

# Outcome of Supracondylar Fractures of Humerus in Children Treated with Open Reduction and Internal Stabilization with Cross Kirschner Wires

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## ABSTRACT

- Objective** To determine the surgical outcome of the open reduction and internal stabilization of supracondylar fracture (SC) of humerus in children.
- Study design** Descriptive case-series.
- Place & Duration of study** District Headquarter Hospital Hangu, from May 2007 to May 2008.
- Methodology** Thirty supracondylar fractures of the humerus (Gartland type III) were treated through Campbell posterior approach. Eighteen patients were males and twelve were females. Mean age of the patients was 6.5 year, ranging from 2-13 year. Patients having vascular compromises were excluded. All the fractures were reduced through open approach and stabilized with two cross Kirschner wires. All patients were assessed post-operatively for deformity, range of motion and pain through Flynn's criteria.
- Results** Sixteen (53.4%) cases yielded excellent results, 6 (20%) had good results, 5 (16.6%) fair results, while 3 patients (10%) had poor results.
- Conclusion** Open reduction and internal stabilization of supracondylar fractures give better functional results.
- Key words** Supracondylar fracture, Open reduction, Internal stabilization, Kirschner wires.

## INTRODUCTION:

Supracondylar fracture of humerus is the most common fracture responsible for hospital admission in children.<sup>1</sup> This fracture is common in first decade of life.<sup>2</sup> The usual age range is from 5-7 year, and seen commonly in boys than girls.<sup>3,4</sup> The mechanism of fracture is fall on out stretch hand. The ligament laxity and the anatomical transformation from tube (shaft) to flat bone distally are also the reasons behind the fracture.<sup>1,5</sup> Supracondylar fracture of humerus in children is classified by many authors but Gartland classification is widely used.<sup>6</sup> Type III of Gartland classification is the type of fracture in

which there is no cortical contact and fragments are widely displaced. The distal fragment is in extension.<sup>2,7</sup> Treatment of the Gartland type III fracture is not simple and remains controversial.<sup>8,9</sup> Different methods of treatment used are close reduction, close pinning, traction, and open reduction and internal fixation, each having complications like malposition, nerve injury, loss of carrying angle, loss of extension and infection.<sup>10-14</sup>

Open reduction and internal stabilization is still the most commonly used method of treatment in developing countries as fluoroscopy is not available in far flung areas. It is indicated in irreducible and complicated fractures.<sup>10</sup> This study addresses outcome of open reduction with internal fixation of SC fracture of humerus.

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## METHODOLOGY:

This was a descriptive case series study performed

at District Headquarter Hospital Hangu from May 2007 to May 2008. Patients of 2 to 13 year were selected who had Gartland type III extension type supracondylar fractures of humerus on x-ray (anteroposterior & lateral views). Type III fractures are those where there is no cortical contact between the fracture fragments. All patients with head injury, multiple injuries and confirmed vascular injury were excluded.

An informed written consent was taken. Under tourniquet control, posterior Campbell approach was used. Ulnar nerve dissected, out, triceps muscle divided in reverse tongue shape manner, and fracture site exposed, cleaned, reduced and stabilized with two crossed K wires. Back slab applied for three weeks. Stitches removed after two weeks and physiotherapy started after three weeks onwards. All the cases were intervened in 1-3 days. Follow up of the patients were in 2<sup>nd</sup>, 4<sup>th</sup>, 6<sup>th</sup> and 12<sup>th</sup> weeks. Final assessment of the patients was done after nine months of operation. During these visits patients were assessed through Flynn's criteria<sup>11</sup> (table I). Good and fair results depend on carrying angle and range of motion, and reversal of carrying angle was declared as poor result. The data was entered into SPSS version 11. Mean, mode, median and standard deviation were calculated.

Grading	Cosmetic factor (carrying angle loss)	Functional factor (range of motion loss)
Excellent	0-5 degrees	0-5 degrees
Good	6-10 degrees	6-10 degrees
Fair	11-15 degrees	11-15 degrees
Poor	>15 degrees	>15 degrees

**RESULTS:**

Thirty patients with Gartland type III fracture of supracondylar humerus were selected. Eighteen (60 %) were males and 12 (40 %) females. Mean age of the patients was 6.5 years. Majority (n=18 - 60%) of the patients were in 6-9 year of age with mean

age of 6.5 year. Twelve (40%) patients had right side involvement. The non dominant side was involved in 18 (60%) patients. The mechanism of injury was history of fall while playing in 22 (73.3%) patients, fall from height in 6 (20%) patients while 2 (6.6%) patients had trauma in road traffic accident. Fracture displacement was posteromedial in 23 (76.6 %) cases, while 7 (23.3%) cases had posterolateral displacement. Out of 30 patients, 3 (10%) had neurological involvement pre- operatively. Ulnar and radial nerve were involved in 2 (6.6%) cases. Five (16.6%) cases had good capillary refill and normal color and temperature of the hand but no radial pulse. In these patients the vascularity improved after surgery.

There was no difference in the functional results between boys and girls. Average stay in the hospital was 3.5 days. Average time of operation was 40-50 minutes. The average time of K-wire removal was 6 weeks. According to the Flynn's criteria our result was excellent in 16 patients (53.4%), good in 6 (20%) patients and fair in 5 (16.6%) patients (table-II). The poor result was due to fracture comminution and faulty reduction of the fracture. There was loss of carrying angle and loss of extension, more than 15 degrees, in these three patients. No major complication during surgery or post-operatively reported in our study.

**DISCUSSION:**

The main aim of treating the supracondylar fractures of the humerus is to gain a functional and cosmetically acceptable extremity.<sup>12</sup> There is no definite treatment of Gartland type III fractures of supracondylar of the humerus in children. Currently, the preferred treatment in children are closed reduction and percutaneous pinning.<sup>13</sup> However, this fails in about 15% of the patients and requires manipulation of inadequate reduction or malposition of wires in 1-7% of patients.<sup>14,15</sup> Proponents of closed reduction and pinning state that fewer complications such as infection and loss of movements occurs with closed reduction and pinning and also the hospital stay is reduced.<sup>16</sup> On the other hand the

Grading	Cosmetic factor (Degrees)	Functional factor (Degrees)	Total number of patients
Excellent	0-5	0-5	16 (53.4%)
Good	6-9	6-9	6 (20%)
Fair	10-15	10-15	5 (16.6%)
Poor	>15	>15	3 (10%)

proponents of open reduction and internal stabilization claim that anatomical reduction is more important for better outcome of supracondylar fracture. Moreover it is indicated for irreducible fractures, in which the fracture pattern presented with no cortical contact and completely detached periosteum, so that closed reduction could not possibly be achieved.<sup>9,17</sup>

Open reduction was preferred in this study as fluoroscopy facility was not available in the district. Perfect anatomical reduction can only be achieved through open reduction and internal fixation.<sup>18,19</sup> Most of the patients were non local and were from adjacent tribal belt. As these patients belonged to far flung areas and law and order situation in the district is always uncertain, so patient were reluctant for prolonged stay in the hospital. Most of the patients were treated by quakes and there was delay of two to three days, so close reduction was not preferred in the cases presented late.<sup>20</sup>

Iatrogenic injury of ulnar nerve was minimized through posterior approach. The ulnar nerve is dissected before the bone fixation. There was one ulnar nerve injury associated with the fracture and was repaired primarily with the bone stabilization. The most feared complication with open reduction is loss of range of motion. In our case only three patients had loss of full extension. The result of our study is comparable with other studies in which open reduction and internal stabilization are performed. Tiwari et al achieved fair results in 15% cases and poor result in 12.5% cases according to Flynn's criteria.<sup>20</sup> In our series excellent and good results were achieved in 73.4% cases. In a similar study Mehmood et al reported fair result in 17% and poor results in 7% cases.<sup>21</sup> In another study, Kamath SU reported 44 outcome as excellent, five good, one fair and four poor.<sup>22</sup> The poor results in three patients in our study may be due to a failure to achieve a satisfactory reduction and in another due to previous elbow injury.

**CONCLUSION:**

The results of our study showed that open reduction and internal stabilization is a better choice of treatment with good postoperative functional results, especially if fluoroscopy is not available.

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