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Clinical Evaluation of the Result of Dorgan's Lateral and Conventional Cross K-Wire Fixation in Supracondylar Fracture Humerus in Children-A Comparative Study.

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Abstrac*t: Supracondylar fracture is most common fracture in child around elbow.There are many techniques described in the literature.conventional cross k wire technique medial k- wire can damage ulnar nerve, due to confution to palpate medial epicondyle in swellencondition.Lateral retrograde k-wire (DORGAN technique) can prevent ulnar nerve indury.we treat 30 patents of supracondylar fracture with conventional cross k wire technique and DORGAN's lateral retrograde technique.we have done a comparative study.clinically no difference between these two,but DORGAN technique is easy and decrease chance of ulnar nerve injury,as well as give same biomechanical stability.*

Keyward:*supracondylarfracture,Dorgan'stechnique,ulnar nerve.*

I. Introduction

Supracondylarhumerusfractures(SHF) are among the most common fractures in children,and completely displaced fractures usually necessitate surgical treatment.(1)

Between the olecranonfossaposteriorly and the coronoidfossaanteriorly, the medial and lateral columns of the distal humerus are connected by a thin segment of bone, which makes this area especially vulnerable to fracture. The most commonly accepted treatment for the displacedSHF in children is closed reduction and percutaneouspin fixation.[3-5]Completely displaced fractures usually necessitate surgical treatment.Several pin fixation techniques have been described including crossed pins and lateral pins.[6,7]Biomechanical studies have shown that the maximumstability was provided by 2 crossed pins placed from the medial and lateral condyles.[8,9]

Although ulnar nerve injury upto 6% from use of a medial pin is common, and this possibility is most likely to occur when the medialepicondyle cannot be palpated in swollen elbows.[10]There are many technique for kirshner(k) wire fixation,

In supracodylarhumerus fracture among them conventional k wire fixation is most popular surgical method.Controversy exists about the optimal k wire configuration in displaced type II & III fracture. We are using a alternate method of fixation with very minimum complications.

In our study we compare the outcome of displacedsupracondylarfracturs fixed by conventional cross k wiretechnique in one group,and another group of patientsoperated by two cross k wire from lateral side.

The study was designed to also give us a chance to understand the distribution and epidemiology of these kind of fractures, during the progress of therapy by different modalities.

II. Meterial Method.

The study was conducted in IPGME & R KOLKATA. ORTHOPAEDICS dept over a period of one and half years from January 2013 to June 2014.

Patients Selection

Out of the 60 patient 26 patients fitted our criteria for study.

Inclusion Criteria

1. Supracondylar fracture of humerusgartland type II & III
2. Close fracture with out distal neuro vascular injury.
3. Fresh fracture with in 0ne week.

Exclusion Criteria

1. open fracture. 2.undisplace fracture.
3. associated with other serious co morbid condition.

III. Surgical Techniques

Every patient was thoroughly examined at the time ofadmission. The first step was to assess the vascular status of the limb. Once, the case was deemed to be without vascular deficit (defined as absent or feeble <50% of the volume on the other side), and then evaluation was done using other exclusion and inclusion criteria. The median (with anterior interosseus) radial and ulnar nerves were tested and the finding documented. The skin condition and the amount of swelling were assessed. Fractures classifications were done by radiographs. Check radiographs of the elbow were taken again if requiredin the anteroposterior and the true lateral planes if possible. The elbow was immobilized in a posterior long arm plaster of paris slab in the comfortable position of 50-60° of fl exion. Analgesics were given, and the arm elevated to decrease swelling. The main investigator would perform the randomization by drawing lots – odd numbers signify medial-lateral pin fixation while even numbers would be treated by two lateral pin fixations by Dorgan method.

Closed reduction is performed in stepwise manner with minor modification of Rang'stechnique[26]. Longitudinal traction is applied to the forearm while countertraction is applied to the proximal humerus. Posterior translation of the distal fragment may be corrected as the fragments disengage. An AP image is obtained at this point, and appropriate force is applied to the distral fragment to correct medial or lateral translation .

fig-1

fig-2

fig-3

fig-4

FIG-1- instrument needed for this operation.

Fig-2,3 –reduction method..fig-4—bluprint for conventional k wire fixation,and DORGAN'S lateral k wire technique.

fig-5

fig-6

fig-7

Fig-5- pre op fracture status.,fig-6 –k wire fixation method.fig-7 –post op reduction.

All patients were operated in supine position under general anesthesia within 48 h of admission. Tourniquet was not applied. The first reduction manoeuvre was performed with traction applied to the forearm with an assistant applying counter traction. First, the medial or lateral displacement of the fracture was corrected. After that rotational displacement was reduced with pronation and supination of the forearm. Final, fixation by smooth K-wire into the medial condyle from the lateral side. The medial condyle should not be penetratedto avoid ulnar nerve injury, but cortical involvement could be achieved (Figure 1). The principal is that the wires should cross above the fracture line. The similar way, conventionalmethod of cross fixation was done (Figure 2). Post-operative immediate neurological assessment for median, ulnar, and radial nerves, and anteroposterior and lateral X-rays were performed.The patients with iatrogenic ulnar nerve lesions in both groups were followed up without any treatment. The mean

hospitalization period was 1.7 days (range 1-5 days). We removed the cast K-wires after three weeks and started gentle active elbow exercises. At the last follow-up, we evaluate a range of motion and carrying angle by goniometer at both elbows. We evaluate the functional and cosmetic results
according to the criteria proposed by Flynn *et al*. (Table 1).

IV. Result And Analysis

Our study including 26 patients of closed supracondylarhumerusGartlandtypeII and III.tow of them were extentiontype.Study was conducted at IPGME&R KOLKATA. Patients range from 5 years to 12years.(avarage-7.51yrs).

The most frequent age group affected was 5-6 years.they were admitted and operated and folled up for period ranging from 13 months to 5 month avarage 8.35 months.

Clinical evaluation was based on modified Flynn's criteria.

Table 1: Modified Flynn's criteria to evaluateoutcome of treatmentOutcome Loss of elbow ROM (°) Loss of carrying angle (°)

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

Result of Dorgan's lateral k wire technique.

Results of conventional cross k wire technique.

For comperison of the result of both these procedures (conventional and DORGAN tech) we had to use universally accepted FLYNN'S CRITERIA , as well as with other published works..

To avoid statistical problem during comperison of these two group,we decide to make two group.. One with both EXCELLET &GOOD results.and another with FAIR &POOR results combined together.thus we could obtain a two by two contingency table and apply a statistical test to it.

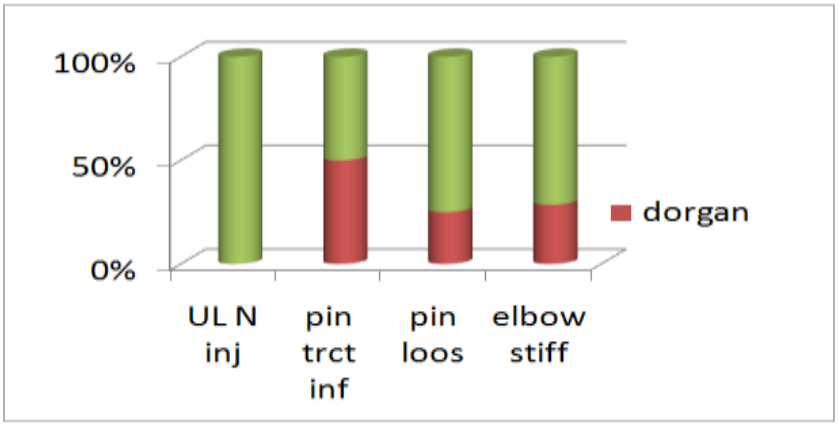
Since our sample size was small (26 cases only) and the chi-square test relies on a large sample approximation therfore,wepreffed to use

"FISHER'S EXACT TEST" as in situations where a large sample appoximation is inappropriate the ideal test to compare the results fairly was a fisher's exact test. Based on exact probabilities from a specific distribution.

When this data was applied and a exact test done the values we
Obtained were
The p- value for the same or a stronger association=0.4999999*

The p- value for the same or the reverse association=0.810869*
Two sided p –value (the sum of small p's) =0.99
since the two sides p-value was much
greater than **>0.05**

Complications



V. Discussion

There is a lack of uniformity of opinion concerning the ideal method of treatment of displaced supracondylar fractures in children. Several treatment modalities have been recommended.[13. 14].

Closed manipulation and percutaneous K-wire stabilization is the accepted, and most popular treatment of displaced supracondylar fractures of the humerus in children.[3-6,14])Biomechanical studies have demonstrated that crossed pin constructs are significantly more stable than lateralpin fixation alone.[2,9]).The cross-wire technique waspopularized in recent years by several authors.[11,14-16]

The torquerequired to produce lateral K-wires were comparable to cross-wires in extension, varus, valgus, and rotational loading, but were inferior in axial rotation testing. The 2-wire cross fixation is the most commonly used and good results have been reported, but injury of the ulnar nerve when inserting the medial wire has been documented ranging from 2-8%.[3-5,14]).When we compare our findings of iatrogenic ulnar nerve injury in 1 patients of group1, with none in group 2, we find that the most frequent problem faced while performing medial K- wire is iatrogenic ulnar nerve injury.[10,14,16,17]

However, we also found that the ulnar nerve remains safe when performing cross K-wire application laterally. Theoretically, the radial nerve could be injured during insertion of the more proximal wire. However, the radial nerve is situated anterior to the lateral intermuscular septum at this level, and can be avoided by entering the skin posterior to the midcoronal plane.14

VI. Conclusion

we conclude that while both closed reduction and percutaneous fixation techniquesprovide the best mechanical stability and good union rate, Dorgan's lateral cross-wiring technique has theadvantage of avoiding injury to the ulnar nerve. Further larger prospective series, with longer follow-up ismandatory to support these results.

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