

ORIGINAL ARTICLE

Evaluation of outcome of supracondylar fracture of humerus managed with closed reduction and percutaneous pinning

Dr. Geetesh Kumar Singh¹, Dr. Amit Varshney²

¹Assistant Professor, Department of Orthopaedics, N C Medical College & Hospital, Panipat, Haryana;

²Assistant Professor, Department of General Medicine, Sakshi Medical College, Guna, Madhya Pradesh

ABSTRACT:

Background: Supracondylar fractures of the humerus represent a significant burden of injuries in children, accounting for 12-17% of all paediatric fractures. The present study was conducted to evaluate outcome of supracondylar fracture of humerus managed with closed reduction and percutaneous pinning. **Materials & Methods:** 85 cases of supracondylar fracture of humerus were treated with closed reduction and percutaneous pinning. Gartland grading, time between injury and surgery and outcome of the treatment was recorded. **Results:** There were 5 and 6 cases with excellent and good results with <12 hours of injury, 12-24 hours injury showed 8, 19, 2 and 2 cases with excellent, good, fair and poor outcome respectively, 24-48 hours showed 6, 22, 4 and 1 case with excellent, good, fair and poor outcome respectively and 48-72 hours had 5, 4 and 2 cases with good and fair results. Gartland Grade II was seen in 28 cases which showed excellent, good results in 4, 24 outcome respectively and grade III in 8, 21, 23 and 5 cases with excellent, good, fair and poor outcome respectively. The difference was significant ($P < 0.05$). **Conclusion:** Closed reduction and percutaneous pinning with K-wires and lateral-transolecranon wire techniques provide stable fixation in supracondylar fracture of humerus in children.

Key words: Humerus fracture, K-wires, Percutaneous pinning.

Corresponding author: Dr. Amit Varshney, Assistant Professor, Department of General Medicine, Sakshi Medical College, Guna, Madhya Pradesh

This article may be cited as: Singh GK, Varshney A. Evaluation of outcome of supracondylar fracture of humerus managed with closed reduction and percutaneous pinning. *J Adv Med Dent Scie Res* 2016;4(6):352-354.

INTRODUCTION

Supracondylar fractures of the humerus are the most common fractures in children under the age of 7 and the most common paediatric fracture requiring surgery. Supracondylar fractures may have significant complications including nerve injury, vascular injury, malunion and compartment syndrome.¹

Supracondylar fractures of the humerus represent a significant burden of injuries in children, accounting for 12-17% of all paediatric fractures. Extension injuries account for 95% of supracondylar fractures. The metaphyseal flare of the distal humerus connects the diaphysis of the humeral shaft to the epiphysis. The metaphysis is thinned both anteriorly, coronoid fossa, and posteriorly, olecranon fossa, to accommodate the ulna during flexion and extension respectively.² The most common mechanism of injury is when a patient falls onto an outstretched hand with the arm fully extended. The olecranon engages with the olecranon fossa and acts as a fulcrum. Flexion injuries result from direct trauma to the posterior aspect of the distal humerus or falling onto a flexed elbow. These injuries are rare and occur in 2-5% of the cases.³

A cross pin configuration is believed to be mechanically more stable than the lateral pins alone.

However, the Ulnar nerve can be injured with the use of a medial pin.⁴ It has not been proved that added stability of a medial pin is clinically necessary since, in children, pin fixation is always augmented with immobilization in a splint or cast. Lateral pins alone imparts less rotational stability to the fracture although it has been attributed mainly to technical errors of pin placement.⁵ The present study was conducted to evaluate outcome of supracondylar fracture of humerus managed with closed reduction and percutaneous pinning.

MATERIALS & METHODS

The present study was conducted among 85 cases of supracondylar fracture of humerus of both genders. All were informed regarding the study and their consent was obtained.

Data such as name, age, gender etc. was recorded. Preoperative biplanar radiographs and CT scans were obtained in all patients. All patients were treated with closed reduction and percutaneous pinning. Gartland grading, time between injury and surgery and outcome of the treatment was recorded and compared. Results thus obtained was subjected to statistical analysis. P value less than 0.05 was considered significant.

RESULTS

Table I Distribution of patients

Total- 85		
Gender	Males	Females
Number	55	30

Table I shows that out of 85, males were 55 and females were 30.

Table II Time elapsed between injury and surgery

Duration	Excellent	Good	Fair	Poor	P value
<12 hours	5	6	0	0	0.02
12-24 hours	8	19	2	2	
24-48 hours	6	22	4	1	
48-72 hours	0	5	4	2	

Table II, graph I shows that there were 5 and 6 cases with excellent and good results with <12 hours of injury, 12-24 hours injury showed 8, 19, 2 and 2 cases with excellent, good, fair and poor outcome respectively, 24-48 hours showed 6, 22, 4 and 1 case with excellent, good, fair and poor outcome respectively and 48-72 hours had 5, 4 and 2 cases with good and fair results. The difference was significant (P< 0.05).

Graph I Time elapsed between injury and surgery

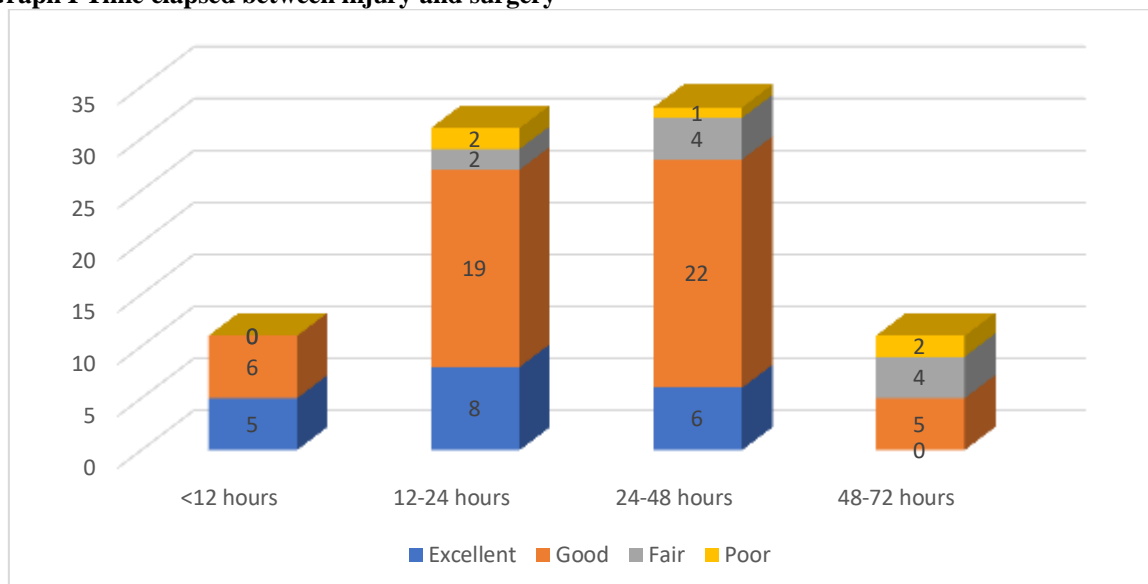


Table III Grade of fracture

Grade	Excellent	Good	Fair	Poor	P value
II	4	24	0	0	0.02
III	8	21	23	5	0.01

Table III, grade II shows that Gartland Grade II was seen in 28 cases which showed excellent, good results in 4, 24 outcome respectively and grade III in 8, 21, 23 and 5 cases with excellent, good, fair and poor outcome respectively. The difference was significant (P< 0.05).

DISCUSSION

Displaced supracondylar fractures are notorious for difficulty in reduction, maintenance of reduction and frequent involvement of neurovascular structures.⁶ No general agreement on the treatment is evident with controversy prevailing regarding the ideal timing of surgery, method of maintenance of reduction and

configuration of the pin fixation.⁷ Gartland classified supracondylar fractures in 1959, with a classification system that differentiate extension supracondylar fractures according to the degree of displacement of the distal fracture fragment; Type I is undisplaced or minimally displaced, Type II is displaced but incomplete with an intact posterior cortex. There may

also be coronal angulation and medial column disruption.⁸ In 1984, Wilkins modified Gartland's classification specifically with reference to Type II and III fractures.⁹ The British Orthopaedic Association Standards for Trauma on supracondylar fractures of the humerus in children recommend an assessment of the limb to include the status of radial pulse, capillary refill time and the individual function of the radial, median (including anterior interosseous) and ulnar nerves. The guidelines further recommend post-operative radiographs should be obtained between 4 and 10 days to ensure maintenance of reduction.¹⁰ The present study was conducted to evaluate outcome of supracondylar fracture of humerus managed with closed reduction and percutaneous pinning.

In present study, out of 85, males were 55 and females were 30. Sharma et al¹¹ assessed the efficacy of treatment of this fracture using one lateral and one trans-olecranon K-wires or lateral entry K-wires alone. Ninety cases of displaced supracondylar humerus fractures were included in the study. The mean age of the patients was 6.7 years (range 3–12 years). The male/female ratio was 5:1 and left side was involved in 70% whereas 30% had right sided injuries. The most common mode of trauma was fall from height with elbow in extension. All the 90 consecutively admitted patients had extension type injury with 73.3% fractures being Gartland type III and 26.7% were type II. Posteromedial displacement was noted in 70% whereas 30% fractures were postero-laterally displaced. In 60 cases, lateral entry wires alone were used whereas, in 30 cases, one lateral and another transolecranon transarticular K-wire was used. K-wires were removed at 3 weeks postoperatively and follow up was done at 6 weeks and 12 weeks when they were evaluated according to the criteria described by Flynn. Results were graded according to Flynn's criteria. Excellent results were achieved in 12 (13.3%), good in 54 (60%), fair in 15 (16.7%) while in nine patients (10%) poor results were obtained.

We found that there were 5 and 6 cases with excellent and good results with <12 hours of injury, 12-24 hours injury showed 8, 19, 2 and 2 cases with excellent, good, fair and poor outcome respectively, 24-48 hours showed 6, 22, 4 and 1 case with excellent, good, fair and poor outcome respectively and 48-72 hours had 5, 4 and 2 cases with good and fair results. Immediate complications associated with it are limb threatening (by virtue of involving neurovascular structures) whereas late complications are a serious concern to functional status of the patient. Due to the above reasons they require a strict vigilance and a proper management protocol. In pediatric age group the more common age of

presentation is 5-7 years (90% cases). Extension type injury is more common than flexion type.¹² It is frequently found in the non-dominant extremity. The flexion type is common in elderly children.

CONCLUSION

Authors found that closed reduction and percutaneous pinning with K-wires and lateral-trans-olecranon wire techniques provide stable fixation in supracondylar fracture of humerus in children.

REFERENCES

1. Mahan ST, May CD, Kocher MS. Operative management of displaced flexion supracondylar humerus fractures in children. *Journal of Pediatric Orthopaedics*. 2007;27(5):551-56.
2. Skaggs DL. Elbow fractures in children: diagnosis and management. *J Am Acad Orthop Surg*. 1997;5(6):303–12.
3. Bachman D, Santora S. Orthopedic trauma. In: *Textbook of Pediatric Emergency Medicine*, Fleisher GR, Ludwig S, et al. (Eds), Lippincott Williams and Wilkins, Philadelphia 2006. Pp.1538.
4. Ryan LM, Bachur RG, Wiley JF. Evaluation and management of supracondylar fractures in children. *UpToDate*. Waltham (MA): UpToDate. 2009.
5. Villarín LA, Belk KE, Freid R. Emergency department evaluation and treatment of elbow and forearm injuries. *Emergency Medicine Clinics of North America*. 1999;17(4):843-58.
6. Campbell CC, Waters PM, Emans JB, Kasser JR, Millis MB. Neurovascular injury and displacement in type III supracondylar humerus fractures. *Journal of Pediatric Orthopaedics*. 1995;15(1):47-52.
7. Sallay PI, Pedowitz RA, Mallon WJ, Vandemark RM, Dalton JD, Speer KP. Reliability and reproducibility of radiographic interpretation of proximal humeral fracture pathoanatomy. *Journal of Shoulder and Elbow Surgery*. 1997;6(1):60-69.
8. Leitch KK, Kay RM, Femino JD, Tolo VT, Storer SK, Skaggs DL. Treatment of multidirectionally unstable supracondylar humeral fractures in children. A modified Gartland type-IV fracture. *J Bone Joint Surg Am*. 2006;88(5):980-85.
9. Otsuka NY, Kasser JR. Supracondylar fractures of the humerus in children. *J Am Acad Orthop Surg*. 1997;5(1):19–26.
10. Griffin KJ, Walsh SR, Markar S, Tang TY, Boyle JR, Hayes PD. The pink pulseless hand: a review of the literature regarding management of vascular complications of supracondylar humeral fractures in children. *European Journal of Vascular and Endovascular Surgery*. 2008;36(6):697-702.
11. Sharma A, Walia JP, Brar BS, Sethi S. Early results of displaced supracondylar fractures of humerus in children treated by closed reduction and percutaneous pinning. *Indian journal of orthopaedics*. 2015 Oct;49:529-35.
12. Lins RE, Simovitch RW, Waters PM. Pediatric elbow trauma. *Orthop Clin North Am*. 1999;30:119.