MATERIAL & METHODS
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The study was conducted in the department of orthopaedics M.L.B. Medical College, Jhansi. Patients included twenty one children admitted after presenting at the O.P.D. or emergency with displaced (Type II & Type III Gartland) fractures of the supracondylar area of the humerus.

The patients were admitted after making the clinical diagnosis and confirming it by roentgenographic examination of the elbow in AP and lat views. The patients were given an above elbow slab in position of the presentation of the limb and the limbs elevated while the patients waited for the reduction of the fracture under general anaesthesia.

The fracture was reduced in the emergency operation theatre and an above elbow slab was applied with the elbow hyperflexed and the forearm in supination/pronation. The patients were transferred to the general ward and kept under observation for the next 24 hrs. to rule out any present or developing neurovasculcal complications.

Post-reduction x-rays were assessed for adequacy of reduction and if unsatisfactory, reduction was re-attempted. If the reduction was satisfactory the patients were discharged after application of cast and to report at 3 weeks post reduction for removal of the cast and assessment of clinical union. In cases where open reduction and K wire fixation was done, wires were removed at the first visit (3 weeks after discharge) and the patients reviewed after further 3 weeks for removal of cast. After confirming clinical union the patients were sent home with advice regarding physiotherapy and reviewed thereafter at monthly intervals.

At each visit the patients were evaluated for recovery of function etc.
The Working proforma is this thesis may be divided into four sections viz:

i) At the time of presentation
ii) During reduction & stay at hospital (till discharge)
iii) First & subsequent follow up in OPD
iv) Final evaluation in OPD

(i) **At the time of presentation**

Name: MRD No:

Age: Ward/Bed:

Sex: Surgeon Incharge:

Fathers Name: Date of admission:

Address:

Time since injury:

Mode of Injury: (a brief history of the cause of injury)

Side Involved: (Right/Left) elbow

Clinical Impression:

Radiological diagnosis (Grading according to Holmberg and any other specific finding):
Routine Investigations viz: Blood - Hb%, TLC, DLC, ESR
Urine - Routine
- Microscopic

Acute Complication present:

Vascular:

Neurological:
a) Median/Anterior Interosseous
b) Ulnar
c) Radial

Associated Injuries:

The criteria used for assessment
of these complications were
Vascular: Vascular deficit was said to be present if the radial pulse was not palpable on the injured side.

Neurological: Sensory & motor functions were tested as shown below -

<table>
<thead>
<tr>
<th>Neurological deficit</th>
<th>Sensory Loss</th>
<th>Motor loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median Nerve</td>
<td>Loss of sensation in the lateral 3.5 digits</td>
<td>Loss of function of flexor pollicis longus / flexor digitorum profundus / and specially abductor pollicis brevis.</td>
</tr>
<tr>
<td>Ant interosseous Nerve</td>
<td>Absent</td>
<td>either of above</td>
</tr>
<tr>
<td>Radial Nerve</td>
<td>Loss of sensation in the area of dorsal skin between 1st &amp; 2nd metacarpal</td>
<td>Presence of wrist drop</td>
</tr>
<tr>
<td>Ulnar Nerve</td>
<td>Loss of sensation in the Medial 1.5 digits</td>
<td>Loss of function of interossei / adductor pollicis / flexor carpi ulnaris</td>
</tr>
</tbody>
</table>

Associated Injuries: The criteria used for assessment of these complications are given on next page; Associated injuries as ipsilateral both bone distal forearm as well as any other bony injury were looked for.

(iii) During reduction and stay at hospital (till discharge)

Observations for the following were made and recorded:

Adequacy of reduction (any persisting rotation /displacement )

If inadequate, number of reductions attempted before accepting position

Position of forearm after reduction of the supracondylar fracture and of other fractures if associated with it:

Adequacy of circulation:
Persistence /new development of neurovascular deficits:

Date of discharge:

Duration of hospital stay:

(iii) First Follow up in OPD

Assessment of clinical union after removal of cast (at three weeks in conservative cases and six weeks in operated cases or cases with associated injuries.

Reevaluation of the neurovascular status where required was done in this and the subsequent visits on the criteria given earlier. The patients were advised on physiotherapy and care of limb etc.

(iv) Final Evaluation: After the shiftiness had subsided patients were evaluated for the following:

(a) Pain: Persisting pain at fracture site or in the rest of the limb

(b) Persistence of neurovascular complications viz:

   Symptoms at work

   Muscle contraction

   Persistent neurological deficits

(v) Movements:

   Left (in degrees)  Right (in degrees)  Loss (in degrees)

   a) flexion
   b) extension
   c) pronation
   d) supination

(vi) Carrying angle:

   Left (in degrees)  Right (in degrees)  Loss (in degrees)

The criteria used for these measurements were as follows:
(a) **Flexion**: With the arm by the side the patient was asked to flex his elbows as much as possible and the angle made between the long axis of arm and forearm was measured on both sides by placing the goniometer on the lateral side of elbow joint.

(b) **Extension**: With the arm flexed to 90° that is in horizontal position with elbows fully extended and the palms facing the roof the goniometer was placed on the lateral side of elbow joint and the angle made between the long axis of arm and forearm was measured on both sides.

(c & d) **Pronation & Supination**: With the arm fixed by the side (to prevent rotation at the shoulder the patient was asked to alternately face the palm towards the roof and floor. If the palm could face fully upwards and downwards it was recorded as +. If midway between full range and midprone position it was recorded as +/- and if no movement on either of the sides then as 0.

(v) **Carrying Angle**: This was measured by the method described by Lyman Smith. With the elbow fully extended as in (b) the angle formed by extending the line from midpoint of wrist and humeral head to join the midpoint of the elbow joint.

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Technique for Reduction:--

With the patient supine on the table general anaesthesia is given; the assistant grasps the upper arm whilst the surgeon holds the hand. The surgeon then applies firm steady traction for a period of two minutes or more in the long axis of forearm until traction has drawn the distal fragment beyond the proximal fragment. Following traction in the flexed position, the surgeon extends the elbow palpating the radial pulse as the does so.

When full extension has been obtained the forearm is fully supinated to correct the pronation deformity present.

The fact that the hand and distal fragment are fully supinated is confirmed by fully supinating the uninjured hand and externally rotating the shoulder; the two hands should now have assumed the same attitude. Next the carrying angle at the elbow is corrected by eye. The surgeon then grasps the upper arm with his second hand placing his finger over the biceps muscles so that his thumb rests on the olecranon. He then changes the position of the hand exerting traction by placing it so that he grasps the distal forearm with his index on the radial pulse. He then slowly flexes the elbow using the hand with which he is exerting traction to produce a combination of flexion and continuous traction in the long axis of the forearm.

The thumb over the olecranon presses the olecranon (and with its the distal
fragment forwards into flexion, the fingers of this hand exert counter- traction against the hand pulling in the long axis of the forearm.

Flexion is continued until a point beyond 90° is reached. Throughout this manoeuvre the radial pulse is felt and if it is obliterated by flexion the elbow is extended until the pulse returns. When the maximum degree of flexion has been obtained compatible with the presence of a radial pulse a light back slab is applied over padding to hold this position and the reduction is checked radiologically.

Post Reduction Management :- After transferring the patients to the ward, the limb was elevated. The patients' vitals were recorded and adequacy of hydration estimated and fluids adjusted accordingly. The patient was kept nil per orally for next six hours post-operatively and advised active finger movements of the injured limb. The patients were discharged after completion of the slab and asked to report after 3 weeks in the O.P.D.