ORIGINAL ARTICLE

Closed reduction and percutaneous pinning with crossed K-wires in type III supracondylar fractures of the humerus in children

Awal Hakeem, Naji Ullah Khan, Tamjeed Gul, Faheem Ullah

Abstracts

Objective: To evaluate the result of closed reduction and percutaneous pinning in the treatment of type III Supracondylar fracture of the humerus in children.

Materials & Methods: Sixty one patients were treated for type III supracondylar fracture of the humerus at Orthopaedic Department, Khyber Teaching Hospital Peshawar from January-2008 to March-2009 with follow up for six months.

Study design: It is a prospective study.

Setting: Department of Orthopaedics, Khyber Teaching Hospital, Peshawar.

Results: Union was achieved in all patients; superficial Pin tract infections were seen in 6 patients, iatrogenic ulnar nerve injury occurred in 3 patients, Cubitus varus and Myositis ossficans in one patient respectively. Deep infection and compartment syndrome were not encountered; the results were excellent in 40 patients, good in 16 patients, fair in 3 and poor in 2 patients.

Conclusion: Close reduction and percutaneous pinning with two cross K-Wires is an efficient and safe procedure with a minimum complication rate in the treatment of type III supracondylar fracture of the humerus.

Key Wards: supracondylar fracture humerus, close reduction, percutaneous pinning

Department of Orthopaedics, Khyber Teaching Hospital, Peshawar
A Hakeem
NU Khan

Department of Surgery, Khyber Teaching Hospital, Peshawar
T Gul

Khyber Teaching Hospital, Peshawar
Faheem Ullah

Correspondence:
Dr. Awal Hakeem
Registrar, Department of Orthopaedics,
Khyber Teaching Hospital, Peshawar
Phone No: 091-2570901
Cell: 0333-9144432
awalhakeem38@yahoo.com

Introduction

Supracondylar Fracture of the humerus is the most common fracture around the elbow in children and represents approximately 3% of all fractures in children.[1,2] Supracondylar Humerus fracture are caused by fall on out stretched hand[3] and is divided into two types, extension type and flexion type. About 96% of supracondylar fractures are extension type and are further classified as describe by Gartland according to the degree of displacement of the distal fragment.[2,4] Type I is undisplaced fracture, type II is displaced with intact posterior cortex, type III is completely displaced with no contact between the fragments.[5]

Supracondylar humerus fracture in children should be handled properly to prevent complications like elbow stiffness, varus & valgus deformties, compartment syndrome, neurovascular compromise and Myositis ossificans.[1] There are different treatment modalities available for the management of Supracondylar humerus fracture in children like side arm traction, overhead skeletal fraction, closed reduction and casting, closed reduction and percutaneous pinning and open reduction and internal fixation.[6]

Type III Supracondylar Humeral fractures in children are usually treated by closed reduction and percutaneous K-Wires fixation, but open reduction and fixation is performed if an adequate reduction cannot be obtained by closed manipulation.[7-10]

Closed reduction and two crossed K-Wires one medial and one lateral percutaneous fixation under image intensifier is the treatment of choice.[7,8,9]

The purpose of this study was to evaluate the short term results of closed reduction and percutaneous pinning in Gartland Type III Supracondylar Humerus fracture in our circumstances.

Materials and methods:

A prospective, descriptive study was conducted at the Orthopaedic Department of Khyber Teaching Hospital Peshawar from January-2008 to March-2009. 61 patients were included in the study all were closed Gartland type III supracondylar Humerus fractures. Patients included were children 2 to 12 years of age. Patients with vascular injury were excluded from the study. There were 39 boys and 22 girls, left side was involved in 35 patients and in 26 patients right side was involved. All patients were admitted through Accident and Emergency department. Detailed history and clinical examination was performed on admission after obtaining informed consent. The patients were either put on side arm traction or placed in posterior splint for temporary stabilization. Distal neurovascular status was monitored closely. Patients were prepared for next day list for surgery.

Surgical Technique:

Under general anesthesia, the patient was scrubbed and draped supine on the operating table with the fracture elbow placed on the main tube of C-Arm. An assistant held the arm and surgeon applied longitudinal traction to disengage the fracture site followed by correction of medial & lateral displacement. The elbow was then flexed into more then 90° while maintaining the longitudinal fraction, the surgeon thumb pushed the tip of olecranon anteriorly at the same time, the reduction is checked by the C-arm image intensifier, after confirming the reduction, 1.6 mm K-Wire was used to fix the fracture. We usually first put K-wire from medial epicondyle by palpating the ulnar nerve and medial epicondyle.

The ulnar nerve was pushed posteriorly with a plain forcep after giving a small incision slightly anterior to medial epicondyle.

Both cortices were engaged avoiding olecranon fossa, after putting the medial pin and confirming by fluoroscopy we put the lateral pin from lateral epicondyle so that the lateral pin cross the medial pin above the fracture line. The elbow is then extended, the position and reduction is confirmed by image intensifier distal pulses are checked, the wire are bent to 90° and cut outside the skin and left protruding the skin.

A posterior splint is given in 80° to 90° flexion of elbow and in neutral portion of forearm. Fortnightly follow up was carried out for two months then monthly for six months.

Results:

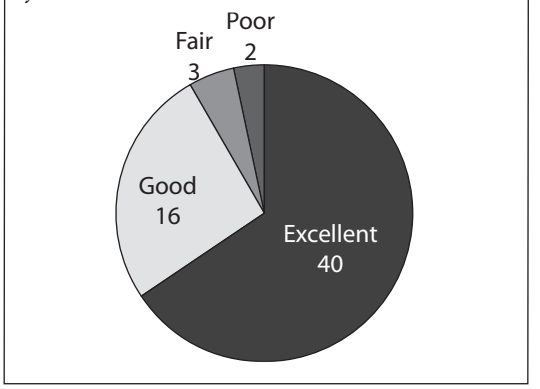
All the 61 patients completed their follow up .There were 39 (63.9%) male and 22 (36.1%) female. Male to female ratio was 1.8:1. Left side was involved in 45 (73.8%) patients and right side was involved in 16(26.2%) patients. Mean age was 6.7 years with age range from 2 to 12 years. The results were evaluated according to Flynn11 criteria, and are given in Figure 1.

Poor result in our study was because of myositis ossificians in 1 (1.64%) patient and cubitues varus deformity in the other one. Iatrogenic ulnar nerve palsy occurred in 3 (4.9%) patients which completely recovered in three months. Pin tract infection in 6(9.8%) patients, which resolved with local care and oral antibiotic. Deep infection and compartment syndrome were not encountered in our series.

Discussion:

Supracondylar fracture of Humerus in children is a common injury and needs proper treatment

Figure 1: *Outcome of Procedure according to Flynn criteria*



to prevent complications like cubitus varus, elbow stiffness, neurovascular compromise and compartment syndrome.[1,6]

Close reduction and casting is an old treatment modality but its disadvantage is loss of reduction, cubitus varus deformity, neurovascular compromise because of high flexion and compartment syndrome. Open reduction and internal fixation has its own demerits like more soft tissue trauma, increase the surgery time, increase the hospital stay and increase the elbow stiffness post operatively.[6]

Closed reduction and percutaneous pinning is the solution for the problem of closed reduction & casting, and open reduction & internal fixation. It gives skeletal stability with no loss of reduction and with minimal soft tissue damage. Its demerits are radiation exposure (cannot be performed without image intensifier), Pin tract infection, ulnar nerve damage and some times secondary procedure for K-wire removal.[2,6]

The results of our study were comparable to both local and international studies. In our study the excellent and good results were 91.2% comparable to Zionts,[13] Swenson,[14] Boggione[15] et al, Jong Sup[16] et al.

Two patients (3.2%) had poor results in our series because they developed Myositis ossifican and Cubitus varus deformity respectively, comparable to the study of Boogione[15] and Shim[16]. Iatrogenic ulnar nerve injury was observed in 3 patients who recovered in three months without intervention. No complete transection of the nerve was observed in our series and was comparable to Gosen.[17]

Overall patient satisfaction with regards to functional and cosmetic outcome was excellent.

Conclusion:

Closed reduction and cross percutaneous pinning for the treatment of type III supracondylar fracture of humerus in children is efficient, safe and cost effective method. It gives excellent stabilization of the fracture site.

Refrences:

1. Minkowitz B, Busch MT. Supracondylar fracture of humerus, current trends and controversies. Orthop Clin North Am 1994;25:581-94.
2. Din SU, Ahmed I. Percutaneous crossed pin fixation of supracondylar humeral fracture in children. J Post grad Med Inst 2003;17(2):184-8.
3. Bajwa G R. Evaluation of results of medical approach following operative treatment of supracondylar fractures in children: a study of 60 consecutive cases. J Pak Orthop Assoc 2009;21(1):1-5
4. Wilkins KE. Fractures and Dislocation of the Elbow Region. In Wilkins KE, King RE (eds). Fractures in Children. Philadelphia, JB Lippincott Company 1991;3:509
5. Gartland JJ. Management of supracondylar fracture of humerus in children. Surg: Gynecol Obstet 1959;109:145-54.
6. Khan MS, Sultan S, Ali MA, Khan A, Younis M. Comparison of percutaneous pinning with casting in supracondylar humeral fractures in children. J Ayub Med Coll Abottabad 2005;17(2):33-6.
7. France J, Strong M. Deformity and Functions In Supracondylar Fractures of The Humerus in Children Variously Treated by Closed reduction and Splinting, Traction and Percutaneous Pinning. J Pediatr Orthop 1992; 12: 494
8. Paradis G, Lavallee P, Gagnon N, and Lemire L. Supracondylar Fractures of the Humerus in Children. Technique and Results of Crossed Percutaneous K-wire Fixation. Clin Orthop 1993; 297: 231.
9. Nacht JL, Ecker ML, Chung SMK, Lotke PA, Das M. Supracondylar Fractures of the Humerus in Children Treated by Closed Reduction and Percutaneous Pinning. Clin Orthop 1983; 177: 203
10. Cheng JCY, Lam, TP, and Shen WY. Closed Reduction and Percutaneous Pinning for Type III Displaced Supracondylar Fractures of the Humerus in Children. J Orthop Trauma 1995; 9: 511.
11. Flynn JC, Mattews JG, Beriot RL. BUCD pinning of displaced supracondylar fracture of humerus in children. J Bone Joint Surg 1974; 56-A:263-72.
12. Shoaib M, Hussain A, Kamran H, Ali J. Outcome of Closed Reduction and Casting in displaced Supracondylar fracture of Humerus in children. J Ayub Med Coll Abottabad 2003;15(4):23-5.
13. Zionts LE, McKellop HA, Hathaway R. Torsional strength of pin configurations used to fix supracondylar fractures of the humerus in children. J Bone Joint Surg Am 1994;76:253-6.
14. Swenson AL: Treatment of the Supracondylar Fractures of The Humerus by Kirschner wire transfixation. J Bone Joint Surg 1948; 30-A: 993-7.
15. Boggione. C, Mazda K, Fitoussi F, Pennecot G. Systematic Pinning of Displaced Supracondylar Fracture of the Humerus in Children. A Prospective Study of 116 Consecutive Patients. J Bone Joint Surg 2001;83-B:888-93.
16. Shim. Jong-Sup: Treatment of completely displaced Supracondylar Fracture of the Humerus in Children by Cross-Fixation with Three Kirschner Wires. J-Pediatr Orthop 2002;22(1):12-6.
17. Gosens T, Bongers KJ. Neurovascular complications and functional outcome in displaced supracondylar fractures of the humerus in children. Injury. 2003;34:267-73.