



SUPRACONDYLAR HUMERUS FRACTURES; COMPARISON OF LATERAL VERSUS POSTERIOR APPROACH IN THE MANAGEMENT OF SUPRACONDYLAR HUMERUS FRACTURES IN CHILDREN.

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ABSTRACT... Objectives: To compare lateral versus posterior approach in the management of supracondylar fractures of humerus in children in terms of functional outcome. **Study Design:** Retrospective Comparative study. **Place and Duration of Study:** Seven years from Oct 2009 to Oct 2016, at Combined Military Hospitals Kharian, Malir and Nowshera. **Patients and Methods:** All the children having supracondylar fracture (Gartland Type-II and III) who underwent surgical intervention either by posterior or lateral approach were included in the study. In Group-A children operated by posterior approach were placed while in Group-B children were operated by posterior approach. They were followed up in OPD after 6 months. The final functional and cosmetic outcome was assessed by using Flynn's criteria. Data was analysed by using SPSS version -20. A p-value of less than 0.05 was considered as statistically significant. **Results:** A total of 104 cases were operated during this study period. Fifty-four cases were done by posterior approach (Group-A), while 50 cases were operated by lateral approach (Group-B). In Group-A the mean age was 6.1 years while in Group-B, mean age was 6.6 years. In Group-A the male to female ratio was 72:28 while in Group-B it was 64:36. The mean weight in Group-A was 19.81Kgs (SD: ± 4.53) while in Group-B it was 20.44 Kgs (SD: ± 3.97). The mean operative time in Group-A was 36.30 minutes (SD: ± 3.32) and in Group-B it was 23.58 minutes (SD: ± 2.12). The functional outcome at six months follow-up was excellent in 35 (65%), good in 8 (15%), fair in 7 (13%) and poor in 4(7%) cases in Group-A while in Group-B it was excellent in 35 (70%), good in 10 (20%), fair in 4 (8%) and poor in only one case (2%). This difference was not significant at a p-value of 0.441. **Conclusion:** Though lateral approach required less operative time but there was no statistically significant difference from the posterior approach comparing the functional outcome in the management of paediatric supracondylar fractures of humerus.

Key words: Fracture, Humerus, Supracondylar fracture, Ulnar Neuritis.

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INTRODUCTION

Supracondylar fracture is defined as a break in the continuity of the distal humerus. The fracture line usually passes transversely through the coronoid and olecranon fossa. It is the commonest fracture of the paediatric age group.¹

The modified Gartland classification² is most commonly used to group these fractures based on the displacement at the fracture site. In Type-I fractures there is no displacement, in type-II fractures are displaced with intact posterior cortex and type-III are completely displaced fractures.³ These fractures are also classified as flexion and extension type based on the displacement

of the distal segment. Extension type is the commonest.⁴ These fractures, if not managed promptly may result in restricted movements at the elbow joint as well as elbow deformity. Gartland Type-I or undisplaced fractures can be managed conservatively in plaster of paris cast but the displaced fractures warrant surgical intervention.⁵ Minimally displaced fractures can be closely reduced and fixed percutaneously.⁶ However, when closed reduction is not possible in severely displaced fractures, open fractures or fractures with vascular injury, then open reduction is carried out.² The fracture site can either be approached through lateral, medial, or posterior side.⁷ Posterior approach is usually considered an

easier one but because of the risk of injury to the extensor mechanism of the elbow joint causing stiffness, it is not very much liked.⁸ Similarly it can cause osteonecrosis of the trochlea.⁹ Some authors, however, have stated that there was no significant difference in clinical results comparing both lateral and posterior approach.¹⁰

We searched pakmedinet the terms “supracondylar fracture humerus”, “lateral approach” and “posterior approach” and found three studies which compared percutaneous lateral pinning with cross-pinning but could not find any study on the comparison of surgical approaches. The aim of this retrospective study was to compare the clinical and functional results of posterior versus lateral approach in surgical treatment of pediatric supracondylar humerus fracture in our setup.

PATIENTS AND METHODS

This retrospective study was carried out over a period of seven years from Oct 2009 to Oct 2016, at Combined Military Hospitals Kharian, Malir and Nowshera. All the children having supracondylar fracture (Gartland Type-II and III) who underwent surgical intervention either by posterior or lateral approach were included in the study. Children who presented later than one week of injury, having osteogenesis imperfecta, on steroids and having multiple other injuries were excluded. All the children were admitted and written informed consent was obtained in all cases. Children were divided in two groups. In Group-A children operated by posterior approach were placed while in Group-B children were operated by anterior approach. All cases were operated by the same surgeon. In posterior approach group, a midline posterior incision was made while the child was in lateral decubitus position. The triceps was either split longitudinally or a u-shaped tongue of aponeurosis was raised to approach the fracture site directly. The ulnar nerve was identified and secured in all cases. The fracture was reduced and fixed with two crossed pins. The wound was closed in layers over a suction drain. In the lateral approach an incision was made centred on the lateral epicondyle while the child was in supine position. A window was created between

the triceps and brachioradialis to approach the fracture site. After reduction of the fracture two parallel pins were passed in the lateral column. The operative time was noted in both the groups. Wound closure and post-operative care was similar in both the group. Drain was removed after 24 hours. Patients were reviewed on 10th post operative day for removal of sutures and the followed up in OPD at 3 months as well as 6 months. The final functional and cosmetic outcome was assessed by using Flynn's criteria¹¹ (Table-I). All the data including patient's demographics were entered in a Performa. Data analysis was done by using Statistical Package for Social Sciences (SPSS)-20. Mean and standard deviations were calculated for quantitative variables like weight and age and frequencies were calculated for qualitative variables like sex. Stratification was done in both groups for weight and sex and p-value was calculated. Chi-square test was used to compare the final outcome at 6 months. Independent samples t-test was used to compare the mean operative time in both groups. A p-value of <0.05 was considered as significant.

RESULTS

A total of 104 cases were operated during this study period. Fifty-four cases were done by posterior approach (Group-A), while 50 cases were operated by lateral approach (Group-B). In Group-A the mean age was 6.1 years (Range: 3-12 years and SD \pm 2.16) while in Group-B mean age was 6.6 years (Range: 4-14 and SD \pm 2.09). In Group-A the male to female ratio was 72:28 while in Group-B it was 64:36. The mean weight in Group-A was 19.81Kgs (SD: \pm 4.53) while in Group-B it was 20.44Kgs (SD: \pm 3.97). Post stratification p-value was insignificant (0.45) as shown in Table-II. The mean operative time in group-A was 36.30 minutes (SD: \pm 3.32) and in Group-B it was 23.58 minutes (SD: \pm 2.12). This was statistically significant as shown in Table-III. None of the patients had delayed union or non-union. The functional outcome was excellent in 35 (65%), good in 8 (15%), fair in 7 (13%) and poor in 4 (7%) cases in Group-A while in Group-B it was excellent in 35

(70%), good in 10 (20%), fair in 4 (8%) and poor in

only one case (2%). The comparison of functional outcome at 6 months is shown in Table-IV. The chi-square statistic was 2.609 and p-value was

0.441. It was not statistically significant. There was only one case of ulnar neuritis in Group-A.

Rating	Loss of motion (°)	Carrying angle (°)
Excellent	0- 5	0 - 5
Good	5 - 10	5 - 10
Fair	10- 15	10- 15
Poor	>15	>15

Table-I. Flynn’s criteria of functional and cosmetic outcome

Independent Samples t-test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Weight	Equal variances assumed	1.080	.301	-.747	102	.457	-.62719	.83923	-2.29179	1.03742
	Equal variances not assumed			-.751	101.706	.454	-.62719	.83497	-2.28340	1.02903

Table-II. Comparison of weight

Independent Samples t-Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Operation Time	Equal variances assumed	10.596	.002	23.029	102	.000	12.716	.552	11.621	13.812
	Equal variances not assumed			23.410	90.761	.000	12.716	.543	11.637	13.795

Table-III. Comparison of operation time

Outcome	Excellent	Good	Fair	Poor	
Group-A	35(65%)	8(15%)	7(13%)	4(7%)	54
Group-B	35(70%)	10(20%)	4(8%)	1(2%)	50
Marginal					104
Column	70	18	11	5	(Grand Total)
Total					

Table-IV. Comparison of functional cosmetic outcome
The chi-square statistic is 2.6

DISCUSSION

The optimum management of the displaced paediatric supracondylar fractures of humerus includes closed reduction with percutaneous pinning or open reduction with internal fixation.¹² An early intervention within the first eight hours is of paramount importance in order to minimize the chances of increased oedema, nerve injury, compartment syndrome and sepsis.⁸

Traditionally the fracture site has been approached through either posterior, anteromedial and lateral approaches. The lateral and posterior approaches are the most frequently used. The proponents of posterior approach argue that good reduction of the fracture site is easily achieved in the posterior approach as compared to lateral approach where only one cortex is exposed.¹³ On the other hand the advocates of the lateral approach claim that there is injury to the extensor mechanism of the elbow joint in the posterior approach so the long term functional outcome may not be very good. Similarly, there is risk of ulnar nerve injury as well.¹⁴ Rose and Phillips have documented 10 cases of ulnar nerve palsies out of 141 supracondylar fractures which were done by the posterior approach.¹⁵ On the other hand some surgeons like Reitman and Waters have achieved excellent results with posterior approach.¹⁶ Similarly, Gennari et al¹⁷ have reported excellent results in 87% cases employing the anterior approach.

Our study can be compared to that of Ensafdran A et al¹⁸ as far as only the results in posterior approach are concerned. However, when they compared the outcome with the lateral approach the difference was clinically significant in contrast to our findings. They concluded that lateral is better approach as compared to posterior approach in terms of functional outcome. One possible reason could be their small sample size of 20 cases in each group.

Our results are similar to the study of Faik T et al¹⁹ who compared both these approaches for functional and cosmetic outcome based on Flynn's criteria. However, they studied 30 patients in posterior approach group while only 8 cases in the lateral approach group. But still they

were able to compare the groups statistically and concluded that posterior approach is comparable to lateral approach in terms of functional outcome. Moreover, in contrast to our findings, the operating time was less for posterior approach in their study. It was because they did not search for the ulnar nerve but we secured it in all cases in the posterior approach.

A systematic review of various approaches used for treatment of supracondylar fractures in children by MP Juan et al²⁰ has concluded that a combined antero-medial approach could achieve better functional and cosmetic outcome based on Flynn's criteria. Our studies had limitations too; we could not compare the angles like Bowmann's angle etc along with Flynn's criteria. Similarly, it was a retrospective analysis and the decision of surgical approach was solely dependent on the surgeon's choice.

CONCLUSION

Though lateral approach required less operative time but there was no statistically significant difference from the posterior approach comparing the functional outcome in the management of paediatric supracondylar fractures of humerus. However, we suggest that this decision shall be based on the surgeon's experience and the anatomy of the fracture site.

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2	Asrar Ahmad	Data analysis.	
3	Irum Saleem	Literature search	
4	Maheen Orfi	Referencing	