.8
16	Pin tract infection	0	4	0.06
17	Lateral condyle prominence	1	2	0.5

Discussion

There are various causes of lateral condyle fractures of humerus being neglected in a developing country. Lack of awareness in people for treatment mainly in rural population. Improper medical facilities and health care services in certain areas, financial constraints and treatment by osteopaths. Open reduction and internal fixation is the treatment of choice for lateral condyle fractures of humerus [2, 6, 12]. If patient presents after 4 weeks of injury, it is defined as late presentation. In neglected cases, anatomical reduction is often not possible due to fracture remodelling, sclerosis of bone ends and callus formation. [2,9,15] In long standing cases, it becomes very difficult for achieving proper reduction without stripping the soft tissues. Chances of avascular necrosis are very high if extensive stripping is done. Due to this reason, many surgeons avoid surgical intervention and leave the fracture alone [2, 10]. Non operative treatment leads to elbow stiffness, instability, malunion/non-union, valgus/varus deformities and tardy ulnar nerve palsy. On the other hand, if these fractures are managed operatively, extensive stripping leads to AVN of the fragment [2, 13]. Despite of number of complications, there are various literature which suggest successful outcome of open reduction and internal fixation [2, 10, 12, 15].

Most common implant used for fixation are cancellous screws or K wires. Various literatures are available in the comparative studies for both the implants [14, 15, 16]. However very few studies are available for neglected cases. A study done by Ranjan *et al.* in 2018 [17] suggests that there was no difference in the treatment modalities. However, immobilization time was less in cancellous screw group which is consistent with our study.

Many surgeons prefer K wire over screw due to easy removal, but duration of plaster immobilization is required for longer duration which can lead to stiffness. On the other hand, screw provides more secure stabilization and compression than K wires. Slab immobilization time is less in cancellous screw and therefore, early movement can be initiated [18, 19]. In a study done by Saraf *et al.* [18] K-wires were used in majority of the neglected cases however they concluded that screw is more secure; screw fixation was not used in majority of their cases due to the disposition of fracture line and apprehension regarding damage to the physis.

Premature closure of physis is a complication of lateral condyle fracture non union after operative management [23]. Agarwal *et al.* treated 22 patients with open reduction in which 4 had premature closure of physis and 7 with fishtail deformity, but it hardly affected the functional outcome. 3 patients in our study had premature closure of physis. Another complication in K wire fixation that being outside the skin, pin tract infection occurred in four patients which was managed by dressing and antibiotics. There was no case of deep infection in our study. Agarwal *et al.* noticed deep infection in one case and premature wire was removed that lead to loss of reduction. Limitation to use K wire for fixation could be infection.

Various functional scoring systems has been used for assessment of elbow function. Agarwal *et al.* used LES for the assessment of elbow function in 22 neglected case of LCF. Ranjan *et al.* also used LES in 42 patients. We also used LES in our study which consisted of ROM of elbow, forearm rotation, ulnar nerve function, pain and use of affected limb in all necessary daily activities which are very essential in circumstances of developing countries. There was no significant difference between both groups with respect to LES.

Conclusion

The preferred treatment for management for neglected lateral condyle fracture of humerus remains open reduction and internal fixation. Excellent results are achieved if bone graft is used in either of the treatment modalities. Both techniques provide stable fixation, union and good functional outcome and there was no difference in the LES. However, cancellous screw fixation is better in terms of slab immobilization time and gain in final range of motion and has less chances of infection. On the other hand, K wire removal is easy and can be performed in outpatient department.

References

1. Landlin LA, Danielsson LG. Elbow fractures in children. An epidemiological analysis of 589 cases. *Acta Orthop Scand* 1986;57:309-12. [PubMed] [Google Scholar]
2. Jakob R, Fowles JV, Rang M, Kassab MT. Observations concerning fractures of the lateral humeral condyle in children. *J Bone Joint Surg Br* 1975;57:430-6. [PubMed] [Google Scholar]
3. Roye DP, Jr, Bini SA, Infosino A. Late surgical treatment of lateral condylar fractures in children. *J Pediatr Orthop* 1991;11:195-9. [PubMed] [Google Scholar]
4. Beaty JH, Kasser JR. Philadelphia: Lippincott Williams and Wilkins, 2006. Rockwood and Wilkins' Fractures in Children. [Google Scholar]
5. Hasler CC, von Laer L. Prevention of growth disturbances after fractures of the lateral humeral condyle in children. *J Pediatr Orthop B* 2001;10:123-30. [PubMed] [Google Scholar]
6. Hardacre JA, Nahigian SH, Froimson AI, Brown JE. Fractures of the lateral condyle of the humerus in children. *J Bone Joint Surg Am* 1971;53:1083-95. [PubMed] [Google Scholar]
7. Tien YC, Chen JC, Fu YC, Chih TT, Hunag PJ, Wang GJ. Supracondylar dome osteotomy for cubitus valgus deformity associated with a lateral condylar nonunion in children. *J Bone Joint Surg Am*. 2005;87:1456-63. [PubMed] [Google Scholar]
8. Shimada K, Masada K, Tada K, Yamamoto T. Osteosynthesis for the treatment of nonunion of the lateral humeral condyle in children. *J Bone Joint Surg Am*

- 1997;79:234-40. [PubMed] [Google Scholar]
9. Masada K, Kawai H, Kawabata H, Masatomi T, Tsuyuguchi Y, Yamamoto K. Osteosynthesis for old, established nonunion of the lateral condyle of the humerus. *J Bone Joint Surg Am* 1990;72:32-40. [PubMed] [Google Scholar]
 10. Rohl L. On fractures through the radial condyle of the humerus in children. *Acta Chir Scand* 1952;104:74-80. [PubMed] [Google Scholar]
 11. Marcheix PS, Vacquerie V, Longis B, Peyrou P, Fourcade L, Moulies D. Distal humerus lateral condyle fracture in children: When is the conservative treatment a valid option? *Orthop Traumatol Surg Res.* 2011;97:304-7. [PubMed] [Google Scholar]
 12. Conner AN, Smith MG. Displaced fractures of the lateral humeral condyle in children *J Bone Joint Surg Br.* 1970;52(3):460-4. [PubMed] [Ref list]
 13. Fontanetta P, Mackenzie DA, Rosman M. Missed, maluniting, and malunited fractures of the lateral humeral condyle in children. *J Trauma* 1978;18:329-35. [PubMed] [Google Scholar]
 14. Launay F, Leet AI, Jacopin S, Jouve JL, Bollini G, Sponseller PD. Lateral humeral condyle fractures in children: A comparison of two approaches to treatment. *J Pediatr Orthop* 2004;24:385-91. [PubMed] [Google Scholar]
 15. Foster DE, Sullivan JA, Gross RH. Lateral humeral condylar fractures in children. *J Pediatr Orthop.* 1985;5:16-22. [PubMed] [Google Scholar]
 16. Ayubi N, Mayr JM, Sesia S, Kubiak R. Treatment of lateral humeral condyle fractures in children. *Oper Orthop Traumatol* 2010;22:81-91. [PubMed] [Google Scholar]
 17. Ranjan R, Abhinav S, Naiyer A, Syed I, Ashish K, Suresh C. Management of Neglected Lateral Condyle Fracture of Humerus: A Comparison between Two Modalities of Fixation, *Indian J Orthop* 2018;52(4):423-429.
 18. Saraf SK, Khare GN. Late presentation of fractures of the lateral condyle of the humerus in children. *Indian J Orthop* 2011;45:39-44. [PMC free article] [PubMed] [Google Scholar]
 19. Sharma JC, Arora A, Mathur NC, Gupta SP, Biyani A, Mathur R. Lateral condylar fractures of the humerus in children: Fixation with partially threaded 4.0-mm AO cancellous screws. *J Trauma.* 1995;39:1129-33. [PubMed] [Google Scholar]
 20. Agarwal A, Qureshi NA, Gupta N, Verma I, Pandey DK. Management of neglected lateral condyle fractures of humerus in children: A retrospective study. *Indian J Orthop.* 2012;46:698-704. [PMC free article] [PubMed] [Google Scholar]