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COMPARISON OF TWO METHODS OF PERCUTANEOUS PIN FIXATION IN DISPLACED SUPRACONDYLAR FRACTURES OF THE HUMERUS IN CHILDREN

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ABSTRACT... Objectives: : to compare the risk of nerve injury and stability provided by medial lateral and 2-lateral pin fixation in treatment of supracondylar fracture of humerus in children. **Study Design:** Randomized Control Trial. **Place and Duration:** study was conducted in the department of orthopaedic surgery, Nishter Hospital Multan from February 2017 to February 2018. **Methodology:** A total number of 180 patients included in this study and divided into two groups' by lottery method. Variables assessed in this study were loss of motion, loss of angle and neurological injury. Data was analyzed using SPSS version 23.Pa values ≤ 0.05 was considered as significant. **Results:** The mean carrying-angle loss (0), elbow extension loss (0), elbow flexion loss (0), Baumann angle loss (0) and MEE angle loss (0) of medial-lateral group was 3.59±1.71, 7.27±3.40, 9.68±1.69, 5.63±1.56 and 6.33±1.14 respectively. While, the mean carrying-angle loss (0), elbow extension loss (0), elbow flexion loss (0), Baumann angle loss (0) and MEE angle loss (0) of 2-lateral group was 3.97±2.01, 7.05±2.10, 10.58±2.86, 4.80±2.09 and 6.97 ±1.75 respectively. The differences were statistically insignificant. **Conclusion:** Our results revealed that both techniques medial lateral and two lateral pin fixations are equally effective; there was no statistically significant difference in terms of stability. Radial and ulnar nerve injury incidence was also similar with statistically insignificant results.

Keywords: Supracondylar fracture, Pin fixation, Nerve injury, carrying angle loss, Cracture.

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INTRODUCTION

Worldwide in pediatric orthopedic clinic most common type of fracture is supra condylar fracture of humerus1. Usually fracture of humerus occurs at supra condylar area or at the metaphysis of distal side. According to boyed and Altenberg2 supra condylar fracture accounts 64.5% fractures of upper limb. High incidence of malunion, vascular and nerve injury was deformity after managemt of this fracture and Arino et al3 reported this incidence 21%.

Chai et al4 conducted a prospective study on 54 patients and reported 15% iarogenic ulnar nerve injury. He managed these patients with medial lateral pin fixation. Most probably supra condylar fracture of humerus managed with closed method instead of open surgery unless fractures is complicated with vascular or nerve injuries which needs exploration of fracture site5. Recommended method is percutaneous pin fixation (varies according to the patient condition and fracture type). Pin fixation may be medial, lateral or medial and lateral both sided6,6,7. Casino et al and Swansea et al conducted two different studies on management of supra condylar fracture of humerus with pin fixation and describe 2 crossed pins fixation (one inserted medial and second laterally)8. Along with its benefit of good stability this method also carries risk of ulnar nerve damage which considered as strong morbidity9. Another study conducted by Arino et al3 on two pin fixations and recommended that two pins should be inserted crossed or parallel to the lateral condyle, through this Currently it is the matter of concern to fix supra condylar fracture in this manner that better stability can be achieved with minimum iarogenic nerve injury. In this trial we compare outcomes measures of two pins fixation, one in medial lateral side and second lateral parallel fixation.

METHODOLOGY

This randomized control trial was conducted on children with supra condylar fracture of humerus (Gartland type I and II) presented in the emergency department of Nishter Hospital Multan. Study was completed in one year duration from January 2017 to January 2018. Study was started after ethical approval from ethical board of institution and informed consent from patients and their guardians. Patients were divided into two groups, one group treated with two medial lateral pin fixation and second group treated with two lateral parallel pins fixation. Patients of age 1 to 12 years, both gender, fracture presented within three days of injury and no previous history of elbow or supra condylar fracture were included in the study.

Cases of fracture were seen in emergency department than orthopedic consultant was called for assessment of fracture any vascular or nerve injury. Radiological investigations were reviewed and all cases of study required wee admitted in ward. Skin traction was applied in full elbow extension. Patient was kept for NPO 6 hours before surgery. Fluid balance, hemoglobin level and other routine investigations were monitored regularly. Main researcher was performed randomization by lottery method. Surgery was performed on day of admission or on next day. Patients were operated under general anesthesia. Surgeon was a senior orthopedic surgeon having experience more than 5 years. Patient was placed in supine position and fractured arm up on side table. Injured arm was placed under image intensifier and arm was supported with plate of image intensifier. Closed reduction was done and confirmed with taking image on intensifier. On acceptable reduction arm and image intensifier was draped, arm was placed along with axilla. After shifting in ward vascular and neurological status was assessed. Patients were discharged from the ward on same or next day by one of the authors. All patients were asked for follow up in out patient department of hospital and plaster cast was removed after three weeks when evidence of callus formation was observed. Follow up was then asked 6 weekly and full observations for loss of motion and carrying angle was done on every follow up. Reduction loss was also observed. Cases with any type of complication were treated through another protocol and were not discharged till solution of problem. According to Flynn's criteria patients outcome was assessed on basis of carrying angle loss and loss of motion. In our set up we used modified second part of criteria that we observed flexion loss and extension loss. Data was entered and analyzed by using computer programe SPSS version 23. Mean and standard deviation were calculated for numerical data like age, hospital stay, degree of carrying angle loss, loss motion etc and frequency and percentages were calculated for qualitative data like gender. Student t test and chi square test was applied to see association between variables. P value 0.05 was taken as significant.

RESULTS

Seventy patients were included in this study. These patients were analyzed into two groups i.e. n=35 in medial-lateral group and n=35 in 2-lateral group. The distribution of injury to surgery (hours), carrying -angle loss (0), extension loss (0) and flexion loss (0) for both the groups were shown in table I. The differences were statistically insignificant. The mean carrying-angle loss (0), elbow extension loss (0), elbow flexion loss (0),Baumann angle loss (0) and MEE angle loss (0) of medial-lateral group was 3.59±1.71, 7.27±3.40, 9.68±1.69, 5.63±1.56 and 6.33 ±1.14 respectively. While, the mean carrying-angle loss (0), elbow extension loss (0), elbow flexion loss (0), Baumann angle loss (0) and MEE angle loss (0) of 2-lateral group was 3.97±2.01, 7.05±2.10, 10.58±2.86, 4.80±2.09 and 6.97±1.75 respectively. The differences were statistically insignificant. (Table II).

Table-I

Variable	Medial-Lateral n=35	2-lateral n=35	P-value
Injury to surgery (hours)			
0-23.9	n=8 (22.9%)	n=8 (22.9%)	0.566
24-47.9	n=21 (60%)	n=18 (51.4%)	
48-71.9	n=3 (8.6%)	n=7 (20%)	
≥72	n=3 (8.6%)	n=2 (5.7%)	
Carrying-angle loss (^{0})			
0-4.9	n=25 (71.4%)	n=23 (65.7%)	0.495
5-9.9	n=5 (14.3%)	n=4 (11.4%)	
10-14.9	n=3 (8.6%)	n=2 (5.7%)	
>15	n=2 (5.7%)	n=6 (17.1%)	
Extension loss (^{0})			
0-4.9	n=16 (45.7%)	n=21 (60%)	0.430
5-9.9	n=8 (22.9%)	n=6 (17.1%)	
10-14.9	n=4 (11.4%)	n=1 (2.9%)	
>15	n=7 (20%)	n=7 (20%)	
Flexion loss (^{0})			
0-4.9	n=11 (31.4%)	n=9 (25.7%)	0.352

Table-II

Variable	Medial-Lateral n=35	2-lateral n=35	P-value
Carrying-angle loss (^{0})	3.59±1.71	3.97±2.01	0.406
Elbow extension loss (^{0})	7.27±3.40	7.05±2.10	0.749
Elbow flexion loss (^{0})	9.68±1.69	10.58±2.86	0.116
Baumann angle loss (^{0})	5.63±1.56	4.80±2.09	0.063
MEE angle loss (^{0})	6.33±1.14	6.97±1.75	0.073

DISCUSSION:

Anwar W et al11 conducted a similar study and reported that both techniques have equal effectiveness. Medial lateral technique provides better stability but risk of ulnar nerve injury is more, on other hand lateral crossed pinning provides safety from neurological injury. Similar findings were reported by Bing C et al12 in his study conducted recently in 2017. In a study conducted by Foead A et al13 reported that both techniques were comparable in terms of stability, risk of nerve and vascular injury and bone union. His results shows that in terms of carrying angle loss and loss of motion 2 lateral pin fixation is better but these results were not significant. Similarly in terms of complication, ulnar and radial nerve injury medil lateral pin fixation is better but results again were not significant. This shows equal outcomes results in both groups. In our study carrying-angle of medial-lateral group was 3.59±1.71. The mean carrying-angle loss (0) of 2-lateral group was 3.97±2.01. The differences were statistically insignificant. Another study was conducted by Ramji Lal Sahu14 in 2013 and reported that lateral pinning of supra condylar fracture of humerus is a better alternative of crossed pin fixation with minimuim complications of ulnar and radial nerve injury. Lateral pinning also provides better stability of displaced supra condylar fracture site. This study is also comparable with our study in terms of complications and bone union. Another study was conducted by Kocher MS et al15 and reported that both techniques medial lateral pin fixation and lateral pin fixation were equally effective in terms of nerve injury and carrying angle loss. But he that study on patients who were presented with Gartland type III fracture instead only. His study is also comparable with our study results. In a study by Salok S et al16 also reported similar findings that that both techniques have same ratio of reoperation and neurological complications. He recommended that to reduce complication rate and experienced supervision is required. In a trial Tripuraneni KR et al17 a reported that while treating supra condylar fracture of humerus surgeon must consider medial and lateral pin fixation instead of both lateral pin fixation because it provides more stability. Better stability provides early bone union with minimum complications. In a study conducted by Gaston R et al18 and reported that there was no difference on radiographic outcomes in both techniques but ulnar nerve injury was observed in medial placement of pins. Result of these two studies comparable with our results. Maity A et al19 conducted a study in 2012 and reported that surgery should be performed in a standard environment and according to standard protocols than there was no significant difference among both groups of pin fixation in terms of safety and effectiveness. Similar findings were reported by Pavone V et al20 that both technique give equal satisfying results in terms of bone union and complications like ulnar and radial nerve injury.

CONCLUSION:

Our results revealed that both techniques medial lateral and two lateral pin fixations are equally effective; there was no statistically significant difference in terms of stability. Radial and ulnar nerve injury incidence was also similar with statistically insignificant results.

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