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A study on clinical and functional outcome of operative management of supracondylar humerus fracture in children lateral vs cross k wire pinning(Minimum 6 months follow up)

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Abstract
Upper extremity fractures account for up to 90% of pediatric fractures. Among these fractures Supracondylar Humerus fractures are one of the commonest requiring surgical intervention and have a high prevalence of associated short term complications such as nerve injuries and long term complications such as cubitusvarus. The epidemiology, classifications, clinical evaluation and complications of this fracture is hereby comprehensively reviewed along with controversies in management and available guidelines.
Keywords: *Supracondylar fracture; Paediatric fracture; Upper limb fracture; Supracondylar fracture management*

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I. Introduction

Supracondylar fractures of the humerus represent 50 – 70% of allelbowfracturesinchildrenin thefirstdecadeoflife.Thisfracturerepresents about 3% of all fractures in children. The rate of occurrencesteadily increases in the first five years of life to peak at 5 to 7 years ofage. Thus supracondylar fracture of the humerus is one of the most talkedabout and often encountered injury (only after clavicle and both boneforearmfracture)inpediatricagegroupwithamalepredominanceclassically occurring as a result of fall on an outstretched hand. Pediatricfractures hold special attention owing to the fact that bones in this agegroup havean enormous growth as well asremodelingability.

Supracondylar fractures may have significant complications including nerve injury, vascular injury, malunion and compartment syndrome.This review article discusses key topics and controversies. The majority of these issues relate to the management of this fracture.

The present work was done to study the functional and radiological outcomes of Modified Gartland Type II, III and IV supracondylar fractures of humerus in children treated by percutaneous cross vs lateral pining.

The review also brings to attention additional areas of contention including classification system, positioning during surgery, pin removal and how to manage the risk factor of obesity.

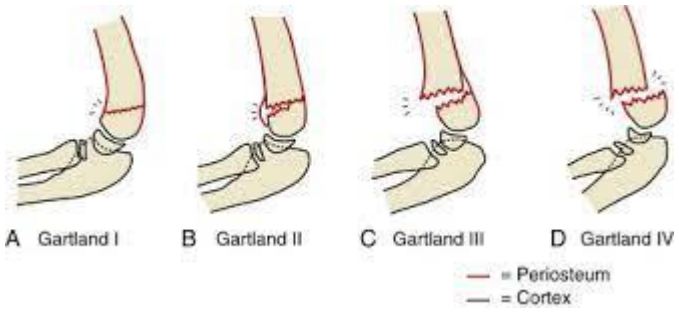
Epidemiology

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. 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. There is a unimodal distribution affectingmalesandfemaleswithapeakat7yearsofage.Followingthis peak, there is a decline in incidence in both sexes equally. These fracturesbydefinitiondonotinvolvethephysis.

Classification

Gartland classified supracondylar fractures in 1959, with a classification system that differentiates 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. In 1984, Wilkins modified Gartlands'

classification specifically with reference to type II and III fractures. Type II was subdivided into Type IIa - stable with posterior angulation and Type IIb – unstable posteriorly angulated and rotated; Type III fractures are displaced fractures with no cortical contact. This can be further subdivided into IIIa - posteromedial displacement and IIIb - posterolateral displacement. A further modification of the Gartland classification has been described; type IV fracture with multi-directional instability .



Objective

To study and compare the functional outcome according to the Flynn criteria, range of motion (elbow flexion and extension) for CROSS V/S LATERAL PINNING fixations in paediatric supracondylar humerus fracture.
To study the radiographic outcome measures for quality of postoperative fracture reduction, and union.
To study the complication rate in various fixations.

Material and Methods

Types of Study – Prospective cohort study.
Duration of Study -This study was carried out over a period of 18 months
Place of study-At a tertiary medical care centre.
Source of Data-The material for the present study has been collected from paediatric patients from in-patient department admitted in Orthopaedics department matching the inclusion criteria, at a tertiary care hospital, with the diagnosis of displaced supracondylar humerus fracture treated operatively with CROSS VS LATERAL PINNING.

INCLUSION CRITERIA

- ✓ Age between 2-14 years
- ✓ Closed and open fractures
- ✓ Type 2, 3 and 4 Supracondylar Humerus fracture as per Modified GARTLAND'S Classification.
- ✓ Patient who have completed minimum of 6 months after surgery are included.
- ✓ Different mode of injuries are included by RTA, assaulted, Fall from height, direct impact/shock.
- ✓ All patients who visited and treated at tertiary medical care centre.
- ✓ The patients available for full follow up observation.

EXCLUSION CRITERIA

- ✓ Type 1 Supracondylar Humerus fracture-Conservatively manage
- ✓ Floating elbow
- ✓ Any other causes.
- ✓ Adult patients
- ✓ Any distal neurovascular deficit

Flynn"s criteria was used to evaluate the final results.

	Cosmetic factor carrying-angle loss (degrees)	**Functional factor movement loss (degrees)**
Excellent	0-5	0-5
Good	5-10	5-10
Fair	10-15	10-15
Poor	>15	>15

II. Observation and Result

These are the final observations which were made from the data collected during our study period i.e. October 2019 to March 2021. This is a prospective study which was conducted on 40 cases of supracondylar

fracture Humerus (Type II, Type III and Type IV), who underwent open/closed reduction with Cross/Lateral K-wire fixation.

Follow-up was done at 2 weeks, 6 weeks, 12 weeks and 6 months.

The present study was undertaken to compare the functional and radiological outcome between lateral pinning and cross pinning technique in the management of paediatric displaced supracondylar farcturehumerus.

- Age of the patients ranged from 2 to 14 years with mean age of 7.3 years
- Among 40 patients, 28 (70%) patients were male and 12 (30%) were females.
- Most common mechanism of injury was fall on out stretched hand while playing in 20 patients constitutes 50% cases, 20 (41%) patients had other injury
- Most of the patients are affected on left side in 28 patients (70%) than right side affection seen in 12(30%) patients.
- Among 40 patients 28 (70%) of them had posteromedial displacement, and 12 (30%) had posterolateral displacement.
- Among 40 patients 35 (87%) of them reached hospital within 24- 48hrs
- Average carrying loss was 4.37+1.42. Average flexion loss was 4.34+1.42. Average extension loss was 4.22+1.42.
- There is no statistically significant difference in carrying angle loss and range of movements loss in cross pinning and lateral pinning group.
- The average Baumann's angle loss was 3.28+1.6.
- There is no statistically significant difference in Baumann's angle loss among cross pinning and lateral pinning groups
- Anterior humeral line was passing through middle third of the capitellum in all the patients.
- Two of the patients among cross pinning group developed ulnar nerve neuropraxiapost surgery.
- One patient had pin tract infection among cross pinning group post surgery.

III. CONCLUSION

Inourstudyweconcludeaclinicallyandradiologicallysatisfactoryoutcomeinmanagingpatientswithdisplacedpaediatricsupracondylar fracture humerus with close/open reduction and K wirefixation by cross pinning and lateral pinning. And there is no statisticallysignificantdifferenceinclinicalandradiologicaloutcomewithcrosspinning and lateral pinning techniques employed for treating paediatricdisplacedsupracondylar fracturehumerus.

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