Original Article

Management of displaced supracondylar humerus fracture in children by closed reduction and percutaneous pinning at Mercy Teaching Hospital, Peshawar, Pakistan

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Objective: To assess the results of closed reduction and percutaneous pinning in management of supracondylar humerus fracture Gartland Type II & III in children.

Methodology: This descriptive study was carried out at the Department of Orthopedic, Mercy Teaching Hospital, Peshawar Medical College, Peshawar, Pakistan from January 2010 to December 2012. The assessment was made by measuring loss of carrying angle (cosmetic factor) and loss of range of motion (functional factor) at final follow up. The results were graded according to Flynn's criteria. Data were analyzed with SPSS version 14.

Results: Out of 50 patients, we achieved excellent functional results in 27 cases (54%), good in 17 (34%), fair in 4 (8%) and poor in 2 (4%) cases. Excellent cosmetic results were achieved in 30 cases (60%), good in 14 (28%), fair in 4 (8%) and poor in 2 (4%) cases.

Conclusion: We observed that in management of type II and type III supracondylar humerus fracture, closed reduction and percutaneous pinning was the best method of treatment in our setup due to excellent and good results with short hospital stay and fewer complications. (Rawal Med J 201;40: 164-167).

Key words: Supracondylar fracture, percutaneous pinning, humerus fracture.

INTRODUCTION

Supracondylar fractures are a very common elbow injury and represent approximately 16.6% of all childhood fractures. Extension-type injuries occur in 95% and associated neurovascular injuries in 5-30%.[1] Gartland classified supracondylar fracture in to three extension types I, II and III on the bases of displacement.[2,3] Cubitus varus is the most frequent problem with incidence of 3-14%. The radial pulse is absent in about 3% after reduction of fracture.[4] Stiffness of elbow may occur, particularly after repeated manipulation and the use of posterior approach for open reduction.

Closed reduction and percutaneous pinning for pediatrics supracondylar humerus fracture was reported by Swenson et al in 1948.[5] In 1974, Flynn's published his 16 years experience of blind pinning and the technique became well established in1988.[4] Supportive data over the past 15 years for closed reduction and percutaneous pinning have led to the use of this method as modern standard in these fracture.[2] The aim of this study was to assess the results of closed reduction and percutaneous pinning in management of Gartland Type II & III fractures in children.

METHODOLOGY

Sixty patients were selected from January 2011 to December 2012 admitted in Mercy teaching hospital both through emergency and outpatient department. Each patient was evaluated for neurovascular injury and X rays of injured elbow for classifying fracture. Age of 2 -12 years with supracondylar fracture of humerus Gartland type II, III received within 12 hours after injury not previously manipulated were included in study. Gartland type I, open fracture, associated neurovascular injury or other fracture in ipsilateral limb, poly trauma patient were excluded from study. An informed consent was taken from parents.

In each case provisional closed reduction under general anesthesia was carried out in emergency operation theater and percutaneous k wire passed under image intensifier in main operation theater on next morning OT list. In our setup it was not feasible for us to carry out closed reduction and

percutaneous pinning on same day. In 53 out of 60 cases surgery was performed with in 24 hrs, while in 7 cases surgery was delayed 24-48 hours. We used 1.5 mm k wire for less than 5 year old child and 2 mm for more than 5 year old children.

Out of 54 patients 4 were lost to follow up; these were excluded from study. Patients were discharged on next day after observation for neurovascular complications. Postoperative follow up was arranged at 4 ,6, 8 and 12th weeks after surgery. k wire was removed at 4 weeks and range of motion exercise was started. All data were analyzed with SPSS v.14.

RESULTS

Out of 50 children, 37(74%) were male and 13(26%) female. Most were between 5-8 years of age (Table 1). 12(24%) had right side fracture and 38(76%) had left side involved. 21(42%) were Gartland type II and 29(58%) were type III. Mechanism in 32(64%) was due to fall and 18(36%) due to road side accident. 21(42%) arrived within 3 hours, 20(40%) within 3-8 hours and 9(18%) patient arrived within 8 -12 hours. Ulnar nerve injury occurred in 3(6%) cases. Pin tract infection occurred in 4(8%) cases.

Table 1. Age range of patients (n=50).

Age group	Number	Percent
2 to 4 years age	6	12.0
5 to 8 years	34	68.0
9 to 12 years	10	20.0
Total	50	100.0

Table 2. Flynn's criteria.

	Cosmetic factor	Functional factor
Excellent	0-5	0-5
Good	6-10	5-10
Fair	11-15	10-15
Poor	>15	>15

According to Flynn's criteria, functional results were excellent in 27(54%), good in 17(34%), fair in 4(8%) and poor in 2(4%) cases. Cosmetic results were excellent in 30(60%), good in 14(28%), fair in 4(8%) and poor in 2(4%) cases (Table 2).

DISCUSSION

Supracondylar humeral fractures are common with peak incidence between the ages of five and ten years.[6] In a review of 1708 reported cases of completely displaced fracture (Gartland type III), clinical results showed manipulation and splint immobilization led to worst result than close reduction and pinning in term of humerocapitillar angle, maintenance of reduction and functional outcome.[7]

Achieving maximal anatomical reduction in coronal and sagittal plan reduced complications like limitation of elbow flexion, which was, reported 50% in review of 223 supracondylar humerus fracture.[8] Los Angeles Orthopedic Hospital compared 101 type II fractures treated within 7 days of injury with 42 type II treated after 7 days from injury and found no significant difficulties in radiographic parameters and ROM.[9] In type III fracture, there are many studies comparing early and late treatment. All these showed no significant different in complications, OR timing quality of reduction and blood loss in case of open reduction.[10,11] However, significant swelling at presentation and delay in fracture reduction is still an important warning sign for development of compartment syndrome.[12] In study of 126 patients treated less than 8 hours compared with 45 patients treated after 8 hours, higher rate of open reduction of 11% was seen in early and 33% in delayed group.[11]

Regarding complications, one is pin tract infection. In our study, pin tract infection occurred in 4 cases that resolved with antibiotics following pins removal. In a study of 622 patients treated with percutaneous pin, 26% received preoperative antibiotics, 95% pins were kept outside skin.[14] Deep infection occurred in 0.2% and superficial infection only 1% prompting authors to recommended simple betadine prep and towel draping.[13]

A metanalysis from 32 studies with 2639 patients undergoing lateral pinning crossed pinning had higher rate of ulnar nerve injury with 1 ulnar nerve injury in every 28 patients treated with crossed pinning.[14] Ulnar nerve injury occurred in 3(6%) of our cases, same as observed in study by Anwar et al.[15] In all such cases medial pin was removed within

24 hrs and re-pinning was done and full recovery was noted in all patient.

Elbow flexion greater than 90 degree led to subluxation of ulnar nerve anterior to medial epicondyl in 18% of children age 5 or less and 8% of children age 6-10 and 6% of children age 11-18yeaar old. In hyper flexion, the ulnar nerve subluxated to a position directly over the epicondyl in 43% of children less than 5 years old, 21% of 6-10 years old and 20% of 11-18 years old.[16] In order to avoid ulnar nerve injury it is recommended that identify medial epicondyl with thumb and in extended elbow position place medial pin.[17] Some authors give small medial incision for medial pin placement which associated with no iatrogenic nerve palsie.[18]

Choice of pin placement either to lateral parallel or divergent or cross pinning depend on stability of fracture reduction peroperative. Metanalysis of various studies showed cross pinning had better rotational stability than lateral pinning alone.[19] Some authors recommend 2 lateral pins for type II fracture and in type III they placed additional medial pin if reduction is unstable.[20] In synthetic bone model, divergent lateral pins were more stable than parallel and cross pinning but cross pinning provided greatest rotational stability.[21,22] Most of elbow motion following this injury returns within 4 weeks after removal of splint/cast with additional small gain taking almost up to one year.[23]

In our patients, fair and poor results were observed particularly in those cases that came late for removal of pins. Therefore, in these patient active range of motion exercise were started late and thus loss of range of motion was quite significant in these patients. We observed many children which were excluded from study either they presented after 24 hrs of injury or with previous manipulation, with tight bandage having swollen forearm was not uncommon scenario. These patients needed either fasciotomy or vascular intervention and in some cases even needed amputation. Therefore, it is highly recommended that the general public should be educated to bring their children with supracondylar elbow fractures within golden hours to avoid major complication.

CONCLUSION

We found that in management of type II and III supracondylar fracture humerus with close reduction percutaneous k wire was best method of treatment in our setup, as we achieved excellent and good results with short hospital stay and less complication.

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