MATERIAL AND METHODS
KAT E RIAL AND METHODS

The present clinical study is based on twenty two patients with closed, displaced diaphyseal fractures of radius and/or ulna, treated in the Department of Orthopaedic Surgery, M.L.B. Medical College, Jhansi, from 15th September 1989 to 14th September 1990.

On admission detailed history regarding mode, type and duration of injury was taken. Enquiry regarding massage and manipulation and thorough local and general examination of patient was made. Clinical assessment of the fractured limb was made and the presence of any neuro-vascular complication was noted. Routine antero-posterior and lateral radiographic views of the injured limb were taken and assessed for the displacements and angulations. Detail history and clinical examination were recorded in the working proforma as follows:

**Working proforma**

| Case No. |  |
|----------|  |
| Name of patient |  |
| Father’s/Husband’s name |  |
| Age/Sex |  |
| Address |  |
Ward/Bed No. : 
Occupation : 
Date of admission : 
Date of injury : 
Date of discharge : 
Mode of injury : 
History of present illness : 

Time between injury and 1st immobilization : 
Any previous treatment taken : 
Any associated injury : 

Examination :

General condition : Blood pressure :
Consciousness : Pallor :
Pulse rate : Jaundice :
Respiratory rate : Hydration :

Systemic Examination -
Cardio-vascular system : 
Central nervous system : 
Respiratory system : 
Abdomen : 

Local Examination -
Side : Right / Left / Both
Nature : Compound / Simple
Site : Proximal third / Middle third / Distal third
Bones involved : Radius / Ulna / Both bones.

Regional arterial pulsations (Radiol.) :

Condition of regional nerves :

Any associated local injury :

Investigations -

Blood : Hb%, TLC, DLC, ESR

Blood sugar : Random

Blood urea :

Urine : Albumin, Sugar, Microscopic examination

Radiological Examination -

Treatment :

Procedure done:

Date of operation :

Post-op. X-ray film - State of fixation :

Post-op. complications :

Infection :

Nerve palsy :

Any other :

Date of removal of external support :

Follow-up : 4 weekly interval.

Condition of stitch line

Range of movement -

Flexion :
Extension :
Extension :
Supination :
State of union

Strength

Wasting

Complications

Functional Result -

Following criteria were used for plating of both bone forearm.

- Adult with displaced fractures of the shaft of the radius or ulna.

- Fractures associated with dislocation, Galeazzi's fracture dislocation and Monteggia fracture dislocations.

- All grossly comminuted fractures were excluded.

- In all the open fractures internal fixation was delayed for one to three weeks, to be certain that infection was not present.

- Old fractures with mal-union, non-union or delayed union.

- Primary autogenous iliac bone grafts were used for fractures in which more than one third of the circumference of the shaft was comminuted and for old fractures (i.e. malunited, delayed union and non-united cases).
After admission on the same day, closed reduction under anaesthesia was attempted and the limb was immobilised in the above the elbow plaster of Paris cast. Limb was kept elevated. The patient was encouraged to do active finger movements on recovery from anaesthesia and was observed overnight for circulatory embarrassment. Check antero-posterior and lateral radiographs were taken on the following day. If the reduction was satisfactory, the conservative management was continued. Periodical radiographs were taken in the Out Patient Department. During this period, patient was taught active shoulder and hand exercises. Once the fracture had united clinically and radiologically, plaster of Paris immobilisation was discarded and active exercises of the immobilised joints were begun. The patients in whom the closed reduction was unsatisfactory or the ones in whom it was lost subsequently, were taken up for surgery. Criteria for satisfactory reduction were none or minimal rotation of the distal fragment and no over-riding or angulation of the fractures fragments.

On deciding upon open reduction and internal fixation, the patients were taken up for surgery as soon as possible. The implants to be used for surgery were selected pre-operatively. Criteria for implant selection included: location of fracture site, fragment geometry, presence of comminution and size of the bone in question.
as evident on the pre-operative radiographs. Indian semi-tubular plates (D.C.P. and small fragment set D.C.P.) for use with 4.5 m.m. and 3.5 m.m. cortical screws were utilized in the present study.

Surgery was performed under strict aseptic conditions. Fractures of the proximal and middle thirds of the radius were exposed by Thompson's or dorsal approach in the plane between extensor digitorum communis and extensor carpi radialis brevis muscle. The fractures of lower third of shaft of radius were exposed by Henery's or anterior approach through the interval between brachioradialis and flexor carpi radialis muscle. Fractures of the shaft of the ulna were exposed by Boyd's approach. Care being taken to strip the periosteum sparingly, the fractures were then reduced as anatomically as possible. The plates were applied subperiosteally on the posterior surface of the ulna and on the postero-lateral surface of radius, using the standard ASIF technique and instrumentation. Supplementary autogenous cancellous bone grafting was done in patients where significant comminution or for delayed union and non-union. Suction drains were not used and wound sutured. The wounds were cleaned and dressed and an above the elbow posterior plaster of paris slab was given with the elbow flexed to 90° and forearm in mid-prone position.
Post-operatively, the operated limb was kept elevated. On recovery from anaesthesia, the patient was encouraged to do active finger movements. Active shoulder movements were begun, usually 24 - 48 hours after surgery. Proper antibiotic cover was provided. Antero-posterior and lateral radiographic views of the operated limb were taken post-operatively to see the alignment of fragments and the position of implants.

The duration of the external plaster immobilisation depended upon the co-operativeness of the patient, adequacy of fixation, amount of comminution and whether or not bone grafting was done. It was usually continued 3 weeks after suture removal in co-operative patients in whom rigid fixation had been secured. If bone grafting had been done, it was continued 4 - 6 weeks. The patient in whom the fracture was significantly comminuted or rigid fixation was not achieved, the external immobilisation was prolonged till the fracture showed signs of union.

All the operated patients were taught and encouraged to do exercises of the shoulder and head of the operated limb till the external plaster immobilisation was present. Once the external immobilisation was discarded, gentle active exercises of all the joints of the operated limb were begun. The patients were advised to restrict the use of operated limb for performing light activities only and not to bear load or do any strenuous work with the operated limb, till the fracture had united.
Patients were followed up at intervals of four to six weeks. Follow-up included check antero-posterior and lateral radiographs of the operated limb and movements in the joints of the operated limb as compared to the joints of the normal opposite limb of the patient. Any complication which occurred was noted and treated accordingly. Forearm and arm atrophy in the operated limb were assessed as compared to the normal opposite limb. The time interval between injury and return to work was also noted.

Criteria of Kuller et al (1950) for the union were followed i.e. obligeration of fracture line and bridging of trabeculas.

The criteria for functional assessment in the injured limb were as shown in the table.

<table>
<thead>
<tr>
<th>Criteria for functional assessment in the injured limb as compared to the normal opposite limb of the patient.</th>
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</thead>
<tbody>
<tr>
<td><strong>Union</strong></td>
</tr>
<tr>
<td>Excellent</td>
</tr>
<tr>
<td>Satisfactory</td>
</tr>
<tr>
<td>Unsatisfactory</td>
</tr>
<tr>
<td>Failure</td>
</tr>
</tbody>
</table>

Criteria used by Anderson & Co-workers (1971) in their series at Campbell Clinic.
AIMS AND OBJECTIVES

1. To evaluate the functional results of semiflexed (LCP) plating in fractures of forearm bones, with reference to the normal limb of the patient.

2. To analyse the rationale of external immobilisation after rigid fixation of the fractured bones.

3. To assess the average time taken for union in fractures after open reduction and internal fixation.

4. To study and assess the complications encountered during the treatment.
Complete set of Instruments with Semitubular plates (S.P.S. D.C.P.).
Plate applied after open reduction.

First two screws tightened.
First four screws tightened.

Plate after fixation of all six screws.
First four screws tightened.

Plate after fixation of all screws.
After subcutaneous stitches.

Skin stitches given.