Outcome of Supracondylar Fractures of Humerus in children treated with Dorgan's Surgical Technique.

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ABSTRACT

Objective: To determine the functional and radiological outcome of supracondylar fractures humerus in children treated with Dorgan's lateral cross pinning technique.

Methods: This descriptive study was carried out at Orthopaedic division Lady Reading Hospital Peshawar and Rahman medical and surgical center Buner Khyber Pakhtunkhwa Pakistan from 2nd June 2017 to 20th June 2019. All children with supracondylar fracture humerus meeting the inclusion criteria were fixed with Dorgan's lateral k wires stabilization technique. Post operative outcome was assessed with X rays for union/malunion and functionally with Flynn's criteria and graded as excellent, good, fair and poor.

Results: A total of 30 children with mean age 4.90 ± 2.48 years were included in our study. Boys were 20(66.7%) and girls 10(33.3%). There were 11 (36.7%) Gartland type II and 19 (63.3%) Gartland type III fractures.Post operatively radiological union was achieved in all patients. Excellent results were achieved in 22(73.3%), good in 5(16.6%) and fair in 3(10%) patients. No ulnar nerve or radial nerve injury was noted.

Conclusion: Excellent and good functional and radiological results were achieved with Dorgan's lateral cross pinning technique. We recommend this technique as first line treatment option to stabilize supracondylar humerus fractures in children.

Key words: Dorgan's technique, Flynn's criteria, Supracondylar fracture, Ulnar nerve

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INTRODUCTION

Paediatric supracondylar humerus fractures are the most common fractures accounting for about 80% of elbow fractures.[1,2] Un displaced fractures are treated conservatively with immobilization while displaced fractures are treated with percutaneous or open k wire fixation.[3]

Various techniques of k wire fixation have been described in literature[4-6] and each technique has merits and demerits. Due to iatrogenic ulnar nerve injury in 2 to 8% cases with medial k wire fixation,[7] two k wires from lateral column has been used with good results.[8] Dorgan's lateral cross k wire fixation technique is in use since 1994. It not only avoids ulnar nerve injury but biomechanically found to reduce the rotation torque by 37% as compared to medial and lateral cross k wire fixation.[4,9,10]

In our center there is no uniform standard protocol for the treatment of paediatric supracondylar humerus fractures. Supracondylar fractures are managed according to the individual surgeon preferences usually with cross pinning from lateral and medial condyles Complications with this commonly used method particularly iatrogenic ulnar nerve damage compelled us to do this study on relatively easy and safe Dorgan's lateral cross pinning technique.

The objective of our study was to determine the functional and radiological outcome of supracondylar fracture humerus in children treated with Dorgan's lateral cross pinning technique. The results of our

study would help us to adopt this technique as the only first line surgical technique to stabilize supracondylar fractures humerus in children in our center.

METHODS

We conducted this descriptive study at Orthopaedic division Lady Reading Hospital Peshawar and Rahman medical and surgical center Buner Khyber Pakhtunkhwa Pakistan from 2nd June 2017 to 20th June 2019. Children of either gender with displaced supracondylar fractures (Gartland type II and III) presenting within three days to Accident and Emergency or Out Patient Department were included in our study. Patients with open fractures, associated vascular injuries and poly trauma children requiring surgical intervention were excluded. The study was approved by Ethical Review Board and informed consent was taken from parents of all the children. In the included children history, clinical examination, relevant xrays and laboratory tests were done and children were prepared for surgery.

Operative procedure

All the children were operated under general anaesthesia on radiolucent table and under image intensifier. The affected upper limb was scrubbed and draped. The fracture was closely reduced with traction and manipulation by the surgeon and counter traction by an assistant and confirming the reduction in image intensifier. The hand was pronated and elbow fully flexed to maintain fracture reduction. Once fracture reduction was confirmed in AP and Lateral views in image intensifier, k wires were passed with Dorgan's technique.[10,11] In this technique one k wire of 1.5-2mm was passed from lateral condyle through the fracture into medial cortex of humerus. The second k wire of similar diameter was passed proximal to fracture from lateral cortex in antegrade fashion into the medial condyle but without penetrating the medial condyle cortex. Both the k wires crossed one another above the fracture line(Fig I).[11] The K wires were cut, bend and buried under the skin. An above elbow cast was given. Post operatively neurovascular status was documented. Check x ray was done in the evening and patients were discharged home next morning. Patients were followed weekly till 4th week when k wires were removed and then monthly for next 6 months. At final visit radiological union/malunion was assessed with x ray elbow AP and lateral view and functional outcome was assessed with Flynn's criteria[5] and graded as excellent, good, fair and poor.

The data was analysed with SPSS version 20. Important quantitative variables like age was presented as mean and standard deviation while qualitative variables like gender and side of fracture was presented as frequencies and percentages. Data presented in graphic form where necessary.

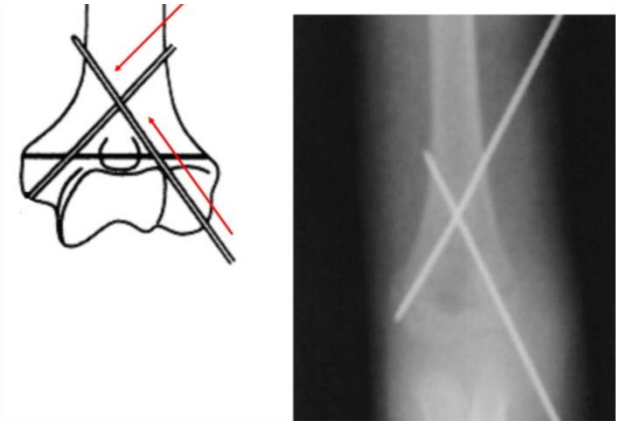
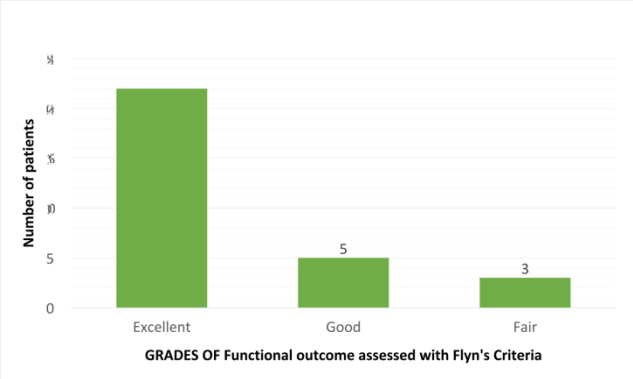


Fig I: Dorgan's technique of stabilizing supracondylar fracture humerus in children

RESULTS

The total number of patients in our study was 30. The mean age of our study participants were 4.90 ± 2.48 years(range 3 to 11 years). Male children were 20(66.7%) and girls were 10(33.3%). There were 11 (36.7%) Gartland type II and 19 (63.3%), Gartland type III fractures. Right sided fracture was present in 21(70%) and left in 9(30%) patients.



Graph I: showing functional outcome of our study participants.

Post operatively radiological union was achieved in all patients. Excellent results were achieved in 22(73.3%), good in 5(16.6%) and fair in 3(10%) patients as assessed with Flynn's criteria(graph I) No poor results documented. All patients of fair results had Gartland type III fractures. No statistically

significant difference was found between the outcome of male and female children(p value ≥ 0.05).No major complication noted. Superficial pin tract infection was noted in 6(20%) patients and deep in 4(13.3%) and resolved with k local wound care, antibiotics and k wire removal. No neurovascular injury was noted.

DISCUSSION

Paediatric supracondylar humerus fractures can be treated in plaster cast, closed reduction and percutaneous k wire fixation and open reduction and internal stabilization with k wires.[8,12-16]

No consensus has yet been achieved regarding the optimal number and configuration of k wires for stabilizing supracondylar fractures in children. Danielson [15] experimented the use of a single k wire for fixing supracondylar humerus fractures in children but results were not encouraging as loss of reduction was the major complication. Swenson[3], Flyn[4],and Nacht[5] favored cross k wires from lateral and medial condyles and reported good results but iatrogenic ulnar nerve injury had been reported from k wire inserted from medial condyle.[6,7]

In our study we treated 30 children with Dorgan's technique and achieved excellent results in 73.3% good in 16.6% and fair in 10% patients. El-Adl and colleagues[17] treated 72 children with Dorgan's technique and achieved satisfactory functional results in all patients, cosmetically satisfactory results in 91.4% children and unsatisfactory results in 8.6%.No ulnar nerve or radial nerve injury was documented in their study. A comparative study by Memisoglu[18] on 75 patients(group I, k wires fixation with Dorgan's technique) and 64 patients(group II, crossed k wires from medial and lateral condyle) reported no statistical difference between the outcome as assessed with Flyn's criteria. However, no ulnar nerve injury was noted in group I while 6(9%) patients in group II had ulnar nerve damage.

Another study conducted by Altay and Erturk[11] compared 25 patients of supracondylar fracture humerus treated with crossed k wires inserted from lateral and medial condyle with 26 patients treated with Dorgan's technique. Post operatively satisfactory outcome was noted in 96% patients fixed with k wires from lateral and medial condyles and 100% in patients treated with Dorgan's technique. No ulnar nerve injury was noted in Dorgan's technique while the other group had 8% iatrogenic ulnar nerve damage.

In our study no major complication had been reported. We noted superficial pin tract infection in 6(20%) patients and deep in 4(13.3%) but all resolved with local wound care, antibiotics and k wire removal. This strengthened our belief that Dorgan's technique is a safe surgical approach. Variable pin tract infection rate associated with Dorgan's technique has been reported in literature. Alty[11] noted pin tract infection in 7.8% of his patients. El-Adl[17] reported 8.6% superficial and 2.8% deep pin tract infection in his study.Quellay[19] reported 7% pin tract infection in his study.

One limitation of our study was the design of our study(descriptive).A comparative study would have been more useful on this topic. Because of our strict inclusion criteria our sample size was small. We therefore recommend further studies with larger sample size.

CONCLUSION

Excellent and good functional and radiological results were achieved with Dorgan's lateral cross pinning technique. No iatrogenic ulnar or radial nerve damage was noted in our study. We recommend this technique as first line treatment option to stabilize supracondylar humerus fractures in children.

Conflicts of Interests: None
Grants/Funding: None

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