

Original Article***The Evaluation of the Results of Closed Supracondylar Fracture of Humerus in Children Gartland type III Treated by Two Lateral Parallel Percutaneous K-wires***

Rahman M¹, Abdullah SM², Hossain MZ³, Salekin MS⁴

1. * Dr. Mahbubur Rahman, Associate Professor, Department of Orthopedics, Jahurul Islam Medical College & Hospital, Kishoregonj.
2. Dr. Syed Md. Abdullah, Assistant Professor, Department of Orthopedics, Jahurul Islam Medical College & Hospital, Kishoregonj.
3. Md. Zakir Hossain, Associate Professor, Department of Orthopedics, Jahurul Islam Medical College & Hospital, Kishoregonj.
4. Md. Shakil Salekin, Registrar, Department of Orthopedics, Jahurul Islam Medical College & Hospital, Kishoregonj.

***Address of correspondence**

Abstract

Background: Reduction and percutaneous pin fixation is widely accepted treatment for displaced humeral supracondylar fractures in children, but the best pin configuration is still debateable. This study examined the outcome for 2 lateral percutaneous pins placement in type III supracondylar humeral fractures.

Material and methods: This retrospective study was carried out in Jahurul Islam Medical College in 35 children with Grade III close supracondylar fractures of humerus. The patients were evaluated at final follow up as described by Flynn and the results compared with the contra lateral normal elbow. Under general anesthesia, all fractures fixations were done by lateral 2 K-wires of 1.8 size under C-arm and well-padded above-elbow posterior back-slab. The follow-ups were given at 1st, 3rd, 4th, 8th, 12th, 24th weeks.

Results: There were 35 children in this study, 24(68.6%) children were male and 11(31.4%) children were females. The children were aged 2-13 years. Modes of injury of all children were fall from height. In a subjective measure of outcome at final follow-up the results were excellent in 30(85.7%) and good in 5(14.3%) patients. No patients or parents reported their outcome as not satisfied. Post-operatively no patient got ulnar nerve injury. Three patients got pin tract infection, which were superficial and healed after removing pins and oral antibiotic administration.

Conclusion: Two parallel lateral pins inserted is an effective method of fixation of grade III supracondylar fracture in children.

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Introduction

Supracondylar fractures of the humerus represent 50-70% of all elbow fracture in children in the first decade of life. (1) Current method of treatment of this fracture is based on Gartland classification. Many different methods are described such as close reduction traction, but all of these methods had large complication rate^{1, 2, 3, 4, 5, 6, 7, 8, 9}. The current preferred method of treatment for displaced Supracondylar fracture has been close reduction and percutaneous pin fixation. The main goal of surgery in pediatric supracondylar humerus fractures is the safe creation of a construct that is stable enough to prevent axial rotation and hyperflexion and extension of the distal fragment and thus avoid postoperative deformity^{10, 11, 12}. Closed reduction with percutaneous pin fixation for the management of displaced or angulated supracondylar humeral fractures in children has become widely adopted, but optimal pin configuration remains controversial¹³. Open reduction is usually unnecessary, although it sometimes can be required to obtain complete reduction especially in cases in which the fracture cannot be reduced because of the presence of avascular lesion.

This method has given excellent results reported by various authors^{7, 8, 9, 14, 15, 16}. Thus, I conducted this retrospective study to evaluate outcome of lateral pin construct, at the same time avoiding the possibility of iatrogenic ulnar nerve palsy^{17, 18, 19}.

Material and methods

This retrospective study was carried out in Jahurul Islam Medical College Hospital from July 2019 to July

2020. In this study 35 children with Grade III close Supracondylar fractures of humerus were included. The patients were aged between 2 years and 13 years with the mean age of 7.76 years. The time of injury with the mean time of operation being 3 days. The patients were evaluated as described by Flynn² and the results compared with the contra lateral normal elbow. Under general anaesthesia, using c-arm fluoroscopy closed reductions were done²⁰. When satisfactory reduction had been achieved, then fixations were done by lateral 2 K-wires of 1.8 size and well-padded above-elbow posterior back-slabs were applied. The patients were carefully observed for 12-72 hours (average 58 hours) and then discharged. The above-elbow plaster of paris (POP) back slabs were kept for three weeks and the pins and slab were removed in the outpatient (OPD) clinic. Elbow Range of motion (ROMS) was started after removing the POP back slab. The follow-ups were given at 1st, 3rd, 4th, 8th, 12th, 24th weeks. Within 2-3 weeks, x-rays were taken to see the callus formation; if callus is formed, then we remove the pop and pins and to start physiotherapy; the 4th follow-up on the 4th week and the 5th follow-up on the 8th week post-operatively to see the ROM and carrying angle of the elbow, and the final follow-up on the 6 months post-operatively to see the final result of the study.

Result

There were 35 children in this study, 24(68.6%) children were male and 11(31.4%) children were females. The children were aged 2-13 years. Mode of injury of all children were fall from a height. All were closed fractures. The extension types were 31 (88.6%) and flexion types 4 (11.4%). (Figure:1)

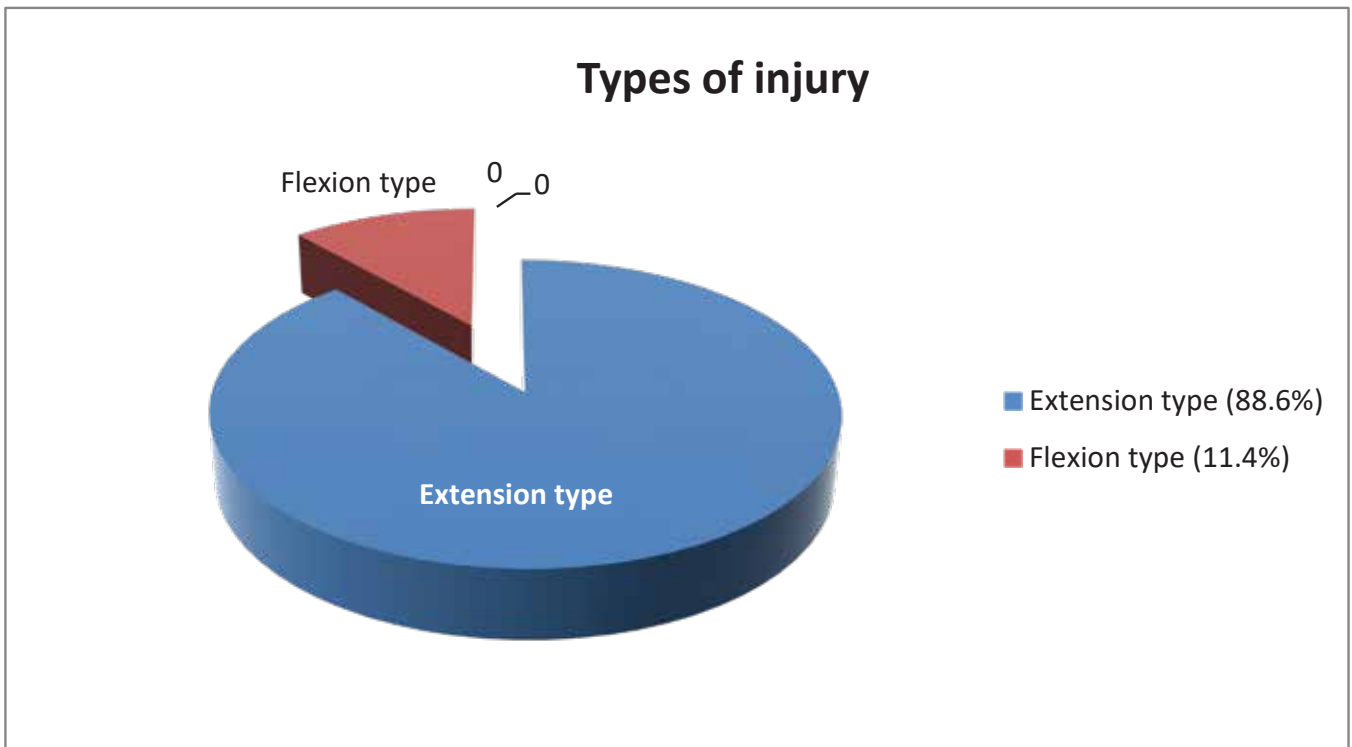


Figure: 1

All cases were treated by two lateral K-wires. Preoperatively no cases had nerve injuries or vascular injuries. Post-operatively no patient got ulnar nerve injury. Three patients got pin tract infection, which were superficial and healed after removing pins and oral antibiotic administration. Callus formations were seen in all patients at around 3 weeks post-operatively before removing the K-wires. The fractures united in all cases at the 4th week post-operatively. Results were analysed using Flynn’s (2) criteria. (Table:1)

Table: 1, Flynn’s Criteria:

Results	Rating	Cosmetic factor	Functional factor
		Carrying angle loss (degree)	Motion loss (degree)
Satisfactory	Excellent	0-5	0-5
	Good	6-10	6-10
	Fair	11-15	11-15
unsatisfactory	Poor	>15	>15



In a subjective measure of outcome at follow-up the results were excellent in 30(85.7%) and good in 5(14.3%) patients. Table: 2

Table: 2

Results	Frequency	Percent	Percent
Excellent	30	85.7	85.7
Good	5	14.3	14.3
Total	35	100.0	100.0

No patients or parents reported their out-come as not satisfied. At follow-up, all patients went on to osseous union and regained a full range of movement after rehabilitation. During this study, complications like vascular injury, compartment syndrome, myositis ossifications, significant mal-union and non-union were not red.

Discussion

In this study in a subjective measure of outcome at follow-up the results were excellent in 30(85.7%) and good in 5(14.3%) patients according to flynn’s criteria². Khan obtained 88% excellent, four percent good and four percent poor results in his study²¹. Tiwari observed

88 percent satisfactory results, among which 42% were excellent, in his series of late-presenting supracondylar fractures of humerus in children²². These two studies are comparable to our study. Flynn et al., reported the incidence of cubitus varus deformity after treatment was 5%, whereas Arino et al., reported that it was almost 21%, ulnar nerve deficit was found in 15% of patients who were treated with medial and lateral pin as per the report of Chai^{2, 23, 24, 25}.

All cases were treated by two lateral K-wires. Post-operatively no patient got ulnar nerve injury. Skaggs found that the use of lateral-entry pins alone was effective for even the most unstable supracondylar humeral fractures and they saw no iatrogenic ulnar nerve injuries, and no reduction was lost^{14, 15}.

Three patients got pin tract infection, which were superficial and healed after removing pins and oral antibiotic administration. Gordon observed pin-tract migration in six percent of cases⁹.

Conclusion

Fixation of displaced humeral supracondylar fractures with two lateral pins inserted parallel gives good results and prevents iatrogenic ulnar nerve injuries.

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