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Efficacy Of Lateral Pinning And Crossed Pinning In The Management Of Displaced Supracondylar Fractures Of Humerus In Children -A Comparative Study

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Abstract
AIM:- To compare the efficacy of lateral pinning and crossed pinning in the management of displaced supracondylar fractures of humerus in children
METHODS:- Over a period of 2 years starting from June 2013 to June 2015, 50 cases of supracondylar fracture humerus were included in the study . 25 cases were treated by crossed pinning technique and other 25 by lateral pinning technique. The clinical outcome was measured by Flynn's criteria & loss of reduction by Skagg's criteria.
RESULT :-Using the Flynn's criteria , there were excellent functional results with less than 5 degree loss of range of motion in most children(96%). None had fair or poor results. The difference in functional outcome between two groups was not statistically significant(x2=0.837,p=0.386).
CONCLUSION:- We conclude that there is no significant difference between the stability provided by the medial and lateral pin fixation and two lateral pin fixation method.
Keywords – *Supracondylar fracture, pinning*

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I. Introduction

Supracondylar fracture of the humerus in children is one of the most common fracture seen in orthopaedic outpatient departments all over the world accounting for 50% to 70% of all the elbow fractures in children in the first decade of life[(1)]. Traditionally, this type of fracture is associated with high rate of malunion, nerve injury, and vascular complications. Current method of treatment of supracondylar fracture of humerus in children is based on Gartland classification. 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.[(2,3,4,5)] Various treatment options has been discovered for type III supracondylar fracture such as closed reduction and long arm cast or slab, Dunlop skin traction, olecranon traction, but all of these methods had significantly large complication rate[(1,2)]. The standard current treatment for displaced supracondylar fracture has been closed reduction and percutaneous pin fixation. This method has consistently given excellent results reported by various authors [(6,7,8,9,10,11)] . However, controversy persists regarding whether medial and lateral pin fixation or lateral pin fixation is the satisfactory technique in terms of stability and iatrogenic ulnar nerve injury(IUNI). Ideally medial and lateral pin fixation engage medial and lateral column at fracture site whereas the lateral pin stabilizes lateral and central column. Medial and lateral pin fixation has been presumed to be more stable but it can cause iatrogenic ulnar nerve injury.

II. Materials And Methods

This was a single site study, carried out at Jubilee Mission Medical College, Thrissur between June 2013 to June 2015 . Ethical clearance was obtained from the institute's ethical committee. Analysis in 25 children treated with lateral pinning and 25 children with cross pinning between June 2013 to June 2015 was done. There were 14 boys and 11 girls treated with lateral pinning. In cross pinning group, there were 8 boys and 17 girls. In both the groups there were no children with any preoperative neurological deficits. Open Fractures, Fractures that required open reduction, Previous lpsilateral elbow fracture and the presence of any concomitant fractures in the ipsilateral limb were excluded from the study. Immediately after the patients arrival to the hospital a detailed clinical examination including a thorough neurovascular assessment was carried out. Standard antero-posterior and lateral radiographs of the involved elbow were taken and the fracture type was

noted. The cases were treated on an emergency basis with closed reduction and percutaneous pinning, under the guidance of C-arm image intensifier after informed written consent. Maintenance of reduction was achieved by passing two crossed K-wires from both the medial and lateral epicondyles or by passing two K-wires from the lateral condyle in parallel or crossed fashion. Postoperatively, Limb was immobilized in posterior slab with elbow in 60-80 degree of flexion depending upon the swelling and neurovascular status. Active elbow exercises were started from fourth week as tolerated by the child. Passive motion and forceful manipulation were avoided. Follow-up was done regularly at six weeks, three months and end of six months. At the end of six months follow up, the clinical outcome was measured by Flynn's criteria & loss of reduction by Skagg's criteria.

III. Results

50 patients who were diagnosed with supracondylar fracture humerus , 25 in each group 14 boys and 11 girls treated with lateral pinning , 8 boys and 17 girls with crossed pinning were followed up. The peak incidence was in 6-7 years age group with an average age of 6.35 years. All surgeries were performed by a single surgeon, the senior most of the authors. In both techniques, there were excellent functional results (according to Flynn's criteria) with less than 5 degree loss of range of motion in most children (96%). None had fair or poor results. The difference in functional outcome between two groups was not statistically significant ($x2=0.837$, $p=0.386$). All fractures united well. In all the cases the Range of movement was comparable and was not statistically siginificant.

IV. Discussion

The aims in the management of the displacedsupracondylar fracture are to reduce and immobilize the fracture to reduce its morbidity; Closed Reduction and Percutaneous Pinning has consistently given good results compared to other methods of treatment. But the controversy persists in literature regarding optimal method of pin fixation. Swenson, Casiano and Flynn et al advocated the use of criss cross pinning[6,7] . Arino and skaggs et al used lateral pins. The goal of all forms of treatment is the same, to obtain and maintain an anatomic reduction of the distal humerus to minimize complications such as nerve injury, compartment syndrome, Volkmann ischaemic contracture, cubitus varus deformity and limitation of elbow movements. The advantage of using criss-cross pinning is to increase the stability of the fracture fixation thus decreasing the potential for loss of reduction, but simultaneously it carries increased risk of IUNI due to placement of the medial pin. Lateral pin configuration has the advantage of avoiding IUNI, but this construct has been thought to be biomechanically less stable. In our study, IUNI was 11%. In literature, Arino et al reported that it was almost 21%, ulnar nerve deficit.12 In other study it was found in 15% of patients who were treated with medial and lateral pin as per the report of Chai.13 Sankar et al studied the loss of pin fixation in supracondylar fractures.14 In all cases, loss of fixation was due to technical errors that were identifiable intraoperative fluroscopic images and that could have been prevented with proper technique. He identified three types of pin-fixation errors: (1) failure to engage both fragments with two pins or more, (2) failure to achieve bicortical fixation with two pins or more, and (3) failure to achieve adequate pin separation (>2 mm) at the fracture site. Skaggs et al showed failure of "lateral-entry pin fixation" technique is mainly due to technical errors. He suggested to maximize pin separation at the fracture site, to engage both columns proximal to the fracture, and to engage sufficient bone in both segments. He also suggested surgeons should have low threshold for using the third lateral pin. From this retrospective analysis, both fixation techniques were good in terms of stability, function and cosmetic outcome. The problem with cross pinning was Iatrogenic Ulnar Nerve Injury due to medial pinning. So lateral pinning is reliably safe method and provides adequate stability in displaced supracondylar fractures.

V. Conclusion

From this study we conclude that there is no significant difference between the stability provided by the medial and lateral pin fixation and two lateral pin fixation method. But the medial and lateral pin fixation group shows one (4%) cases of iatrogenic ulnar nerve injuries which is also shown by many other studies, although this not statistically significant, but clinically. Therefore, lateral pin fixation method for the treatment of type II and III supracondylar fracture is a reliably safe method to avoid iatrogenic ulnar nerve injury which also provides adequate stability if proper pin fixation principles are used.

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