

Outcome of Close reduction and K Wire Fixation in Patients with Supracondylar humerus fracture presenting late

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Abstract

Background: 36 patients of supracondylar humerus were treated by closed reduction and cross K wire fixation. Fifteen patients had Gartland type II injuries and Twenty-one patients with Gartland type III fracture displacement. There were 28 boys and 08 girls. The average age was 8 years (2–14 years) and the average time of presentation was 30 h (3–96 hour). Patients were followed up on 1st week and 3rd week and then every 2nd week till fully functional recovery achieved. The mean immobilisation time in the present study was 4.5 weeks (3–5) weeks. The mean follow-up period was 7.4 weeks (5–20). Outcome was assessed using clinically and radiologically. According to Flynn's criteria used for assessment of result, all patients had satisfactory results. One patient had ulnar nerve palsy after operation. Closed reduction and cross k wire fixation for supracondylar humerus fracture is a safe, closed procedure with satisfactory outcome.

Methods: During the period from 2014 to 2016, 40 cases of supracondylar fracture of the humerus with late presentation were treated at our institute. Inclusion criteria was Gartland type 2 and 3 fractures, duration of injury 5 – 15 days, Exclusion criteria were open fractures, fractures that required open reduction, neurological or vascular injuries found on presentation, previous ipsilateral elbow fracture, presence of any concomitant fractures in the ipsilateral limb and loss to follow-up. We reviewed preoperative clinical examinations, time from injury to surgery, operative notes, postoperative evaluations, duration of immobilisation, time of pin removal, presence of complications, need for further surgery and clinical assessment at final follow-up visit

Results: Sixteen patients with Gartland grade II and twenty four patients with grade III fracture managed with close reduction fixation with K wire were included in the study. The average time of presentation was 7.6 days (range 5 – 15 days). The mean follow-up period was 7.4 (5–20) weeks. Based on Flynn's criteria, 34 patients (95%) had excellent outcome.

Conclusion: Closed reduction with percutaneous pin fixation is viable option for displaced supracondylar fractures of the humerus with late presentation.

Keywords: Close pinning, supracondylar humerus late presentation, flynn's criteria.

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Introduction

Supracondylar fractures are the commonest fractures around the elbow in children. Conservative management is recommended

for undisplaced fractures but conservative management of the severely displaced supracondylar fracture is associated with an unacceptable cubitus Varus deformity.

Closed reduction and percutaneous pin fixation provides the best cosmetic and functional outcome and overcome the problem of malunion and deformity. Closed reduction with percutaneous pin fixation has

become the treatment of choice for displaced supracondylar fractures of the humerus in children [1]. Complications includes ulnar nerve injury, redisplacement and malunion but are rare and can be avoided by correct technique. It is not uncommon to encounter patients with supracondylar humerus presenting late in this part of the world. In patients presenting later than 2 weeks accepting the deformity and planning corrective osteotomy later is usually followed. However, in patients presenting within two weeks the dilemma still exists to go for close or open reduction with K wire fixation. However, some fractures are irreducible by closed means Open reduction is recommended for their reduction. In this study we have discussed supracondylar humerus fractures in paediatric age group presenting late treated with closed reduction and percutaneous pinning.

Materials and Methods

During the period from 2014 to 2016, 40 cases of supracondylar fracture of the humerus with late presentation were treated at our institute. Inclusion criteria was Gartland type 2 and 3 fractures, duration of injury 5 – 15 days, Exclusion criteria were open fractures, fractures that required open reduction, neurological or vascular injuries found on presentation, previous ipsilateral elbow fracture, presence of any concomitant fractures in the ipsilateral limb and loss to follow-up...

We reviewed preoperative clinical examinations, time from injury to surgery, operative notes, postoperative evaluations, duration of immobilisation, time of pin

removal, presence of complications, need for further surgery and clinical assessment at final follow-up visit.

All patients underwent closed reduction and percutaneous pinning. Lateral pin was inserted without any incision and medial pin was inserted after giving 0.5- 1 cm incision and gentle soft tissue retraction. The surgeon selected the pin size to be used according to the age of the child and the size of the arm (usually 1.6 mm for younger children and 1.8–2.0 mm for older children). Reduction and fracture stability was assessed intraoperatively in both anteroposterior and lateral planes with the image intensifier. The pin ends were bent outside the skin, and a long arm posterior slab was applied with approximately 90 degree of elbow flexion and neutral forearm rotation. The children were discharged home when comfortable (usually after 1–2 days) and were seen in the clinic one week after surgery. Radiographs were obtained in both anteroposterior and lateral planes. Patients were followed up at regular intervals, pins were removed after healing and physiotherapy begun. Postoperative radiographs were examined to determine Baumann's angle, humerocapitellar angle and lateral rotational percentage (the percentage of displacement of the proximal humeral metaphysis at the fracture site in relation to the width of the distal humerus just distal to the fracture site as measured on the lateral radiograph) were assessed [2,3]. The clinical and radiological assessments were reviewed at the final visit. Clinical assessment included range of motion, carrying angle, neurological and vascular examination, return to full function and need for reoperation. Radiological assessment was made by comparing Baumann's angle. A change in Baumann's angle of more than 12° was defined as a major loss of reduction; a change from 6° to 12° as mild displacement; and a change of less than 6° as no displacement In the initial

postoperative and final follow-up radiographs [4]. Outcome was graded according to Flynn's criteria [5].

Results

Sixteen patients with Gartland grade II and twenty four patients with grade III fracture managed with close reduction fixation with K wire were included in the study. Out of these 40 patients, 2 patients of Gartland type 3 injury required open reduction. 2 patients (1 Gartland type 2 and 1 Gartland type 3) lost to follow up so total 36 patients (21 Gartland type 3 and 15 Gartland type 2) considered for final evaluation.

There were 28 boys and 08 girls. The average age was 8 years (2–12 years) and

the average time of presentation was 7.6 days (range 5 – 15 days). The mean follow-up period was 7.4 (5–20) weeks.

The displacement was postero-medial in 22 patients, posterior in 10 and postero-lateral in four patients. Post-operatively one child had ulnar nerve palsy which recovered within 2 months of surgery. There were no cases of deep infection. The range of movement was restricted in two patients, both had extension lag of 10° which was regained by formal physiotherapy. No case of cubitus varus was seen. results of treatment based on Flynn's criteria are depicted in table 4. According to these criteria, 34 patients (95%) had excellent outcome.

TABLE-1 : Distribution of respondents by Baumann angle size

Baumann's angle	No of patients	Percentage
<65	00	0%
65-70	01	2.78%
70-75	25	69.44%
75-80	08	22.22%
>80	02	5.56%

TABLE-2 : Distribution of respondents by Humerocaptellar angle

Humerocaptellar angle	No of patients	Percentage
<25	00	0%
25-30	02	5.56%
30-35	14	38.89%
35-40	19	52.78%
>40	01	2.78%

TABLE-3 : Flynn's criteria for grading of outcome

Result	Rating	Cosmetic factor loss of carrying angle ($^{\circ}$)	Functional factor loss of motion ($^{\circ}$)	No of patients
Satisfactory	Excellent	0–5	0–5	34
	Good	6–10	6–10	2
	Fair	11–15	11–15	0
Unsatisfactory	Poor	>15	>15	0

There was lateral rotation of 10° seen in one patient in post-operative radiograph. 33 patients had Baumann's angle between 70° - 80° (mean 73.5°). 30 patients had humerocapitellar angle between 30° - 40° . Among all the children treated with

percutaneous pinning only one patient had deformity which was evident by decrease in carrying angle (5°)

Discussion

In our study of 36 patients of supracondylar humerus fracture with late presentation treated with closed reduction and percutaneous k wire fixation, we found all patients had satisfactory results including 34 patients had excellent results as evaluated by flynn's criteria.

Pirone et al. reviewed 230 patients of supracondylar humerus in pediatric age group and found that The highest percentages of excellent results were achieved by percutaneous Kirschner-wire fixation (78%), Closed reduction and application of a cast was associated with a significantly lower percentage of early and late complications, including Volkmann ischemic contracture and cubitus varus. So he advocated Percutaneous Kirschner-wire fixation as the method of choice for the majority of displaced fractures [6].

Cheng et al. in his study showed that cross or lateral percutaneous pinning was found to be effective in the treatment of Gartland type III extension fractures with a high success rate and minimal complications [7].

In our study one patient had ulnar nerve palsy which recovered within 2 months. Which is comparable to the study of Lyons et. Al who showed that ulnar nerve palsies occurring due to percutaneous pinning are usually recoverable [8].

In our study method used was cross percutaneous pinning which gives more stability than two parallel lateral pins while equal stability as given by 2 divergent pins [9]. There is risk of ulnar nerve palsy with cross pins which can be minimized by giving

small incision and gentle soft tissue retraction as used in our study.

Devnani in his study of late presentation used gradual traction later unacceptable deformity were corrected by an osteotomy in 28 children, with an average age of 7 years 6 months, who presented after an average delay of 5.6 days. Their stay in the hospital was 14 days on average. At follow-up (average, 24 months), five children (18%) who had cubitus varus greater than 10 degrees had corrective osteotomy [10].

Tiwari et al in his study of 40 patients with mean age of 7 years reported mean delay in presentation 4 days. No patients presenting more than 7 days after injury had the fracture reduced by closed manipulation. The mean hospital stay was 41 hours. At the final follow-up (mean, 18 months), 88% of the patients had a satisfactory result, according to Flynn's criteria. They concluded that operative treatment for late presentation of supracondylar humeral fractures in children is effective. It minimises the risk of complications and the need for continuous traction or corrective osteotomy [11].

In our study mean post reduction Baumann's angle was 73.4° . which is as compared to the study of Dahal et. Al. who showed mean normal baumann's angle 74.4 ± 4.14 [12].

Conclusion

Closed reduction with percutaneous pin fixation is viable option for displaced supracondylar fractures of the humerus with late presentation. Complications include ulnar nerve injury which is recoverable.

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