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USE OF POSTERIOR TRICEPS SPLITTING APPROACH IN COMPARISON WITH LATERAL APPROACH FOR OPEN REDUCTION OF PAEDIATRIC SUPRACONDYLAR FRACTURES OF HUMERUS

Orthopaedics

John Mohd Department of Orthopaedics GMC Jammu, J&K India

Zubair A. Lone* Department of Orthopaedics GMC Jammu, J&K India *Corresponding Author

ABSTRACT

Supracondylar farctures of the humerus are one of most frequently encountered entities in orthopaedic practice. A multitude of the classification systems have been propounded time to time, although Modified Gartland is the most widely used world wide. Gartland type I fractures (undisplaced) are managed conservatively, while as for displaced fractures closed reduction and percutanous pinning (CRPP) is the accepted gold standard. However, there are many instances in which open reduction remains to be the only option available to fix these fractures. In our study, we compared the results of a posterior triceps splitting approach with a lateral approach in open reduction and fixation of these fractures. According to the inclusion and exclusion criteria, we selected 57 patients, which were divided into two groups: Group 1 (n=45) in which posterior triceps splitting approach was used and Group 2 (n=12) in which lateral approach was used. Flynn criteria was used for outcome analysis. The mean fracture union time in Group 1 and Group 2 was 45.3 days and 46.4 days, respectively (P Value < 0.05). Patient or parent satisfaction in Group 1 was 72% while as it was 74% in group 2 (P value < 0.05). Time taken to return to near complete range of motion was 58.5 days in Group 1 and 58.9 days in group 2 (P Value < 0.05). Hence, we conclude that for displaced supracondylar fractures of humerus, when open reduction is inevitable, use of posterior triceps splitting approach is a safe method with results comparable to the lateral approach.

KEYWORDS

Supracondylar fracture humerus, posterior approach, lateral approach

Introduction

Supracondylar farctures of the humerus are one of most frequently encountered entities in orthopaedic practice.[1,2,3] A multitude of the classification systems have been propounded from time to time, although Modified Gartland classification is the most widely used world wide. Gartland type 1 fractures (undisplaced) are managed conservatively, while as for displaced fractures closed reduction and percutanous pinning (CRPP) is the accepted gold standard.[4] However, there are few instances in which open reduction remains to be the only option available to fix these fractures, which include failed closed reduction, soft tissue entrapment, severely displaced fracture, very edematous elbow, open fracture, or neurovascular injury.[5,6,7] Posterior approach has both advantages and disadvantages. It is technically an easy approach but the complications associated including stiffness have been encountered.[8,9] Although, few authors are of the opinion that there is no significant difference in the results.[10] In our study we compared the results of the posterior triceps splitting approach with lateral approach for open reduction of paediatric supracondylar fractures of the humerus.

Materials and methods

We conducted a prospective, observational, comparative study from June, 2017 to December, 2018 at our institution. All displaced supracondylar fractures, of either sex, aged < 12 years and managed with open reduction and internal fixation using either posterior of lateral approach, were included in our study. Patients with undisplaced fractures, successful closed reduction with pinning, open fractures, associated neurovascular injury or aged 12 years or more were excluded from our study.

We included 57 cases of paediatric supracondylar fractures of the humerus according to the inclusion and exclusion criteria. The patients were segregated into two groups: Group 1 (n=45) included the patients operated using posterior triceps splitting approach and Group 2 (n=12) included those operated using lateral approach. The patients were chosen from among those attending the Orthopaedic emergency department of our hospital.

Thorough examination was done to rule out any associated injuries. Initial splintage was done in the emergency and adequate analgesia provided. Lateral and anteroposterior radiographs were obtained. **(Figure 1 & 2)** The patients were operated within 24 to 48 hours of admission.

Figure 1: Pre-operative X Ray (Lateral view)

Figure 2: Pre-operative X Ray (AP View)

Surgery was performed under general anaesthesia. In posterior approach, a midline longitudinal skin incision was made starting just proximal to the tip of the olecranon. Triceps fascia was cut followed by a midline split of the triceps muscle. The bone was adequately exposed and direct reduction followed by fixation using K wires was done. Triceps muscle and its fascia were repaired using interrupted absorbable sutures followed by skin closure. In a lateral approach skin incision was made over the lateral bony prominence and fracture exposed. Indirect reduction of the fracture was performed followed by fixation using K wires. Soft tissue was closed back in layers.

The patients were put in a long arm back slab post operatively for a period of 4 weeks.Post-operative radiographs were done to check the fixation. **(Figure 3 & 4)** Antiseptic dressings were done at 2nd and 7th post operative days. The sutures were removed at 2 weeks post operatively.

Figure 3: Post-operative X Ray (Lateral view)

Figure 4: Post-operative X Ray (AP View)

K wires were removed at 3 weeks post operatively and the back slab was left in place for 4 weeks. Assisted range of motion was started at 3 weeks post operatively. The parents were instructed to remove the back slab once in a day to allow range of motion.

The patients were followed up at 1 month, 3 months and 6 months after surgery. At every follow up the bone healing, functional results and complications were studied. Flynn criteria were used to study the outcome. Patients and parents were asked for the overall satisfaction.

Results

We included 57 cases of paediatric supracondylar fractures of the humerus aged < 12 years. The patients were segregated into two groups: Group 1 (n=45) included the patients operated using posterior triceps splitting approach and Group 2 (n=12) included those operated using lateral approach. The mean fracture union time in Group 1 and Group 2 was 45.3 days and 46.4 days, respectively (P Value < 0.05). Patient or parent satisfaction in Group 1 was 72% while as it was 74% in group 2 (P value < 0.05). Time taken to return to near complete range of motion was 58.5 days in Group 1 and 58.9 days in group 2 (P Value < 0.05). The only post-operative complication encountered was pin site infection which occurred among 4 patients and was managed with anti-septic dressings and antibiotics. (Table 1)

Table 1: Results

	Group 1 (n=45)	Group 2 (n=12)	P Value
Mean fracture union time	45.3 days	46.4 days	< 0.05
Patient/Parent satisfaction	72%	74%	< 0.05
Return to near complete range of motion	58.5 days	58.9 days	< 0.05

Discussion

Closed reduction and percutaneous pinning is the accepted gold standard for displaced supracondylar fractures of humerus in children. In cases of failed closed reduction various surgical techniques for open reduction have been described. Open reduction, in such cases, helps achieve anatomical reduction and a stable fixation. The various approaches used for internal fixation include lateral, anterior or posterior approach. Lateral approach is used widely but the associated unsatisfactory reduction is frequent. There is scarcity of literature on the use of posterior approach. In or study we included 57 cases of paediatric supracondylar fractures of the humerus aged < 12 years. The patients were segregated into two groups: Group 1 (n=45) included the patients operated using posterior triceps splitting approach and Group 2 (n=12) included those operated using lateral approach. In posterior approach, a midline longitudinal skin incision was made starting just proximal to the tip of the olecranon. Triceps fascia was cut followed by a midline split of the triceps muscle. The bone was adequately exposed and direct reduction followed by fixation using K wires was done. Triceps muscle and its fascia were repaired using interrupted absorbable sutures followed by skin closure. In a lateral approach skin incision was made over the lateral bony prominence and fracture exposed. Indirect reduction of the fracture was performed followed by fixation using K wires. Soft tissue was closed back in layers. The patients were put in a long arm back slab post operatively for a period of 4 weeks.

The mean fracture union time in Group 1 and Group 2 was 45.3 days and 46.4 days, respectively (P Value < 0.05). Patient or parent satisfaction in Group 1 was 72% while as it was 74% in group 2 (P value < 0.05). Time taken to return to near complete range of motion was 58.5 days in Group 1 and 58.9 days in group 2 (P Value < 0.05). The only post-operative complication encountered was pin site infection which occurred among 4 patients and was managed with anti-septic dressings and antibiotics. The difference between the outcome of the two groups was not significant.

Conclusion

We conclude that for displaced supracondylar fractures of humerus, when open reduction is inevitable, use of posterior triceps splitting approach is a safe method with results comparable to the lateral approach.

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