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### RESEARCH ARTICLE

#### SURGICAL CORRECTION OF POST TRAUMATIC CUBITUS VARUS DEFORMITY USING VELLORE TECHNIQUE.

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#### Abstract

Malunion of Supracondylar fractures of the Humerus resulting in Cubitus Varus is a common complication in our country. It needs correction not only for the cosmetic deformity but also for the other reasons which include increased incidence of posterior-lateral elbow instability, lateral condyle fracture, ulnar nerve friction neuropraxia and shoulder dislocation if not corrected. Many methods have been described but the correction commonly done now is by modified French osteotomy. There are various techniques for modified French osteotomy, but the described Vellore technique do correction at lower level nearest to the CORA, which is ideal. Described is the case which was corrected using Vellore technique.

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#### Introduction:-

Elbow is a hinge joint which consists of three articulations namely humero-ulnar, humero-radial and proximal radio-ulnar joints. The articular cartilage surface of the capitulum and trochlea projects downward and forward from the end of the humerus at an angle of approximately 30°. The trochlea is oriented spirally giving humeroulnar joint valgus angulation named as carrying angle. The alignment is important for normal orientation of arc of elbow movements(1). Malalignment of the relationship of one condyle to the other changes their arcs of rotation, limiting flexion and extension.

Distal Humerus physis contribute 20% to the total length of the bone (2). The sequence of ossification at the distal Humerus is as follows: capitulum, radial head, medial epicondyle, olecranon, trochlea, and lateral epicondyle (3) Elbow fractures are one of the commonest injuries in children and 70 – 80% among them is supra condylar fractures (4). As there is minimal growth at the lower end of Humerus, the malalignment of fracture is unlikely to get corrected by remodeling process. It's the most common fracture in pediatric population which needs surgery.(5) Cubitus Varus is one of the commonest late complications following a Supracondylar fracture. Irrespective of method used for treatment the incidence of this ranges from 10–57%, traditional bone setters adding to it (6). It consists of Varus, hyperextension and internal rotation deformity of the distal bone fragment of the Humerus. Conservative management has higher likelihood of leading to deformity than percutaneous pin fixation. Joint surface remains uninvolved in whole of this process.

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Cubitus Varus is not only a cosmetic deformity but also predisposes patients for lateral humeral condyle fracture, posterolateral elbow instability, friction neuropraxia of ulnar nerve and shoulder instability (7,8,9). There is no rule of hemiepiphysodesis or remodeling in the management of cubitus varus.(10)

There are various types of osteotomies to correct deformities which includes lateral closing wedge osteotomy, oblique osteotomy, Pentalateral osteotomy, Step cut osteotomy, Arc osteotomy, Dome osteotomy etc. Similarly stabilization methods used are simple cast application, lane plates, K wires, Screws, SS wires and Ilizarov fixation.(11,12,13). Among the available methods, the dome shape osteotomy, translation step cut osteotomy attends to lateral condyle prominence index correction(14,15). The correction still remain above CORA and it needs considerable extensive dissection.

Routinely used is modified French technique of lateral closing wedge osteotomy fixed with two screws and wire loop. The pit fall of these techniques is that the level of correction is little higher to the CORA, which is not ideal and also these osteotomy tends to make lateral condyle more prominent.

The described Vellore technique attends these pitfalls as it can be done along CORA and also makes the possibility of lateral condyle prominence less. To best of our knowledge there is no literature suggesting the usage of this technique in the institutes other than Christian Medical College, Vellore.

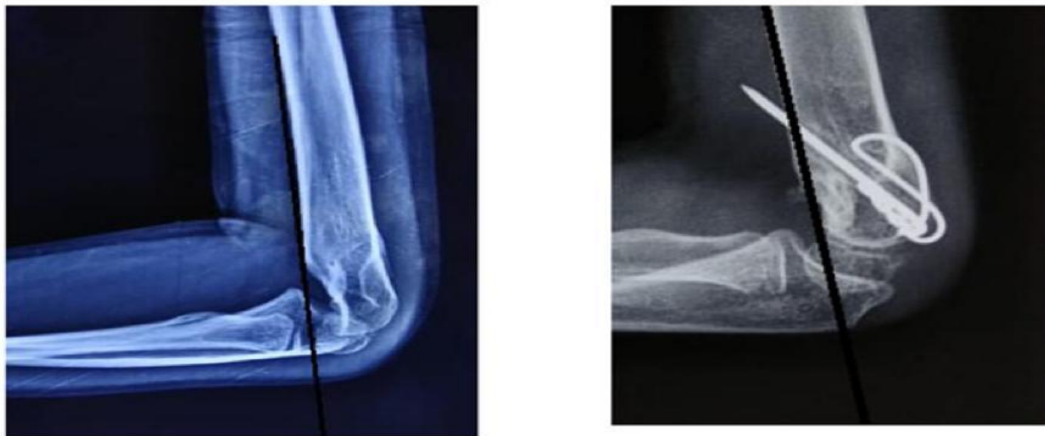
#### Case Report:

7 years old male patient presented to orthopedics OPD with deformity of left elbow joint, noticed after 2 months of fall ,two years back, for which he was treated by quack using message therapy. Patient could perform his routine activities but there is altered ROM in frontal plane over elbow joint and coronal plane at shoulder joint. There was considerable cosmetic deformity.

Clinical examination revealed cubitus Varus following Malunion of Supracondylar fracture, with Varus deformity of 27 degrees ,extension deformity of 10 degrees and rotation deformity of 20 degrees. The Radiological parameters were altered when compare to the normal side which include carrying angle of -20 degrees (7 degrees on normal side), Baumann's angle 102 degrees (64 degrees on normal side), and metaphyseal diaphyseal angle 117 degrees (87 degrees on normal side).

Patient was treated with lateral closing wedge osteotomy using Vellore technique.

#### ANTERIOR HUMERAL LINE



**Figure 1:**-showing -The anterior humeral line, which is a radiographic line that is drawn down the anterior margin of the humerus and through the middle third of the capitellum. It is used along with the radiocapitellar line when assessing for the presence of a radial head fracture or dislocation at the elbow or for the presence of a supracondylar fracture.

**BAUMANN'S ANGLE**



**Normal side**

**Effected side Pre OP**

**Post OP**

**Figure 2:-** showing Baumann's angle, which is determined by drawing a line straight down through the middle of the humeral shaft and then through the trochlea and then drawing a line that is perpendicular to the humeral shaft line. Then a line is made parallel, but running through the lateral condylar physis. The angle between the humeral shaft line and the parallel line to the lateral condylar physis should be about 70 - 75 degrees.

Normal side angle is 64 degrees and the affected side Pre-op angle is 102 degrees and Post-op angle reduced to 67 degrees

**METAPHYSIO DIAPHYSEAL ANGLE**



**Normal side**

**Effected side pre Op**

**Post Op**

**Figure 3:-**showing Metaphysio diaphyseal angle of normal side 87 degrees and Pre Op and Post-Op Metaphysio Diaphyseal angle reduction from 117 degrees to 85 degrees.

**CLINICAL IMAGE****Pre OP****Post OP****Figure 4:-**showing the Pre-Op and Post-Op Clinical images.**Procedure: (16)**

Under general anaesthesia, the whole upper limb was cleaned and draped from the shoulder up to the fingertips. Pre-operative on table Varus angle and contra lateral normal carrying angle is measured. A sterile tourniquet is used. This is useful for assessing final on table correction.

The skin incision is oblique along the Langers lines so as to get a cosmetic scar. A lateral approach is used, taking the “mobile wad of Henry” anteriorly. Once the distal fourth of the Humerus is exposed two James McDonald’s retractors are introduced.

The first one is applied on the posterior aspect just proximal to the articulation of the olecranon with the distal Humerus with the elbow in full extension. This helps to define the lower limit for the desired osteotomy. The second McDonald is applied anteriorly abutting the tip of the first one such that both are perpendicular to each other. This also serves as a protection for the ulnar nerve and is the guide for the osteotomy.

The desired wedge of osteotomy is outlined and cut on a piece of foil paper (the aluminum foil cover of the suture material). This wedge of foil is then placed flush on the anterior surface of the distal Humerus with the apex at the anterior medial most edge and the base at the lateral border. The base is marked with either cautery or marker pen. The desired angle of wedge is then cut out from the distal Humerus cutting the medial cortex but retaining the medial cortex and periosteal hinge.

Prior to this, using a 2.5 mm drill, a hole is drilled on the proximal fragment about a centimetre above the marked osteotomy medial to the lateral edge of the Humerus. A length of stainless steel wire is then passed through this. The medial cortex is also fractured and the wedge is removed. The lateral border of the proximal and distal fragments of the Humerus is then matched to correct any rotational deformity and the distal fragment is pushed medially till the lateral edges of the proximal and distal fragments coincide.

This is to prevent abnormal protuberance of the lateral condyle. Finally a K- wire is passed from lateral condyle anterior portion of the distal fragment to medial portion of the proximal fragment so that it passes through the near as well as distant cortex correcting the internal rotation by matching the anterior cortices and the stainless steel wire is tightened around the K-wire in a figure of 8 pattern creating a tension band.

Before tightening the stainless steel wire, the elbow is fully extended and the amount of correction achieved is checked with a goniometer. The K- wire is finally bent and buried behind the lateral condyle. The stainless steel wire is trimmed and rotated to come and lie under the anterior muscle mass.

The wound is closed over a drain which is kept long in length so as to be brought out proximal to the above elbow cast. An above elbow cast is applied in extension and full supination with moulding in cubitus valgus (medial in the forearm and lateral in the arm) from the axilla up to the distal palmar crease.

### Results:-

Immediate post op, there was complete correction of carrying angle, Baumann's angle corrected to 67 degrees and metaphyseal diaphyseal angle to 85 degrees. Follow up x rays showed no loss of correction. Patient attained full range of movements within two months following surgery.

Implant removal done with the same incision after 6 months of surgery.

### Discussion:-

As there are many methods to correct post traumatic cubitus Varus deformity, the technique which is simple, needs minimal instrumentation, can help in meticulous correction at CORA and avoid the radiation would be ideal to implement. The described technique fit into it. Hence, Vellore technique is a relatively simple technique with firm fixation that allows early movement of joint with good clinical results.

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