MATERIAL AND METHODS
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Twenty cases of fracture neck femur, both fresh as well as un-united or neglected, attending orthopaedics out-patient department and emergency department of M.L.B. Medical College Hospital, Jhansi, were thoroughly examined clinically, radiologically and treated by open reduction and internal fixation with multiple Austin Moore's pins, bone grafting and muscle pedicle bone grafting.

Criteria for selection of cases -

All the cases of fracture neck femur except at extremes of age, constituted the subjects of this study with following exceptions.

1. Inability to walk due to causes other than fracture.

2. Those unable to co-operate in the post-operative programme because of senility, psychosis, mental retardation, perkinsonism, or cerebro-vascular accident with residual hemiplegia and spasticity.

3. The patients with poor health who can not withstand two major operation, in these cases prosthetic replacement may help.

4. Those with life expectancy of less than 2 years (such as malignant disease).
The patients were thoroughly examined clinically and radiologically and relevant findings recorded in the proforma as below:

- **Case No.**
- **M.R.D. No.**
- **Name of patient**
- **Father's/Husband's name**
- **Age/Sex**
- **Address**
- **Occupation**
- **Date of admission**
- **Date of discharge**

**Chief Complaints**

**History of present illness**:
- **Date of injury**
- **Mode of injury**
- **Time lapse between injury and first treatment taken (immobilization)**
- **H/O unconsciousness, vomiting etc.**
- **Other complaints**
- **Associated injury**
- **Treatment taken**

**Past History**:
Family History:

General Examination:
- Appearance
- Built
- Pulse rate
- Blood pressure
- Respiratory rate
- Pallor
- Icterus
- Cyanosis
- Clubbing
- Oedema
- Lymphadenopathy

Systemic Examination:
- Abdomen
- Cardiovascular system
- Respiratory system
- Central Nervous System.

Local Examination:
- Side - right / left / both
- Simple / compound
- Abrasion / Contusion
- Attitude
- Deformity
- Telescoping
- Shortening (True)
- Upward shift of greater trochanter
- Range of movements
- Wasting of Quadriceps
  (at 20 cm above the knee joint line)
Investigations:

Blood
- Total Leukocyte count
- Differential leukocyte count
  P    L    E    M
- Erythrocyte sedimentation rate
- Haemoglobin
- Blood sugar - F
-   PP
- Blood urea

Urine
- Albumin
- Sugar
- Microscopic examination

X-ray
- Site - Subcapital / Transcervical / Basal
- Absorption of neck
- Sclerosis at fracture site
- Proximal migration of greater trochanter (Upward shift)
- Avascular necrosis of femoral head
- Changes in acetabulum.

MANAGEMENT

I- First aid management
- Absolute rest
- Long Liston's splint
- Skin Traction A/K / B/K
- Skeletal traction
- Skin traction & limb kept on Thomas' splint.
II - **Definitive management**: already done before admission.

a) **Conservative**
   - By traction
   - POP hip-spica

b) **Operative**
   - S-P Nailing
   - Multiple pinning
   - MC Murray's osteotomy

III - **Present management**

- Open reduction with internal fixation with
  multiple pinning with muscle pedicle bone grafting.

  OR

  Open reduction with internal fixation with
  multiple pinning with muscle pedicle bone grafting
  with multiple drill holes.

- Site from where the graft were taken.

**Post-operative Management**:

- Nature of immobilization in post-operative period.
- Date of mobilization.

**Check X-ray**:

- Good / Satisfactory / Unsatisfactory
- Alignment at fracture site
- Coxavara / Coxavalga
- Anteversion / Retroversion
- Position of muscle pedicle bone graft
- Position of pins
Condition of wound
- Haematoma
- Superficial infection
- Deep infection

Date of discharge

Nature of immobilization at the time of discharge

Total period of hospitalization

Follow-up:

At 2 month
- Condition of wound
- Presence of pain
- Signs of union on X-ray
- Signs of non-union on X-ray

At 3 months
- Condition of wound
- Presence of pain
- Signs of union on X-ray
- Signs of non-union on X-ray
- Ability to lift the limb against gravity
- Ability to walk unsupported
- Ability to walk with crutches
- Limb length discrepancy
- Range of movements
- Quadriceps wasting
- Evidence of avascular necrosis of femoral head.
at 4th, 5th and 6th months

- Condition of wound
- Presence of pain
- Signs of union on X-ray
- Signs of non-union on X-ray
- Ability to lift the limb against gravity
- Ability to walk with crutches
- Ability to walk unsupported
- Limb length discrepancy
- Range of movements
- Quadriceps wasting
- Evidence of avascular necrosis of femoral head
- Ability to squat
- Ability to sit cross legged.

Final Results:

- Good / Satisfactory / Poor.

Operation:

Anaesthesia - General anaesthesia or spinal analgesia.

Position - Prone position on fracture table with feet fixed to foot plates.

Approach:

Moore's approach with some modifications was used.
Incision starts about 10 cm distal to the posterior superior iliac spine extending distally and laterally with the fibres
of gluteus maximus up to the tip of greater trochanter, extending distally to the lateral aspect of greater trochanter, vertically downward on lateral surface of thigh for about 10 to 12 cm. Gluteus maximus muscle split in direction of its fibres. The underlying fat and sciatic nerve reflected medially. The quadratus femoris identified and limb rotated internally, the rectangular graft is marked out on the inter-trochantric crest of femur, starting at a point about 3 cm. from the tip of greater trochanter along the postero-lateral aspect of inter-trochantric crest for a distance of entire width of quadratus femoris, about 1.5 to 2 cm. broad and 1 to 1.5 cm. thick. To minimize the chances of breaking the graft, it is outlined with drill holes through posterior cortex of femur and these drill holes are then be connected using osteotome. The graft thus outlined is undermined with curved osteotome. Medial edge of graft should be at the base of neck of femur and outside the capsule.

After the bone graft has been undercut with curved osteotome, the graft with attached quadratus femoris muscle is freed with a large osteotome and retracted in the direction of the muscle's origin on the lateral aspect of the ischial tuberosity.

Evidence of circulation on cancellous surface of bone graft as well as in the substance of attached quadratus femoris muscle was always noted. This was seen
by free oozing on cancellous surface of bone graft and the muscle maintained the reddish appearance of normal muscle.

After preparation of graft, rotators of hip were cut and retracted medially and inverted T incision is then made in the posterior part of capsule, the stem of which starts at the acetabular labrum and ends at the femoral attachment of capsule. The cut ends of capsule was retracted and posterior aspect of the head is readily seen. In old untreated un-united fractures, fracture surfaces were cleared of fibrous tissue and any tags of periosteum; their sclerosed surfaces were then freshened. A tilt or rotation of femoral head was corrected. Multiple drill holes were made in femoral head to decompress the necrotic bone. The fracture surfaces were reduced and fixed in a position of 20° internal rotation.

The fracture was then fixed internally by Moore's pins. Usually we used 3 or 4 Moore's pins. Free cancellous bone grafts, taken from iliac crest or greater trochanter were packed between the fracture surfaces. Pins should be parallel to each other to provide good fixation. Muscle pedicle bone graft was attached to the gutter made on posterior surface of head and neck without any tension or torsion with the help of stapple.

The common tendon of obturator internus and gemelli was again reattached to its original insertion
and quadratus femoris muscle fibres to provide graft with additional security. Wound closed in layers.

**Post-operative treatment**

Part is immobilised by long Liston's splint in post-operative period up to the removal of stitches. After the removal of stitches, a hip spica was applied for 2 - 4 months, but in some patients where fixation was secure, no immobilization was given and patient was kept freely mobilized in bed.

Criteria for the perfect reduction are the Garden's alignment index, utilizing standard radiographic views. The normal angle between the medial trabeculae of the femoral head and the medial cortex of the femoral shaft is 160 degree. The central axis of femoral head and neck in the lateral views normally be in straight line, i.e. 180 degree. A perfect reduction can then be called as an alignment index (A.P. angle / Lateral angle) of 160 degree/180 degree. Reduction producing an angle of 155 degree to 180 degree in each view should be considered acceptable. It is associated with a relatively higher rate of union and low incidence of avascular necrosis.

**Follow-up**

Patients were followed at 2 months and then every month for 6 - 12 months.
I. Clinical assessment -

At 2 month - Condition of wound,
- Presence of pain.

At 3 month - Condition of wound,
- Presence of pain,
- Ability to lift the limb against gravity,
- Ability to walk unsupported,
- Limb length discrepancy,
- Range of movements,
- Quadriceps wasting.

At 4th, 5th and 6th months -

- All above criteria with ability of patient to walk with crutches or unsupported.
- Ability to squat and sit cross-legged.

II. Radiological assessment -

was done at regular intervals of 1 month to see -

1. Whether fixation was secured,
2. Stage of union at fracture site,
3. Extrusion of pins,
4. Any evidence of absorption of neck of femur,
5. Any sign of segmental collapse or avascular necrosis.
Photograph - 1
Showing skin incision.

Photograph - 2
Showing Quadratus Femoris Muscle.
Photograph - 3
Showing Muscle pedicle graft
(Cruralus Femoris Muscle) with donor site.

Photograph - 4
Showing cancellous bone grafts taken from greater trochanter.
Photograph - 5
Showing sclerosed head of femur.

Photograph - 6
Showing multiple drill holes made in femoral head.
photograph - 7

showing fractured fragments fixed with Moore's pins and muscle pedicle graft fixed with staple.