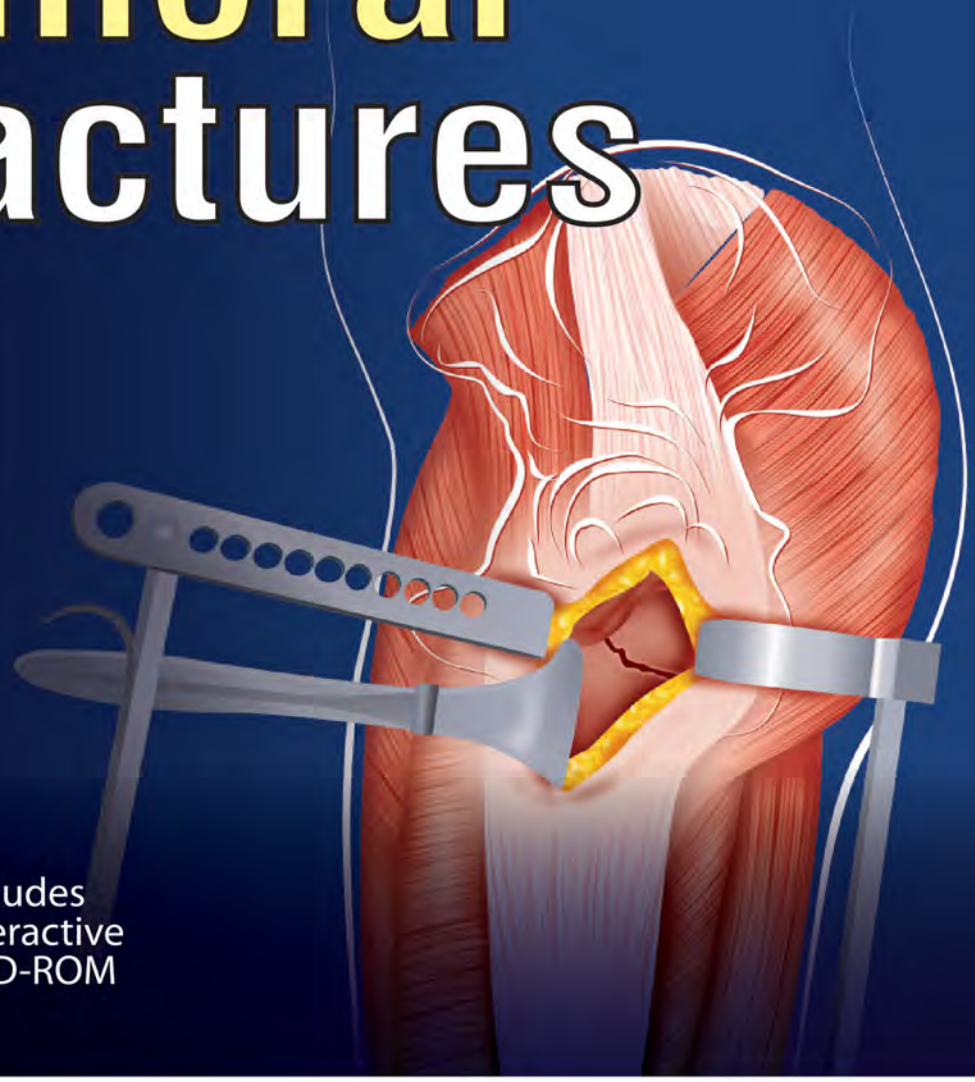
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# An Operative Manual of Proximal Femoral Fractures





Includes Interactive DVD-ROM

**Dhananjay Gupta**
**Sumit Banerjee**

*Forewords*
**Lawrence D Dorr**
**Surya Bhan**

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# Section 3

## Intertrochanteric Femoral Fractures


9. Intertrochanteric Femoral Fractures: An Overview
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# 9 Intertrochanteric Femoral Fractures: An Overview

*Dhananjay Gupta, Surya Prakash Sharma*

## Introduction

Intertrochanteric hip fracture patients are biologically older than those who sustain a femoral neck fracture. They have low Hb%, poorer prefracture ambulatory status and a higher number of associated medical conditions[1] (Lawton et al.). These types of fractures are common in geriatric age group patients. Aside from a higher incidence, hip fractures in a geriatric population is a significant problem due to the possible onset of severe and in some cases dramatic complications and consequences.[12] Internal fixation is the standard treatment.[2-5] Therefore, perioperative mortality is expected to be high owing to their comorbid clinical conditions.

## Epidemiology

### Incidence

*Race:* Incidence is 2–3 times greater in whites, because of the increased rate of osteoporosis in whites.

*Sex:* Intertrochanteric fractures are more frequent in women than men by about 5:1.

*Age:* The average age is 50–75 years.

After age 50 years, its rate doubles with each decade. Intertrochanteric (IT) fracture at a young age is not common and is usually the result of a major traumatic event or bone pathology.

## Biomechanics of Trochanteric Fracture

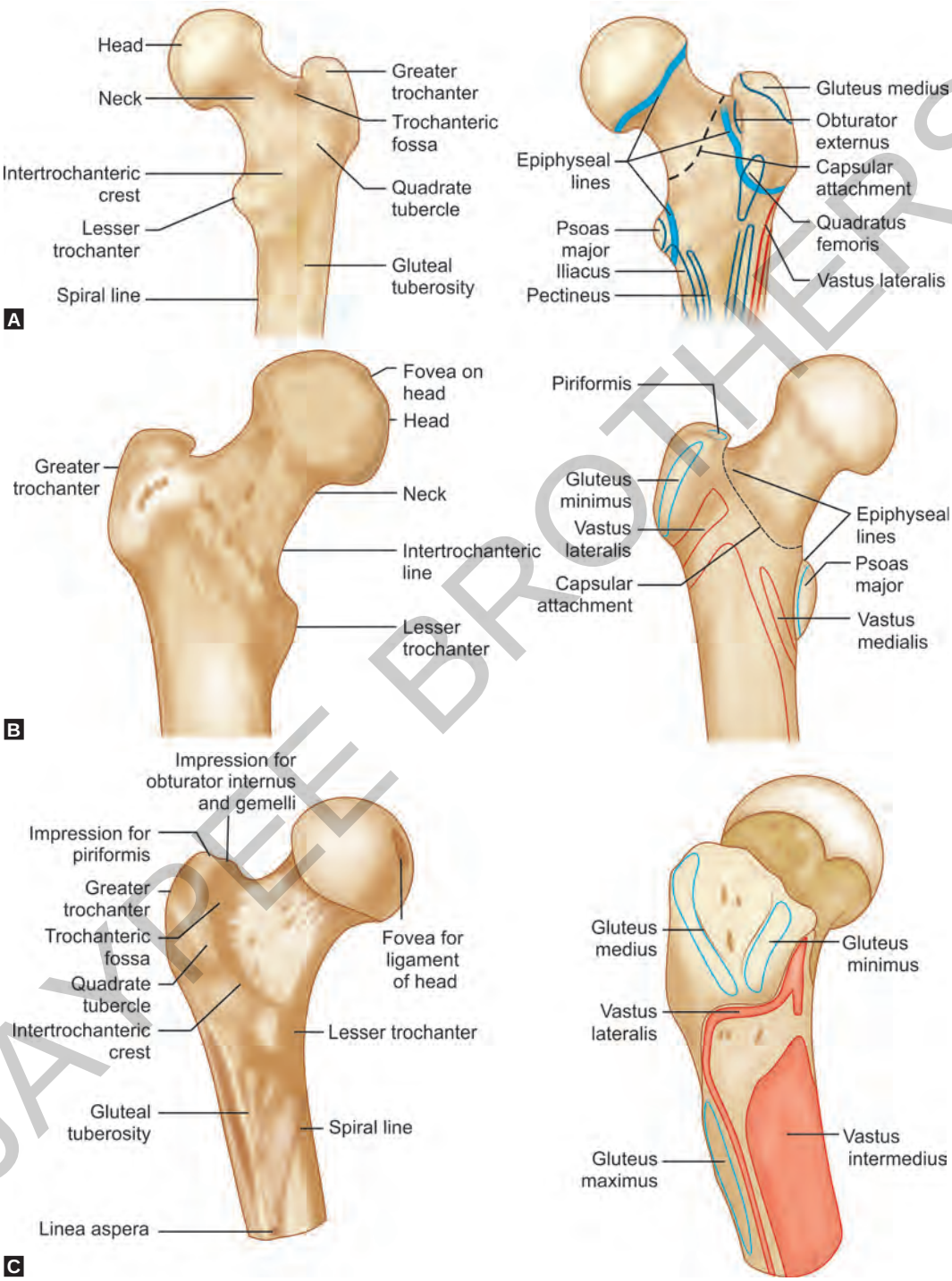
Contributing factors are fall on or near hip, poor protective reflexes, thin soft tissue cover such as muscle and fat and off course, low density bones. Poor vision, decreased muscle power, labile blood pressure, vascular diseases, and coexistent musculoskeletal pathology are also involved. A curse for old, porotic bones, a simple fall will lead to proximal femur fracture in around 2–4% elderlies. Men >80 years have eight fold women >80 years have five fold increases in (Gallagher et al.) chance of fracture.

The fall of an elderly generates 16 times the energy necessary to fracture the femur.[6] Only 4–5% result in a fracture and only 2% result in hip fracture.[7] Young suffer these injuries after high-energy trauma such as motor vehicle accidents (MVA) or fall from height.

## Pathoanatomy

- An intertrochanteric hip fracture occurs between the greater trochanter, where the gluteus medius and minimus muscles (hip extensors and abductors) attach **(Figures 9.1 A to C)**, and the lesser trochanter, where the iliopsoas muscle (hip flexor) attaches[8]
- These extracapsular fractures occur in cancellous bone with an abundant blood supply. As a result, nonunion and

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**Figures 9.1A to C:** Pertrochanteric region and muscle origin and insertion: (A) Anterior; (B) Posterior; (C) Lateral.
*Source:* Cunningham's Textbook of Anatomy

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osteonecrosis are not major problems, as in femoral neck fractures

- Deforming muscle forces will usually produce shortening, external rotation, and varus deformity at the fracture:
  - Abductors tend to displace the greater trochanter laterally and proximally.
  - The iliopsoas displaces the lesser trochanter medially and proximally.
  - The hip flexors, extensors, and adductors pull the distal fragment proximally.

## Calcar Femorale

A vertical wall of dense bone extending from the posteromedial aspect of the femoral shaft to the posterior portion of the femoral neck, forms an internal trabecular strut within the inferior portion of the femoral neck and intertrochanteric region and acts as a strong conduit for stress transfer **(Figure 9.2)**.

Fracture stability is determined by the presence of posteromedial bony contact (communition), lateral wall integrity, and osteoporosis.

## Classification

Basically the aim of classification should be to address the preoperative selection of implant, intraoperative difficulty by the surgeon, and postoperative rehabilitation of the patients, which can be achieved by the stable internal fixation of the fracture. Standard

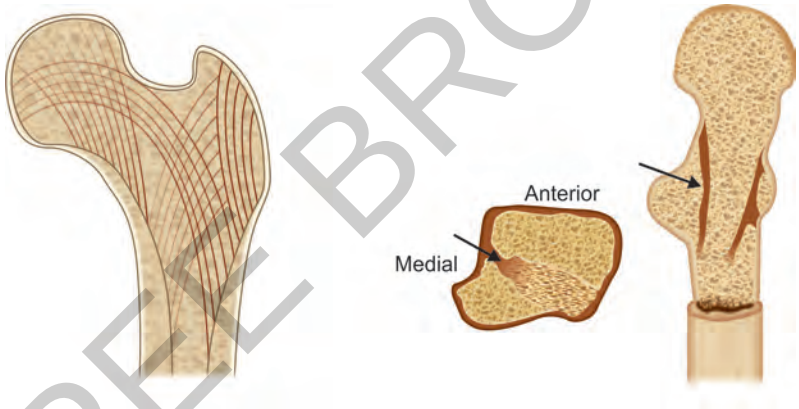



**Figure 9.2:** Calcar femorale

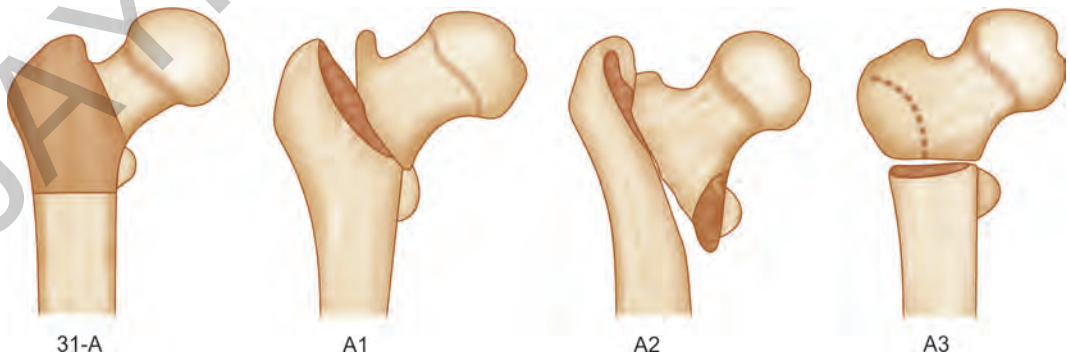



**Figure 9.3:** AO classification of trochanteric fracture

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classification used in common clinical practice is AO classification,[9] which divides trochanteric fractures into three groups based on obliquity of the fracture line **(Figure 9.3)**.

*A1*: Trochanteric area fracture, pertrochanteric simple:
- Along the intertrochanteric line
- Through the greater trochanter
- Below the lesser trochanter

*A2*: Trochanteric area fracture, pertrochanteric multifragmentary:
- With one intermediate fragment
- With several intermediate fragments
- Extending >1 cm below the lesser tro-chanter

*A3*: Trochanteric area fracture, intertrochanteric
- Simple, oblique
- Simple, transverse
- Multifragmentary

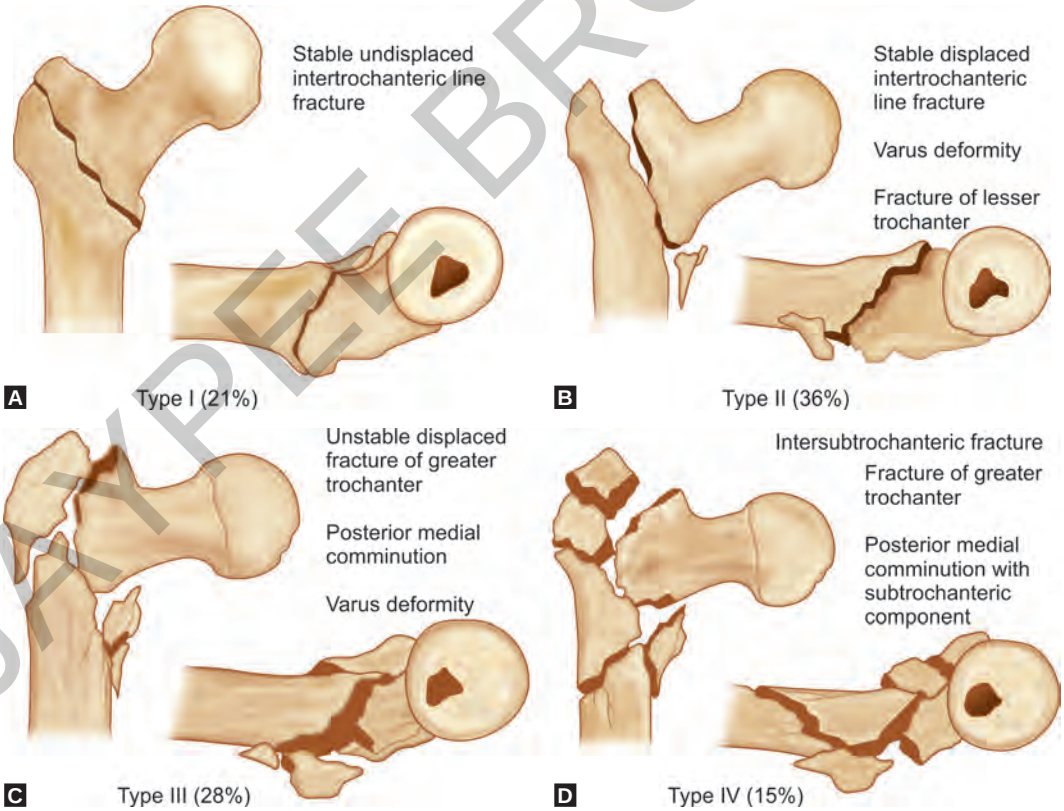
*A1*: These types of fractures are simple two fragment fractures with a good support at the medial cortex

*A2*: These types of fractures are multifragmentary with the medial and dorsal cortices broken at several levels, but with an intact lateral cortex

*A3*: These are the fractures where the lateral cortex is also broken (reverse obliquity fracture).

## Body and Griffin Classification

**Figures 9.4A to D** show the Body and Griffin Classification.[10]




**Figures 9.4A to D:** Body and Griffin classification

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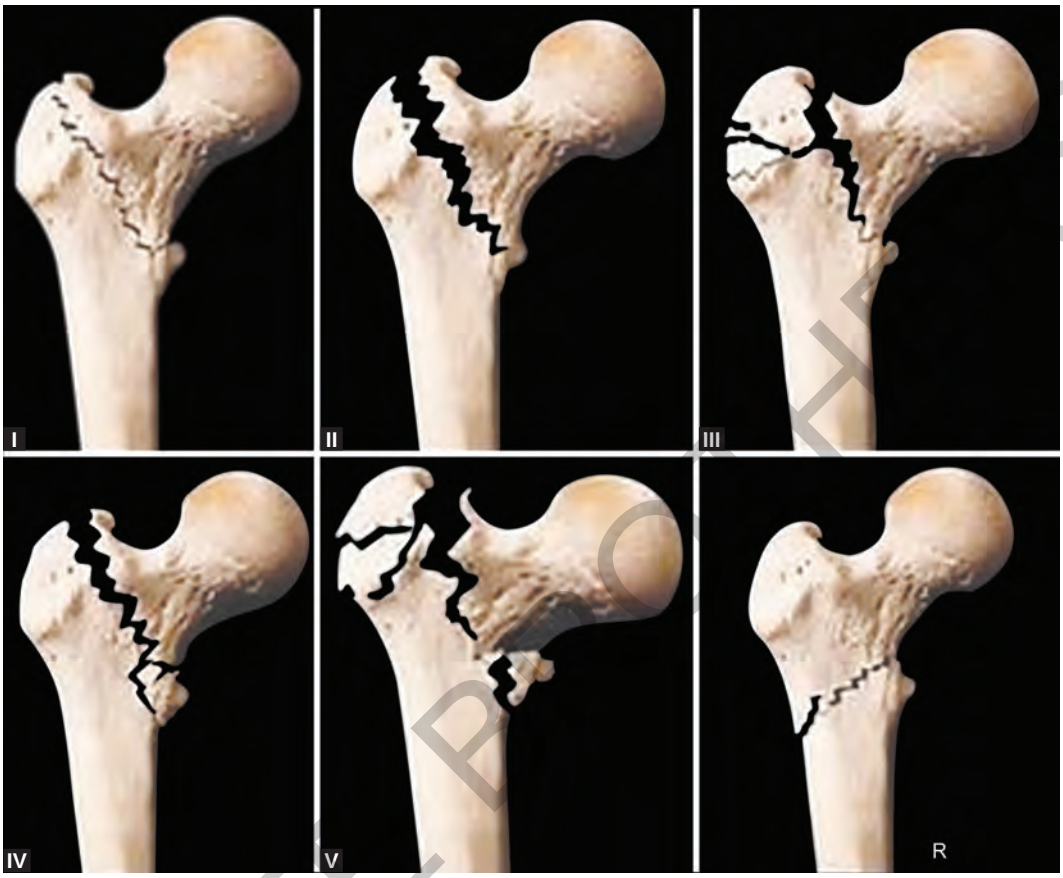



**Figure 9.5:** Evans' classification

### *Evans' Classification*

**Figure 9.5** shows Evans' classification of intertrochanteric femur fracture.[11]

*Type I*: Undisplaced two-fragment fracture.

*Type II*: Displaced two-fragment fracture.

*Type III*: Two-fragment fracture without posterolateral support, owing to displacement of greater trochanter fragment.

*Type IV*: Three-fragment fracture without medial support, owing to displaced lesser tro-chanter or femoral arch fragment.

*Type V*: Four-fragment fracture without pos-terolateral and medial support (combination of type III and IV).

*R—Reversed obliquity fracture*: A special category is the 'reverse obliquity fracture.' In reverse obliquity fractures, the fracture line courses laterally as it extends from proximal to distal, running perpendicular to the intertrochanteric line. Even if there is no comminution and even if the fracture line does not reach the subtrochanteric region, this fracture is unstable and prone to displacement with conventional sliding screws, as the fracture line is parallel to the course of the sliding screw and displaces as the screw slides.

## Presentation and Assessment

Presentation is usually with history of trauma or fall followed by pain in the groin or thigh,

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**Figure 9.6:** Pelvis with both hip AP view

unable to stand or ambulate, shortening and external rotation of the limb, tenderness in the area of trochanter, ecchymosis may be present, ROM hip will be painful and restricted. Well apparent in displaced fracture and less obvious in undisplaced or impacted fracture where patient may come walking complaining of pain in groin or proximal thigh. Extensive bruising will be visible in thigh area if patient is coming after few days. Assessment of nutrition and bedsores should always be done in such patients, as negligence cannot be ruled out.

Associated injuries should be evaluated clinically. Radiological screening should start with X-ray of pelvis with both hip AP view **(Figure 9.6)**. On confirmation, we go for X-ray of affected hip with thigh in 15° to 20° of internal rotation in AP **(Figure 9.7)** and cross table lateral view **(Figure 9.8)** to see stability of fracture along with chest X-ray and of other painful areas to prevent frequent shifting to X-ray department and to rule out associated injuries.



**Figure 9.7:** Fifteen degrees internal and traction view

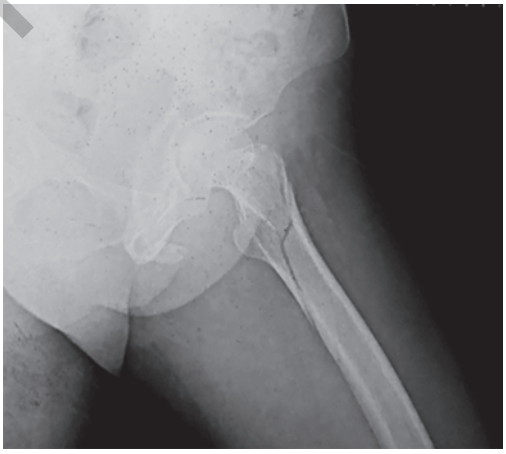


**Figure 9.8 :** Cross table lateral view

## Treatment

The primary purpose of treatment and rehabilitation in the elderly after a hip fracture is to improve an individual's quality of life. It is important to underline that principles and methods of functional restoration after hip fracture should consider careful planning of a rehabilitation program individually for every patient and its implementation with respect to decisions made by the rehabilitation team.[12]

## Conservative Treatment

Conservative treatment is associated with unacceptably high rate of complications and reserved for an elderly person whose medical

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condition carries an excessively high risk of mortality from anesthesia and surgery, nonambulatory patient who has minimal discomfort following fracture. Approaches for conservative management are early bed to chair mobilization within limits of patient comfort, to prevent the complications of recumbency. Accept the deformity. Establish and maintain reasonable reduction via skeletal traction until fracture union occurred (10–12 weeks). Complications are frequent, nursing care difficult.

## Surgical Treatment

In any patient who hopes to get out of bed, the treatment of intertrochanteric fractures are surgical.

## Extramedullary Fixation

The traditional treatment in recent decades is the sliding hip screw. This device has a large screw in the femoral head, and neck engages a plate fixed to the shaft, with sliding of the screw allowed if and when the fracture impacts. Other options for these types include varus fixed angle devices such as a blade plate or a 95° sliding hip screw; or more recently, a locked proximal femoral plate

## Intramedullary Fixation

Intramedullary devices (cephalomedullary nails) theoretically offer less soft tissue dissection and a shorter moment arm (the vertical device, i.e. the nail, is closer to the hip center than the plate would be). Intramedullary fixation may be preferable for reverse obliquity fractures of those with subtrochanteric extension and carries fewer complication.[13] In reverse obliquity fractures, the fracture line courses laterally as it extends from proximal to distal and typically reaches the subtrochanteric region. Because of that geometry, these fractures are more prone to failure when fixed with traditional sliding screws: the shaft displaces medially and the fracture does not compress as the screw 'slides.

## Conclusion

Sliding hip screw fixation is likely more cost-effective for stable intertrochanteric fractures (A1) or those with questionable stability (A2), whereas intramedullary nail fixation is more cost-effective for reverse obliquity fractures (A3). These conclusions are highly sensitive to the fixation failure rate, which was the major influence on the model results.[14]

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An Operative Manual of

# Proximal Femoral Fractures

***Salient Features***

- Includes the principles and modalities of treatment which are still evolving in the attempt to mobilize the patients associated with all proximal femoral fractures
- Introduces the intertrochanteric fractures treatment with skeletal traction in suspended T-splints on Balkan beams, with serial bedside X-rays
- Enlightens the journey from fixed angle devices to dynamic hip screw (DHS), proximal femoral nail (PFN), proximal femoral locking plates (PFLPs) and challenging arthroplasties
- Gives a basic detail about the region or pathology concerned and then give a detailed step-by-step surgical procedure with tips and pearls
- Attempts to create a thought process in the mind of the readers about the topic, navigate them through the steps of surgical procedure
- Keeps the book restricted to the fracture fixation techniques
- Helpful for the residents and young orthopedic surgeons in improving their knowledge of surgical practice.

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