



A Comparatives Study of Crossed Versus Lateral Pinning in the Treatment of Displaced Extension-Type Supracondylar Fractures of the Humerus

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ABSTRACT

Introduction : Supracondylar fracture of humerus in children are one of the commonest injury around the elbow. The most common type is extension-type (95%). There has always been conflicts, about type of operative management of displaced fracture between lateral & cross pinning. The purpose of our study was to evaluate and compare the two pinning techniques in terms of functional outcome and complications if any, in children with supracondylar fractures of humerus.

Material and Methods : 40 children with fracture of supracondylar humerus out of which 26 were boys and 14 girls taken for retrospective study at C.U.Shah medical college during august 2013 to June 2015 Patients were analyzed clinically & radiologically using Flynn's criteria. Out of 40 cases, 23 patient treated with lateral pinning and 17 with cross pinning technique based on surgeon's preference.

Results : Among patients treated with lateral pinning technique, 16 (69.57%) had excellent outcome, 6 (26.09%) had good outcome while 1 (4.34%) had fair outcome. Similarly in patients treated with cross pinning technique, 12 (70.59%), 3 (17.65%), 1 (5.88%), 1 (5.88%) had excellent, good and fair, poor outcomes respectively. Two patients developed superficial pin tract infections which were treated successfully with regular dressings and oral antibiotics. One patients developed iatrogenic ulnar nerve injury in the cross pinning group.

Conclusion : There is no significant difference between the two pinning techniques based on clinical outcome in our study. But no chances of ulnar nerve palsy with lateral pinning so our study results support the use of lateral pinning for displaced supracondylar fractures.

KEYWORDS : Lateral pinning, Cross pinning, Supracondylar humerus fracture

INTRODUCTION:

Supracondylar fracture is one of the most common elbow injuries in children. The most common type is extension-type (95%) (1). The commonly used classification system based on degree of displacement is Gartland classification (2) i.e. Type I-undisplaced, type II – displaced with intact posterior cortex, and type III – displaced with no cortical contact. Every orthopaedician will be confronted with a supracondylar fracture with or without complication, during his clinical practice. The association of this fracture with neurovascular complications and deformity warrants an aggressive approach for management. There has always been conflicts, about type of operative management of displaced fracture between lateral & cross pinning. The purpose of our study was to evaluate and compare the two pinning techniques in terms of functional outcome and complications if any, in children with supracondylar fractures of humerus.

Supracondylar fracture so designated is in lower end of humerus just above both condyles and just proximal to the olecranon fossa, and does not directly involve the joint (extra-articular fracture) or distal humeral epiphysis. This view stresses the importance of prevention of pin track sepsis in K-wire fixation to avoid joint infection. The brachial artery, radial nerve and median nerve all of which lie anteriorly in relation to supracondylar region of humerus are vulnerable to injury by sharp corner of proximal fragment, but nature is really great and has provided with excellent anastomosis around elbow joint.(3) This is the reason why we do not get very frequent Volkman's ischaemia. Relationship of ulnar nerve to the medial epicondyle requires special mention, as to prevent its damage, one has to pass medial 'K' wire slightly anterior and above the tip of medial epicondyle. Lower end of humerus when viewed from lateral aspect has some anterior curvature, which makes "angle of inclination," the importance being when passing 'K' wire in coronal plane, it should be 100 posteriorly directed. The medial edge of the trochlea projects about 6mm below than the lateral edge, causing the transverse axis of the joint to decline about 100 downward and medially. This declination is matched by a similar angle of the trochlear notch of the ulna. This configuration of joint makes "carrying angle" of the elbow. This angle is most apparent and best visualized when the shoulder is externally rotated, the elbow is

completely extended and the forearm is supinated. Clinical measurement of carrying angle is done by measuring the angle formed by line joining the midpoint of the wrist and midpoint of the humeral head with the midpoint of the ante-cubital space. The radiological parameter for measurement of carrying angle is "Baumann's angle". It of humerus and line tangential to the straight epiphyseal border of lateral part of distal metaphyses. According to Dodge⁷, it is a reasonably accurate parameter of any change in the carrying angle as compared with normal side.

Material and Methods

40 children with fracture of supracondylar humerus out of which 26 were boys and 14 girls taken for retrospective study at c.u.shah medical college during august 2013 to june 2015. 29 were gartland type 2 and 11 were gartland type 3. Patients were analyzed clinically & radiologically using Flynn's criteria. Of 40 cases, 23 patient treated with lateral pinning and 17 with cross pinning technique based on surgeon's preference.

PRINCIPLE:

The goals of treatment are to reestablish a functional range of motion, preserve function of the upper extremity, and obtain cosmetically acceptable appearance. In choosing treatment, the main consideration should be given to "avoid catastrophe" such as compartment syndrome and minimizing embarrassment, such as cubitus varus and stiffness. In first aid, splint the fracture in extension. Flexing a displaced fragment in sling, may compress the brachial artery. Reduction should be undertaken as soon as child is fit for anaesthesia, as reduction is easiest, before oedema is added to haematoma.

METHOD: (4) (5) (6)

- Palpate bony landmark, check the direction of displacement.
- Apply traction with the elbow flexed at 20 degree and correct any lateral displacement.
- Push the olecranon anteriorly to correct the posterior displacement and flex the elbow about 40 degree.
- Rotate the forearm externally to correct the usual internal rotation deformity.

- (e) Continue to flex the elbow above a right angle with maintaining pressure on the olecranon. The posterior displacement is reduced before this is done, otherwise the brachial artery will be damaged between the fracture fragment. Flex the elbow until the olecranon lies anterior to the epicondyles.
- (f) Keep forearm in full pronation, to prevent varus deformity.
- (g) Check the position radiologically. Any angulation and rotational deformity should not be accepted and correct it.

For lateral pinning technique, after reduction evaluation, two pins were inserted from the lateral aspect of the elbow. The pins were parallel or divergent and engaged the medial cortex. The elbow was kept hyperflexed and in a position of pronation for inserting the lateral pins. The elbow was then extended fully and fracture reduction and stability assessed clinically as well as radiologically under image intensifier.

For cross pinning technique, after reduction evaluation, the lateral pin was inserted first, similar to the manner for lateral pinning technique. The elbow was then extended to less than 90° position and a medial pin was inserted. For medial pin insertion the surgeon palpated the ulnar nerve and pushed it posteriorly with the thumb. Two patients required a separate incision over the medial epicondyle to explore the ulnar nerve. The fracture reduction and stability was assessed clinically as well as radiologically under image intensifier.

The excess length of the pins was cut and then bent outside the skin to avoid migration. Betadine roller-gauze dressing was applied to avoid pin track infection. A below elbow plaster slab was applied with the elbow in 90° flexion and full supination of forearm.

All patients were discharged after two days. They were followed up for clinical evaluation (carrying angle, elbow range of motion, neurovascular complications and pin tract infections) and radiological evaluation (fracture displacement, Baumann angle, humero-capitellar angle) at three to four weeks and final follow up at six months. The pins and slab were removed after three to four weeks. Active elbow 'range of motion' exercises were encouraged. At the end of six months period, Flynn's criteria (7) were used to grade the result. Results were graded as excellent, good, fair and poor.

RESULT:

AGE DISTRIBUTION

| GENDER | NUMBER | PERCENTAGE |
|--------|--------|------------|
| MALE | 26 | 65% |
| FEMALE | 14 | 35% |

ANALYSED CLINICALLY & RADIOLOGICALLY USING FLYNN'S CRITERIA

| RESULT | LATERAL PINNING | CROSS PINNING |
|-----------|-----------------|---------------|
| EXCELLENT | 16 (69.57 %) | 12 (70.59%) |
| GOOD | 06 (26.09%) | 03 (17.65%) |
| FAIR | 01 (04.34%) | 01 (05.88%) |
| POOR | 00 (00.00%) | 01 (05.88%) |

One patients developed iatrogenic ulnar nerve injury in the cross pinning group.

DISCUSSION:

Supracondylar humerus fracture in children is an urgent condition, requiring rapid diagnosis and treatment, particularly due to the serious vascular and nerve complications associated with this injury.

Percutaneous fixation is popular, and was described by Judet and Swenson as an osteosynthesis technique based on the work by Miller (1939) *apud Fumo et al* which recommends this method for the treatment of T-shaped injuries; its widespread use is due to a series of advantages, including low cost, safety, efficiency and minimal hospitalization times.

In our study, in age distribution male have more predispose to injury than female.

In our study, cross pinning technique one patient develop post-opera-

tive iatrogenic ulnar nerve injury.

Conclusion:

There is no significant difference between the two pinning techniques based on clinical outcome in our study. But no chances of ulnar nerve palsy with lateral pinning so our study results support the use of lateral pinning for displaced supracondylar fractures

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