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**Research Article**

## THE OUTCOME OF SUPRA-CONDYLER FRACTURES OF ELBOW JOINT MANAGED DURING ALTERED PERIODS OF TIME BY VARIOUS TECHNIQUES IN CHILDREN

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**Abstract:**

**Objective:** To evaluate the results of supra-condyler fractures of elbow joint managed by various techniques to determine their complication in different hands and to generate attentiveness in public and treating doctor to highlight the complications and results of such injuries.

**Place and duration of the study:** In the Orthopedic Unit II of Jinnah Hospital Lahore for one year duration from March 2019 to March 2020.

**Materials and methods:** In this study, 247 patients were selected. Patients were divided into two groups; Group A consisted of 75 patients who were directly admitted to the hospital after the injury and were operated on 1-3 days after the injury. Group B (1) was divided into two groups, group B (1) was initially treated by quacks and after 10 to 15 days of injury were operated, group B (2) patients treated by comprehensive physical therapy, range of movement exercises and were conservatively managed after failure of treatment by quacks. A total of 120 patients underwent surgery and an open reduction with k wire fixation was performed, wire fixation was performed. All patients (247) were clinically and radiologically evaluated, with modified Gartland classification before and after surgery, using modified frayn's criteria to assess the overall adequacy of supracondylar fractures.

**Results:** 23 patients have compartment syndrome, 18 patients had surgery and 5 patients have refused for surgical intervention. Nine patients had gangrene located in the forearm, six were operated and amputation was performed on the above or below elbow, three patients refused surgery and went to another place / quacks for treatment. Complications were observed after various treatment regimens, including elbow joint stiffness and VIC; myositis, ossification, anterior and interosseous nerve damage, brachial artery spasm. The patient who developed post-traumatic neurological complications felt relief after treatment, and long-term complications were observed in patients who admitted after quacks treatment.

**Conclusion:** Early surgical intervention gives excellent results. The results were disappointing when it was late because arm and elbow stiffness and infection were more likely due to a primary subclinical-infection due to a dirty seismic dressing. We noticed that there was no difference in postoperative radiography in terms of fracture reduction or a good result. In our opinion the soul reason illiteracy and failure of daily approach of parents who never follow doctor's instructions. That is why we recommend that doctors be aware of the importance of managing parents and patients by counselling, the consequences of such injuries and preventing complications.

**Key words:** Operative technique, Supracondyler fracture, quack therapy.

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**INTRODUCTION:**

Supra condylar fracture is a fracture of the distal end of the humerus above the epicondyle. It is common in children and rare in adults. This is the most common fracture observed in OPD of orthopedic patients, accounting for 50 to 70% of all fractures around the elbow joint. These fractures are often associated with long-term complications such as arthritis, compartment syndrome, VICs and neurovascular complications, and if treated with the wrong hands, the patient can cause gangrene with forearm loss<sup>1</sup>. Children often fall with their arms outstretched. The most common involved limb is the non-dominant limb. They account for about 60% of all fractures in children and are common in 7-year-olds because this is the maximum period of laxity<sup>2</sup>. Therefore, when children try to prevent it during falls, elbow hypertension and olecranon during this process hit bone metaphysics, which causes typical hyperextension injury. While the extension type is 95% more frequent, flexion type is 5% of supracondylar fracture. Various treatment options for type 2 and type 3 supracondylar fractures based on Gartland classification have been discussed in the literature: long arm cast or back slab. The elbow joint can be bent or straight, Dunlop skin traction, olecranon traction but these methods have been reported to have complications (Hering JA, Flaynn, JC, Chai, wilkin, Dunlop, warlock, Smith, Shannon FJ and Gordon)<sup>4-6</sup>.

The current method of supracondylar fracture is based on the Gartlands classification. The standard treatment method reported by various authors is fragment reduction and pin fixation. There are other studies on the reduction of open or closed and percutaneous pin fixation, i.e. different lateral, medial and lateral fixations. Several authors have reported that the two column pin fixation damaged the ulnar nerve. (Arino reported 21% damage to the ulnar nerve, 5% Flayna and 15% Chai. The two column pin fixation provides better stability, but some patients reported lateral column pin fixation was as rigid as the two column pin fixation.<sup>7</sup> For this reason, we conducted a study to assess the results of early surgical intervention in patients directly admitted to the hospital<sup>8</sup>. The patients were first treated by quacks and then they were operated according to those who were conservatively treated in the hospital.

**MATERIAL AND METHODS:**

The study was conducted in the Orthopedic Unit II of Jinnah Hospital Lahore for one year duration from March 2019 to March 2020. The study involved 247 patients, including 180 men and 67 women with an average age of 5 to 15 years. We lost 20 patients for follow-up and were excluded from the study. Falling from a height with arms outstretched or road accidents are the supreme

causes of fractures. Most patients (220) had closed fractures and 27 patients had protruding bone open fractures. All patients were clinically evaluated for edema, bruising, deformation and neurovascular damage, compartment syndrome, open and closed injury, and radio logically with respect to pad of fat sign and displacement of bone the fragment. These patients were divided into two groups. Group A includes patients (75) who went to the hospital immediately after the injury and were operated on 1-3 days after the injury. Group B consists of 172 patients divided into two groups. Group B1 consisted of 78 patients who attained quack treatment for the first time and presented after 10-15 days and they were also operated as group 'A' patients. Group B2, 94 patients were reported at the OPD clinic after a two-week of quacks treatment. During treatment, these patients were not operated and conservatively treated with strong physical therapy, range of movement exercises, NSAIDs as well as counselling of patients and parents were done. In an open fracture from which the bone emerged from the wound, the fragment was reduced from the same wound and percutaneous fixation was performed with two K wires, and after complete cleansing, the wound was closed and the pop back slab was applied to all operated cases in 102 operated patients, reconstruction of the lateral and medial pillars was carried out using two crossed K wires. In 15 patient's fixations of the lateral and medial column fixation was achieved using a lateral approach with 2-3 lateral K wires. Fourteen patients underwent closed reduction and percutaneous pinning. 17 patients had severe swelling in which back slab pop was applied and were operated on a few days later. 14 out of 17 patients treated by quacks were done with fasciotomy because of compartment syndrome, the wound was initially open and then closed after 8 to 12 days of surgery. Four patients refused surgery and returned to quacks. Nine patients presented with the forearm gangrene after a simple fracture of the elbow joint treated by the quacks due to a tight bandage. We performed an elbow amputation on six patients; the two patients refused the surgery again, despite an obvious critical situation, and went to other places or quacks, hoping to save the forearm.

Intraoperative IV bolus was administered to all operated cases followed by two days of injected antibiotics followed by 5 days of oral antibiotics. The assessment of the neurovascular system was performed before and immediately after the procedure and after a week's break. Patients were evaluated both clinically and radiologically after one, two, three, four and six weeks and a year later. In both group A and B1, K wire withdrew three to four weeks after surgery. We gently manipulated the elbow joint just before removing the wire and

came to the conclusion that it improves the functioning of the elbow and prevent stiffness. Clinical evaluation includes passive range of motion, measurement of carrying angle, muscle loss, neurovascular condition, deep and superficial

infection, and pin tract infection. Clinical evaluation and results were classified according to the criteria of the modified Frayn's index criteria and the results were evaluated.

### RESULTS:

These results were evaluated according to modified Frayn's criteria as follows. Assessment of patients from group A according to modified Frayn's criteria and general assessment.

| Nature of injury                | n= | E  | G | F | P |
|---------------------------------|----|----|---|---|---|
| Gartland's Type two fractures   | 13 | 6  | 5 | 1 | 1 |
| Gartland's Type three fractures | 32 | 20 | 4 | 4 | 4 |
| Flexion type s/c fracture       | 11 | 5  | 2 | 2 | 2 |
| Open compound fracture          | 19 | 9  | 4 | 3 | 3 |

E: Excellent G: Good, F: Fair, P: Poor

### Assessment of group B1 patients based on modified Frayn's criteria and overall rating (n=78)

| Nature of injury               | n= | E  | G | F | P |
|--------------------------------|----|----|---|---|---|
| Gartland's Type two fracture   | 21 | 10 | 4 | 4 | 3 |
| Gartland's Type three fracture | 34 | 13 | 8 | 8 | 5 |
| Flexion type s/c fracture      | 23 | 7  | 5 | 5 | 6 |

E: Excellent, G: Good, F: Fair, P: Poor

### Assessment of group B2 patients based on modified Frayn's criteria and overall rating (n=94)

| Nature of injury                | n= | E | G | F | P  |
|---------------------------------|----|---|---|---|----|
| Gartland's Type one fracture    | 20 | 2 | 5 | 6 | 7  |
| Gartland's Type two fractures   | 24 | 1 | 3 | 5 | 15 |
| Gartland's Type three fractures | 30 | 1 | 2 | 3 | 24 |
| Flexion type s/c fracture       | 20 | 1 | 3 | 4 | 12 |

E: Excellent, G: Good, F: Fair, P: Poor

| Complications                | Group A | Group B1 | Group B2 |
|------------------------------|---------|----------|----------|
| Infection Superficial        | 5       | 4        | 8        |
| Deep                         | 2       | 3        | 3        |
| Pin tract infection          | 4       | 3        | 0        |
| Neurological: Ulnar          | 5       | 3        | 15       |
| Radial                       | 0       | 0        | 0        |
| Interosius                   | 1       | 5        | 7        |
| Compartment syndrome         | 4       | 5        | 14       |
| Volsman ischemic contracture | 1       | 0        | 25       |
| Elbow Stiffness              | 5       | 10       | 24       |
| Wasting of forearm           | 5       | 6        | 19       |
| Myositis ossificans          | 2       | 4        | 15       |
| Vascular                     | 0       | 0        | 0        |
| Cubitus Varus                | 5       | 3        | 30       |
| Cubitus Valgus               | 0       | 0        | 14       |
| Malunion                     | 0       | 0        | 20       |
| Nonunion                     | 0       | 0        | 0        |

For this reason, the majority of patients admitted directly to hospital after trauma with regular postoperative observation, even compound fractures fall between excellent and fair group, and

those who initially tremble for treatment by quacks were surgically managed and fall between fair and good criteria, and patients those initially attained quacks treatment and were on conservative

management in hospital were fall in the poor group criteria inspite of best efforts. No surgical revision was required for patients in group A and group B1. Whereas in B2 patients cubitus varus deformity was present in 27 patients in which corrective osteotomy was performed later on. The results of these osteotomies are not included in this study.

### DISCUSSION:

Supracondylar fractures are the most common fractures in children and require special treatment to save our children's future. In civilized countries, this work is carried out by well-trained specialist personnel for the treatment of such injuries. Unfortunately, these wounds are mostly dealt with by untrained people and earthquakes in our country, especially in the district<sup>9</sup>. Due to the improper and unprofessional behavior of professionals who are not trained in their work. District people have developed faith in quacks and lead to disaster; Not only in Gartland type 1 fractures, but also unbroken fractures, we have only seen bad results with lifelong disability due to elbow swelling and quacks treatment, resulting in permanent disability.



Various treatment options have been described in the literature along with their advantages and disadvantages in Gartland type 2 and 3 supracondylar fractures. Current treatment is closed

or open reduction followed by pin fixation, which may be from lateral side or from both lateral and medial side<sup>10</sup>. Supra condylar fractures have also been reported to cause neurovascular injury. Damage to the ulnar nerve can lead to weakening of the flexors and adduction of the wrist, elongation of the fingers and flexion of the distal phalanx (small finger) of the fifth finger<sup>11</sup>. These weekly mobility findings are also associated with sensory disturbances on the ulnar side of the ring and fifth finger. Injury of the median nerve causes weakness of the flexor muscles in the hand and loss of sensation of two points of the thumb, forefinger and ring finger<sup>12</sup>. Most often, an injured nerve damages the anterior interdigital nerve, which is a branch of the median nerve and weakness of the hand, without forearm pain and subsequent sensory deficiency<sup>13</sup>. Damage to the radial nerve leads to a weakening of the extensors of the thumb, finger and wrist, as well as a change in sensation in the step between the thumb and forefinger, so only in a clinical study the distal neurological condition, namely the dorsal mesh (radial nerve), Palmer's index finger (median nerve) and little finger (ulnar nerve)<sup>14</sup>.

After clinical examination, flexion and extension should not be allowed, as patients may exacerbate neurovascular injury. The type of displacement and fracture is based on AP radiography and lateral view. In normal lateral xray elbow joint, the anterior pad of fat is seen as it is located in coronoid but posterior pad of fat is not seen as it is located in deep intra condylar fossa (olecranon) but after injury as there is leakage of blood and marrow into the joint capsule, so this elevate the pad of fat which is seen as elevated lucent line as anterior humoral line in lateral x-ray as Thron sign and posterior pad of fat is displaced posteriorly. The displacement of the distal fragment predicts the nature of the fracture, i.e. the anterior distal fragment (flexor type) and posterior extensor type. In addition, the fragment displacement also provides for a type of nerve damage, i.e., the posterolateral displacement of the distal fragment increases the risk of damage to the median nerve and anterior interosseous nerve. A distal posterior-medial fragment increases the likelihood of damage to the radial nerve, while damage to the ulnar nerve is often associated with the type of supra- condylar fracture (flexion type)<sup>15</sup>.

The incidence of iatrogenic damage to the ulnar nerves associated with medial and lateral cross medial and lateral pin fixation (Skaggs, Chai, Flaynn, Brown, Lyons, Rasool, Zaltz, Kasser) ranges from 0 to 6%. The wind reported that ulnar nerve injuries were more frequent. Although the ulnar nerve injuries often heal, Pero Rasool MN, Ramachandran, Brzoza and Eastwood have reported several permanent ulnar nerve injuries. In

our study we operated on 120 cases and no iatrogenic ulnar nerve damage was found. This change was present in 7 preoperative patients and healed over time in group A and group B1 patients. Twelve patients in the B2 group showed elbow paralysis. All seven patients in groups A and B1 recovered, but only 3 patients in group B2 recovered and 9 patients had permanent elbow paralysis. In our view, misuse, a tight bandage, and a wooden or foot splint and external cause this neurological insult. Excessive edema, ecchymosis of the elbow, increased pain, cold hand with weak perforations indicate the development of the compartment syndrome, and if the compartment syndrome is not properly treated, it may progress to volkman ischaemic contracture leading to fixed flexion deformity of the elbow joint, forearm extension, wrist flexion and extension of metacarpal joint.. Dunlop 1939 and Dodge 1972 reported a high incidence of cubitus varus deformity after s / c fracture of the elbow joint. The etiology of various deformations is controversial (Sri 1939, Ailken's 1943, Larwerance 1956, Smith 1960). He admits, however, that the main cause of elbow deformation is medial angulation, not growth disturbance (Mann 1963). The incidence of cubitus varus also depends on the position at which the elbow is mobilized, more than 60% if the elbow is set to 90% flexion and supination in the forearm (Ailken's 1943). Ailiken et al. Suggests that a completely dislocated supracondylar fracture hardens significantly with callus formation. It should not be manipulated early as in 85% of patients with late manipulation result in developing myotitis ossificans. The preferred treatment for these fractures is to allow the fracture to heal and then assess whether a corrective osteotomy is needed. In our study we noted 30 patients having cubitus varus deformity. The frequency of deformities was higher in patients in the B2 group.

### CONCLUSION:

1. Early correction of deformities within 3-5 days gives excellent results compared to delayed surgery.
2. Surgery should be performed by a qualified orthopedic surgeon trained in the treatment of such injuries. Other specialists should not operate on such cases to save a child's future.
3. Consultation with the patient and parents is essential and it is doctor's duty to counsel the patients about the depth of the injury and possible complications in the future if proper instructions and further action are not followed. Even the best results observed on X-ray may end up in poor grade if proper instructions and follow-up are not followed.
4. K wire should be removed within 3-4 weeks. We recommend that manipulation must be done gently

before removing the wire to achieve good results in these patients.

5. The shoulder joint should not be immobilized with the elbow joint.
6. Mass awareness programs against quacks and unskilled people should be launched to highlight the effects of such injuries and prevent future generations.

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