



DISPLACED SUPRACONDYLAR FRACTURES OF HUMERUS IN CHILDREN – DELAYED PRESENTATION AND ITS MANAGEMENT.

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ABSTRACT **EPIDEMIOLOGY** : Supracondylar fractures of the humerus account for 3% of fractures in children and it also account for 60% of all fractures around the pediatric elbow.

OBJECTIVE :- The purpose of the study was to evaluate the clinical , radiological and functional out come following closed reduction and percutaneous pinning in displaced supracondylar fractures of humerus in children with delayed presentation in RAJIV GANDHI INSTITUTE OF MEDICAL SCIENCES KADAPA.ANDRHA PRADESH.

METHODS:- Reviewed the functional and radiological results of closed reduction and percutaneous pinning using crossed k wires in 24 patients with displaced extension type supracondylar fractures of humerus of Gartland type III with delayed presentation. The average age of the patients was 8 years ranging from 5-12 years .

RESULTS:- Closed reduction and percutaneous pinning was successful in 84 % of the patients the mean follow up period was 12 months .The Baumanns angle and metaphysis – diaphyseal angle was restored with in 5 degrees of the unaffected side in all patients .Careful use of passing the k wire over the medial epicondyle in patients with severe swelling by mini open technic helped us to avoid ulnar nerve injury . Using the FLYNN'S Criteria 20 patients had good to excellent result .Two patients had mild myositis and the both has satisfactory result.Two patients had mild cubitus varus which was neglesible and need not be interfered.

CONCLUSION:- Closed reduction and percutaneous pinning of displaced supracondylar fractures of humerus in children is safe and effective method.

KEYWORDS : Closed reduction, percutaneous pinning, supra condylar fractures of humerus, image intensifier.

EPIDEMIOLOGY :- Supra condylar fractures of the humerus account for only 3% fractures in children and it also account for 60% of all fractures around the pediatric elbow . Supra condylar fractures of the immature skeleton mostly occur before the age of 12years with a peak incidence between 6 to 8 years of age (1) .In this setting , bone is weaker than ligaments and there for a significant stress applied to the elbow results in a bone a injury rather than a dislocation (1) .Supra condylar fractures occur more of ten in boys and in left arm (2) .

INTRODUCTION :- Percutaneous pinning was described for adult 'T' condylar fractures of humerus and has gained popularity for pediatric supracondylar fractures. closed reduction Percutaneous pinning under image intensifier control is the procedures of the choice for the displaced supra condylar fractures when ever possible with original SWENSEN TECHNIC(4) of crossed k wires with excellent results and low morbidity . These are bio-mechanically most stable as compared to the other pin configurations.

In the developing world, proportion of delayed presentation is much higher because of poorly developed health delivery system and involvement of local quacks patients reaching the tertiary care centers from long distance.At this satge closed reduction and percutaneous pinning and open reduction and internal fixation are the methods of choice(3) .Fractures which present late are difficult to treat because of excessive swelling and may be associated with complications, such as neurovascular injury, compartment syndrome. There is fear of perioperative and late postoperative complications like iatrogenic nerve injury, Volkmann's ischemic contracture, cubitus varus deformity, elbow stiffness and myositis ossificans. The aim study was to evaluate the clinical, radiological and functional outcome following closed reduction and percutaneous pinning of widely displaced supracondylar fractures of the humerus presenting more than 24 hours or more after the injury.

METHODS:- Between July 2013 and June 2016, 24 patients with displaced extension type supracondylar fractures (Gartland type III 17) of the humerus were treated at RAJIV GANDHI INSTITUTE OF MEDICAL SCIENCES KADAPA.ANDRHA PRADESH. Which is a tertiary referral center. The 24 patients were available for the study and were followed up for a period of 12 months. All fractures were splinted in 30o of flexion. Extremity was kept elevated to promote venous outflow and to reduce and prevent swelling. Radiographs of opposite elbow were also taken to measure normal Baumann's angle for that patient and for assessment of adequacy of postoperative fracture reduction. All the patients were operated under general anesthesia within 24 hours of presentation in the operation theater . There were 16 boys and 8 girls. The average age of the patients was 8 years (range: 5-

12 years). Fall on the outstretched hand was the mechanism of injury in 18 patients, and the other 6 patients were struck by a motor vehicle. The average delay in presentation was 30 hours (range: 24 hours-3 days). 4 patients had one or more attempts at reduction before they presented to us. 6 patients had previous history of massage. All operations were done under general anesthesia. Closed reduction and percutaneous cross pin fixation was done with the technique originally described by Swenson et al(4). Following fracture reduction cross pinning done under image intensifier. When gross swelling made palpation of medial epicondyle difficult, a miniopen technique was used for placement of medial wire as described by Green et al(5) . Once K-wires were passed , the elbow was extended, radial pulse palpated and the carrying angle and stability of reduction was assessed. The K-wires were left outside the skin after being bent at right angles. An above elbow plaster slab was given in 45°flexion of the elbow. K-wires were removed at 4 weeks after obtaining an X-ray image post-operatively to assess union and myositis ossificans. At each follow-up, the carrying angle, range of motion of both the elbows and distal neurovascular status were recorded. Outcome was graded according to Flynn's criteria.



Pre operative x-rays

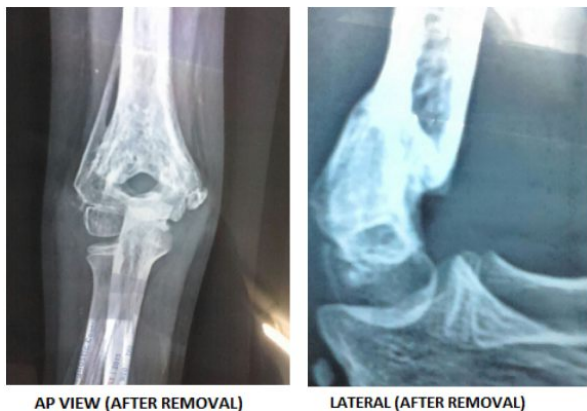


POST OPERATIVE X-RAY FILMS

RESULTS:- Under C-arm control closed reduction and percutaneous cross pinning was successful in 18 patients. 6 patients were needed open reduction, through lateral approach. The mean delay in presentation was 36 hours with a follow up off 12 months the causes for failed closed reduction in this series are .

- Penetration of proximal fragment through Brachialis Muscle(10).
- Gross swelling due to repeated manipulations by a local quack which is common practice in our area .
- Comminuted fractures .

Most of the fractures were treated with closed reduction and percutaneous crossed pins both on the medial and lateral aspects of distal end of humerus(7). 8 patients were needed mini open technic on the medial side to prevent iatrogenic ulnar nerve injury. The average anesthesia time was 45 min to 1 hour mean hospitalization was more than 48 hours. All the fractures were united . Immobilized with above elbow pop slab for 4 weeks. Pins and the slab were removed after 4 weeks from the date of operation. Mobilization of the elbow was started after removal of the pins and full range off motion was achieved after 3 months from date of operation. All fractures healed in good alignment, with the Baumann angle within 4 degrees on the unaffected side. The carrying angle as measured with a goniometer was within 3° of the unaffected extremity in 24 patients at final follow-up. In our series closed reduction and percutaneous pinning was successful in 84 percent of cases.



AFTER IMPLANT REMOVAL X-RAY FILMS



FLYNN'S CRITERIA(8).

Results/rating	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

AGE INCIDENCE

Age	No.Of Cases
5 - 6 Years	6
7- 8 Years	8
9-10 Years	6
11-12 Years	4

SEX INCIDENCE

Sex	No.Of.Cases
Male	16
Female	8

RESULTS OF CASES TRATED

Results	No.Of Cases	Percentage
Excellent	6	25
Good	14	58.33
Fair	4	16.66

COMPLICATIONS NOTED IN THIS SERIES :-

- Myositis ossificans seen in 2 cases
- Mild cubitus varus deformity seen in 2 cases.
- Pin tract infection (Superficial) in 4 cases .Treated conservatively.

DISCUSSION:-

Displaced supracondylar fracture is a common fracture seen in the pediatric population. Anatomical reduction and its maintenance is essential for obtaining good cosmetic results and functional recovery. Primary closed reduction and percutaneous pinning and open reduction and internal fixation by Kirschner wires. Infection and joint stiffness usually are the problems in open reduction(16). Hence closed reduction and percutaneous pinning is the preferred treatment in grade III displaced supracondylar fractures even in delayed presentation.

Percutaneous pinning after closed reduction of supracondylar fractures has got several advantages.

- Hospitalization is markedly reduced
- Carrying angle can be accurately assessed at surgery
- Pinning ensures the maintains the reduction
- The risk of developing the compartment syndrome is reduced by immobilizing the arm in fewer than 90 degrees of flexion which facilitates the venous drainage and reduced the swelling.

Swenson reported excellent results using crossed pin fixation, but others have suggested the pins placed from the lateral condyle in a parallel or crossed configuration to minimize the risk of iatrogenic ulnar nerve injury(18).Although injury to ulnar nerve from the medial pin is a major concern, especially when fracture is associated with swelling its incidence is estimated to be 2%–3%.Direct injury to ulnar nerve as well as delayed neuropathy possibly due to stretching of nerve over the medial pin is a known complication(11). Recent studies comparing the relative strength of fixation afforded by different configurations of pin placements have crossed medial and lateral pins to be the most stable configurations biomechanically:

The rate of conversion to open reduction has been reported in literature as ranging from less than 3% to up to 46%. Gupta et al(12) reported a 6% rate of open reduction when only Gartland type III fractures were considered with a delay of more than 12 hours. Mehlman et al(13) reported a conversion rate of 3% for delayed treatment group.

CONCLUSION:-

In conclusion, the results of the present study show that closed reduction and crossed pinning of displaced supracondylar fractures of humerus in children is a safe and effective method even with delayed presentation (9,14,15,17). Use of strict intraoperative criteria to obtain anatomic reduction and stable fixation minimizes the risk of development of cubitus varus deformity later(6). Mini-open technique for placement of medial pin in cases with severe swelling reduces risk of iatrogenic ulnar nerve injury.Closed reduction and percutaneous pinning reduces the incidence of cubitus varus deformity if the surgical technic is followed strictly.

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