DISLOCATION OF HIP JOINT

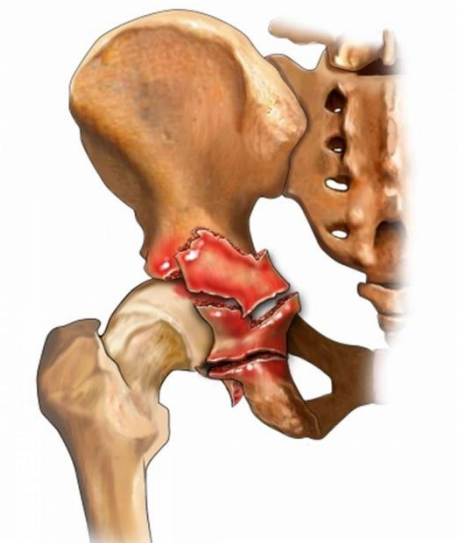
* **Incidence:** Rare because it is a stable joint due to deep acetabulum & strong surrounding muscles and ligaments.

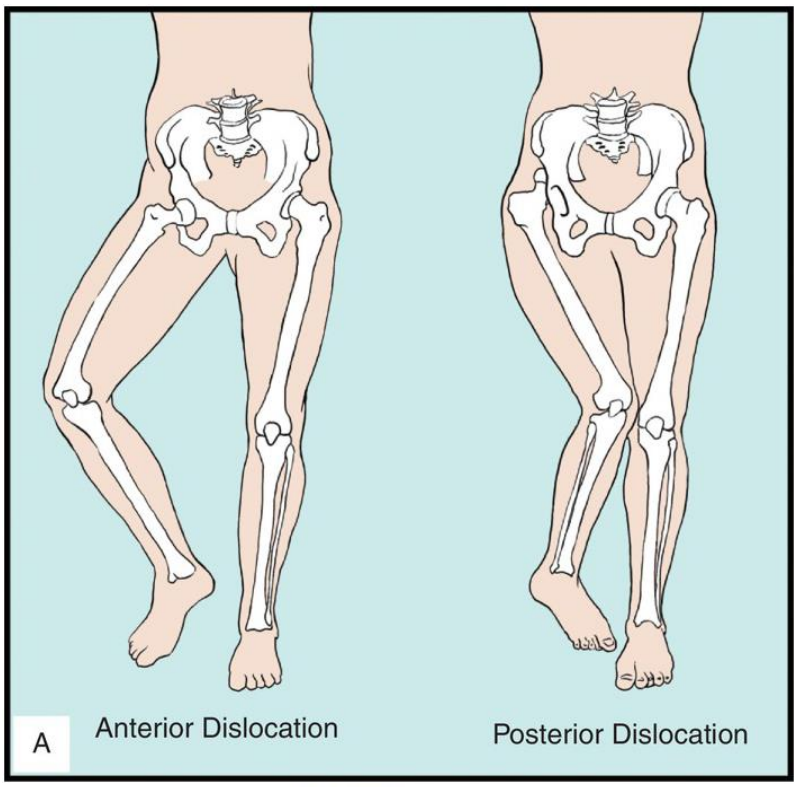
* **Types:**

1. **Posterior dislocation:** The commonest.

2. **Anterior dislocation:** is rare , occur due to force transmitted along the femoral shaft, with the hip join in flexion , abduction and externally rotation so that the head of femur lies on the anterior rim of the acetabulum.

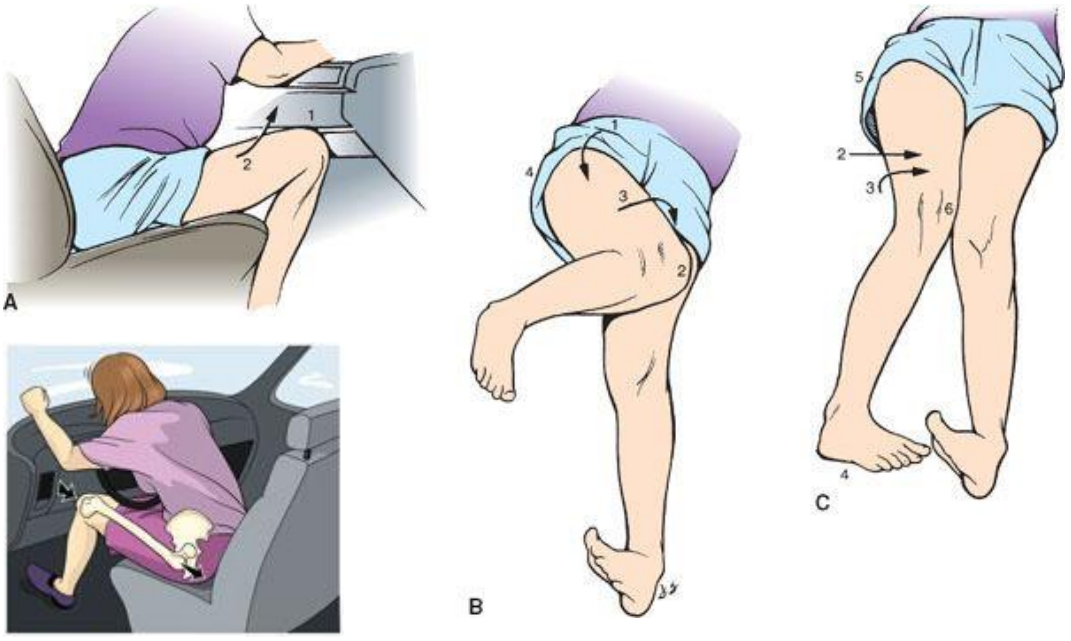
3. **Central dislocation:** is rare , occur due to fall on the side i.e on the greater trochanter → push of head of femur medially → acetabular fracture





Posterior Dislocation of Hip joint

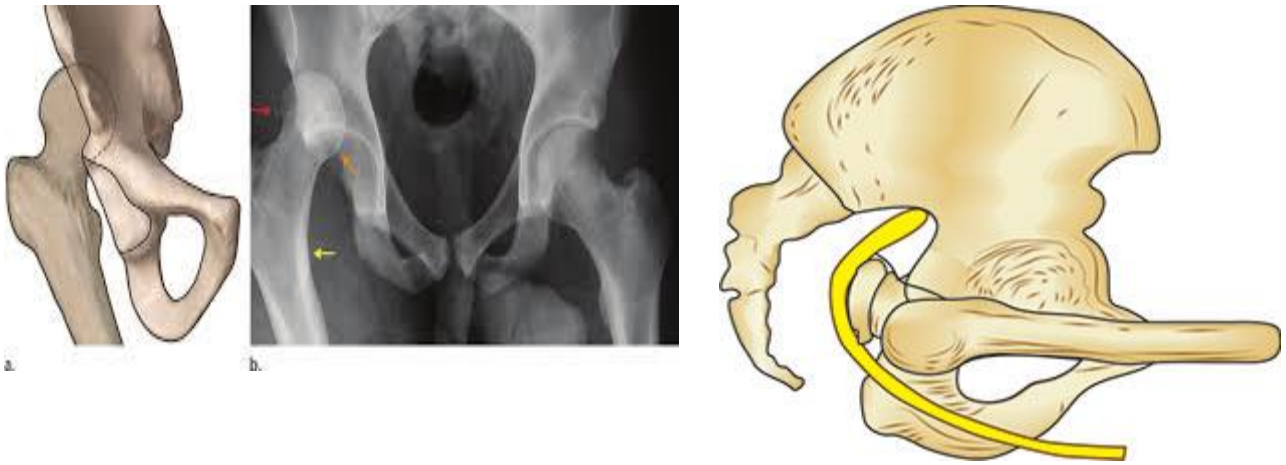
* **Aetiology:** occur due to force transmitted along the femoral shaft, with the hip join in flexion , adduction and internal rotation so that the head of femur lies on the posterior rim of the acetabulum as in dash-board accidents .



* **Classification:** According to the site of the head of femur into :

A. **Iliac dislocation:** The commonest, the head lies on the lateral aspect of the ilium.

B. **Sciatic dislocation:** Rare, the head lies on the sciatic foramen.



* **Complications:**

1- Fractures of posterior lip of acetabulum , femoral head ,neck and shaft of femur or patella .

2- Avascular necrosis of head of femur

3- Myositis ossificans .

4- Injury of sciatic nerve .

5- osteoarthritis of hip.

* **Clinical picture:** (see general principles of fractures) +.

1. History of characteristic trauma followed by a**bsolute** loss of movements of hip joint with pain & tenderness in the groin.

2. The **head of femur** is not felt in its normal place (femoral pulse is not felt) & felt in abnormal position (over the ilium or gluteal region).

3. The **greater trochanter** is displaced upwards.

4.**Deformity:** Flexion, adduction, internal rotation with real supratrochamenc shortening & the greater trochanter is raised.

5. **Real supratrochanteric shortening** detected by:

- Measure the distance between the A.S.I.S. & the adductor tubercle of femur on both sides →the distance is shorter on the diseased side.

a- Nelaton's line: a line between the A.S.I.S. & the ischial tuberosity :

♣ Normally, this line passes on the top of the greater trochanter.

♣ In supratrochanteric shortening, the greater trochanter is above this line.

b- Schene's Line : Draw the following 2 lines:

1) A line connects the 2 A.S.I.S.

2) Line connects 2 greater trochanters.

- ♣ Normally, the 2 lines are parallel.
- ♣ In supratrochanteric shortening, the 2 lines are not parallel.

a-Shoemaker's Line: Draw a line from the greater trochanter to the A.S.I.S. & extend it upward to meet the middle line.

- ♣ Normally, this line meets the middle line above the umbilicus.
- ♣ In supratrochanteric shortening it meets the middle line below the umbilicus.

b- Shenton's line: It is a radiological finding.

- ♣ Normally, in A-P view there is a smooth curved line passing through the lower border of the superior pubic ramus & the lower border of the neck of the femur.
- ♣ In supratrochanteric shortening, this line is disturbed.

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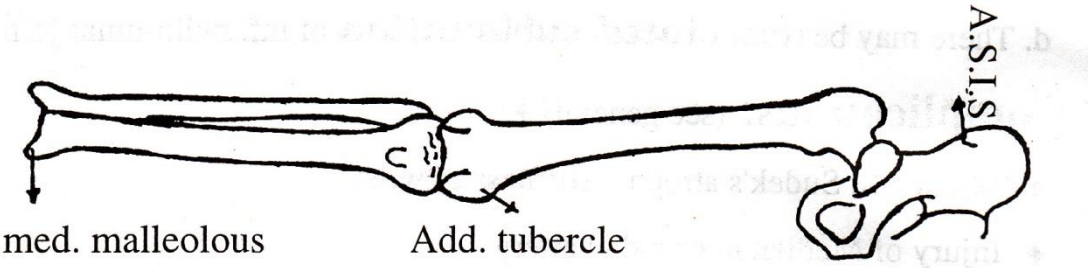
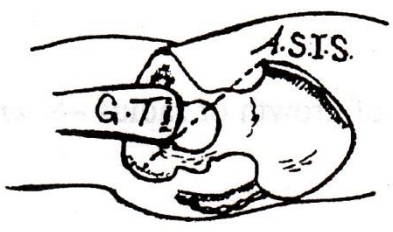
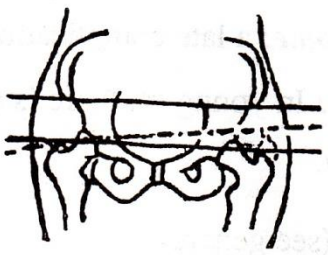
* Supratrochanteric Shrtening *

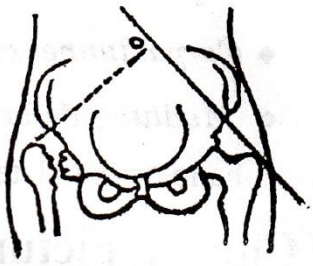




• Nelaton's line



• Schene's line



• Schoemaker's line

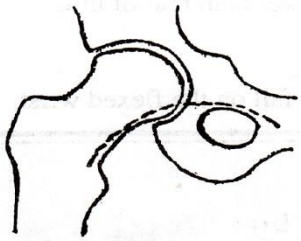
- **Investigations:**
  - **Plain X-ray:**
    - The head of femur is outside the acetabulum.
    - The lesser trochanter is less apparent due to internal rotation .
    - **Shenton's line .**
    - Associated fracture as posterior rim of acetabulum .

- **Treatment:**

1. Closed reduction under general anaesthesia:
   - With the patient supine & the pelvis is fixed by an assistant.

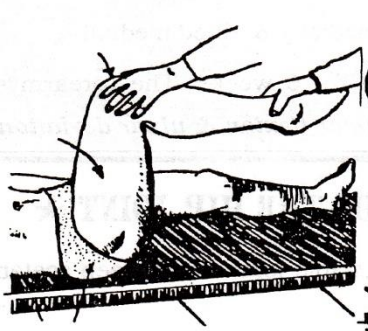
- Flexes hip & knee at right angles to bring head of femur behind acetabulum.
- The femur is pulled vertically upwards to draw its head into the acetabulum.

2. Fixation: in a hip spica or traction for 6 weeks in abduction.

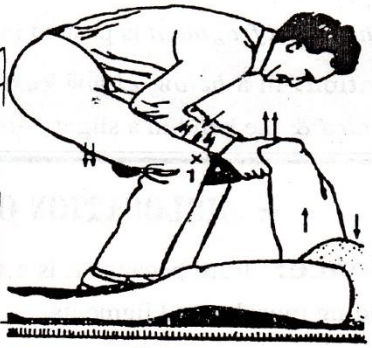


• Shenton's line

" 1 "

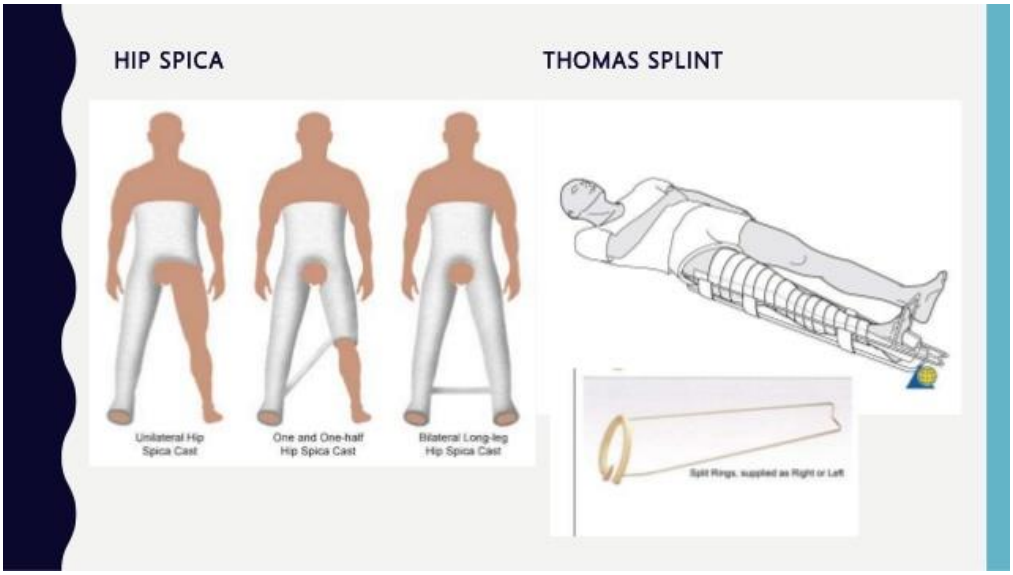


" 2 "



" 3 "

*** Reduction of Post Dislocation of Hip Joint ***



FRACTURE NECK OF FEMUR

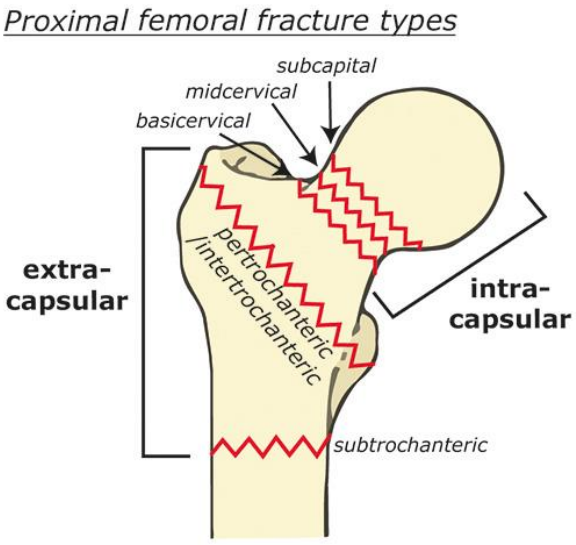
Intracapsular neck fractures

* **Incidence :**
  - More common in **elderly females** above 50 years (due to postmenopausal osteoporosis).
  - It is the **commonest fracture in old age** .
* **Aetiology:**
  a. **In elderly :** The trauma usually a minor injury (due to senile osteoporosis). Recently, this fractures is considered stress fracture .

  b. **In young adult :** the fracture may occur due to severe trauma applied in the long axis of femur.
* **Classification:** (see general principles of fractures).

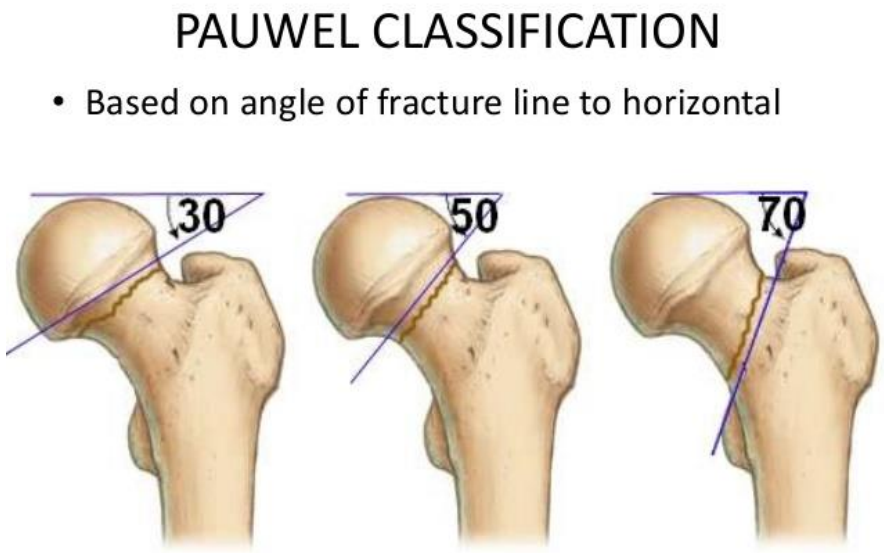
A) According to the site : Intracascular fracture or also called high neck fracture includes:

1. **Subcapital** : immediately below the head of femur.
2. **Trancervical** : in the middle of the neck of femur.
3. **Basal** : At the junction of neck with greater trochanter.



B) Pauwels' classification: Pauwels' angle is the angle between the fracture line and the horizontal plane .

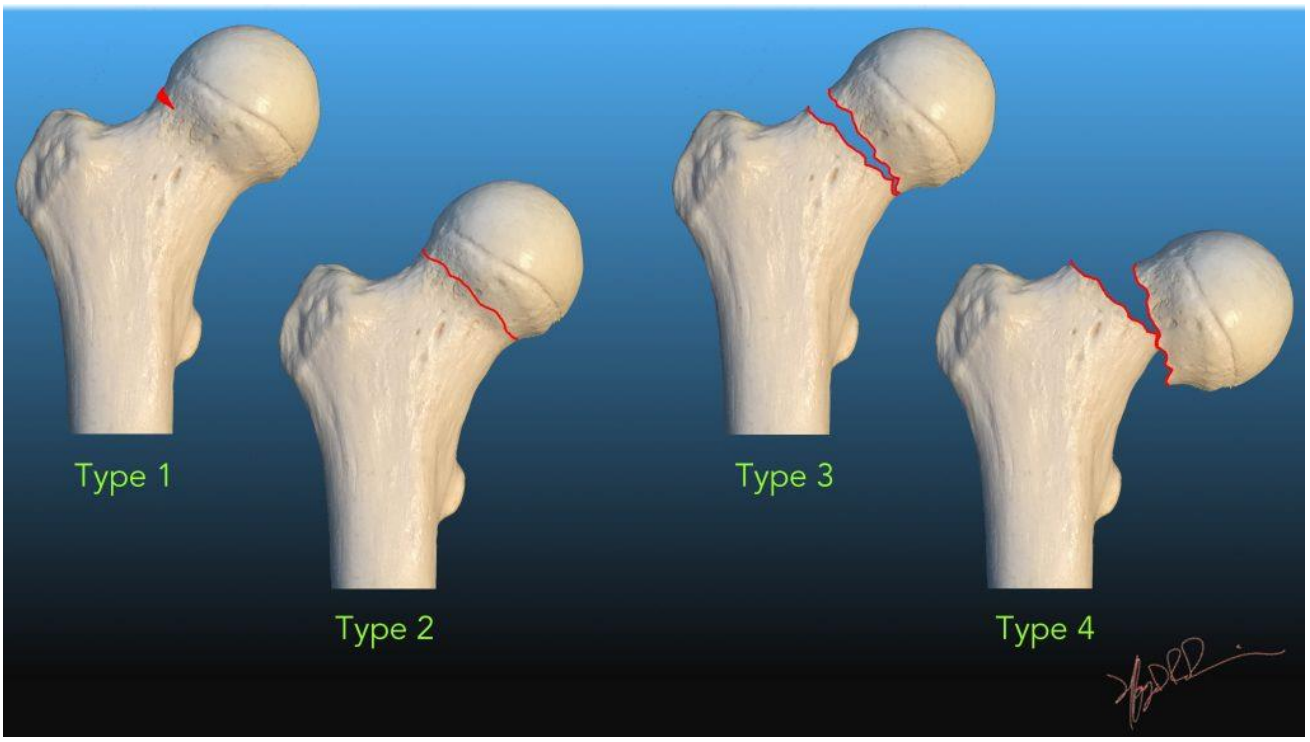
- **Type I:** Less than 30° :Stable fracture & have good chance to unite .
- **Type II :** 30 – 50 °: is intermediate between type **I** and **III**.
- **Type III:** 70° or more: vertically unstable fracture . It is under shearing forces and may go to non-union if it is not stabilized by surgery.



C) Garden's classification : According to the degree of **displacement** , the fracture is classified into :

- **Type I :** Incomplete or impacted fracture, good chance to unite.
- **Type II :** Complete undisplaced fracture in AP and lateral views, good chance to unite.
- **Type III :** Complete with partial displacement , moderate chance to unite.

- **Type IV:** Completely displaced, more liable to non-union.



D) According to the **position of the distal fragment** after trauma :

1. **Adduction** fracture: 80% of cases.
2. **Abduction** fracture: 20% of cases.

* **Complications** : (see general principles of fractures).

I) General complications :

- Complications of prolonged bed rest (mention).
- **Mortality rate is 20 %** in the first 3 months after the fracture in elderly patients .

II) Local complications :

1. Avascular necrosis :

- Blood supply of the head of femur is derived from:

- An **extracapsular arterial ring** present at the base of the neck formed by branches of the medial & lateral circumflex femoral arteries.
- **Retinacular vessels** which are ascending cervical branches arising from extracapsular ring, ascend along the surface of the neck .
- **Intra-osseous nutrient blood supply** ascending in the shaft & neck of femur (of doubtful value) .
- Arteries of **ligamentum teres** (minor blood supply) only supply a small area of bone around the fovea. In adults, not always patent.

- **In intracapsular fracture**, avascular necrosis of the head of femur may occur (35%) due to injury of retinacular main blood supply.

2. **Delayed union & non-union** is common in intra-capsular fracture due to :

a. **Osteoporosis** in elderly.

b. **Avascular necrosis** of the head of femur,

c. Minimal fracture haematoma with scanty callus formation.

d. The **head of femur** is freely mobile with accurate reduction & fixation is difficult .

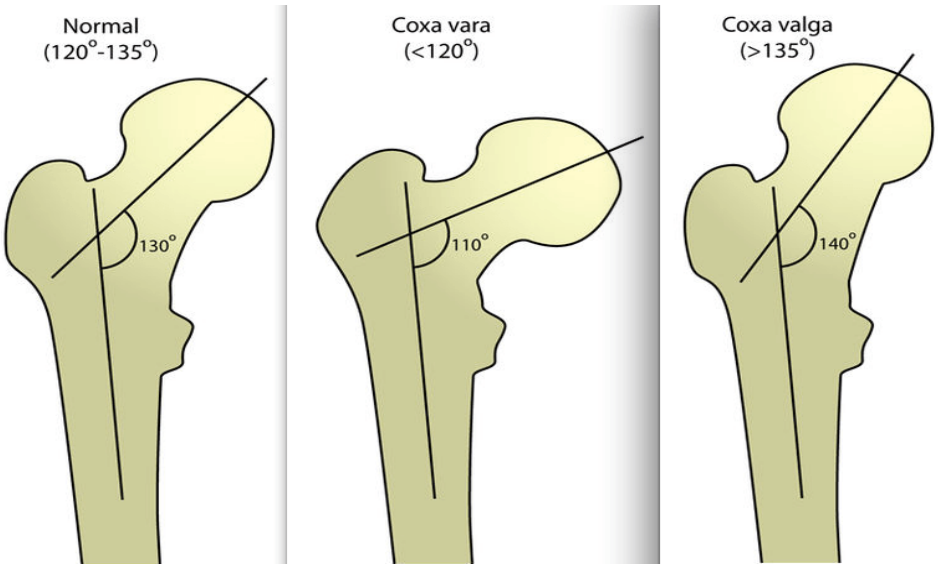
3. **Mal-union** :

- The normal neck shaft angle is 120^{o} - 135^{o} .
- **Coxa vara :** decrease neck shaft angle below 120^{o} .
- **Coxa valga :** increase neck shaft angle above 135^{o} .

4. Osteoarthritis of hip.

5. Sciatic or femoral **nerve injury.**

6- Myocytis ossificans



* **Clinical picture**: (see general principles of fractures).

I- Undisplaced impacted fracture: Only tenderness over the fracture with no other abnormal finding & easily missed clinically.

II- Displaced fracture:

1- History of **trauma with pain & tenderness** over the fracture .

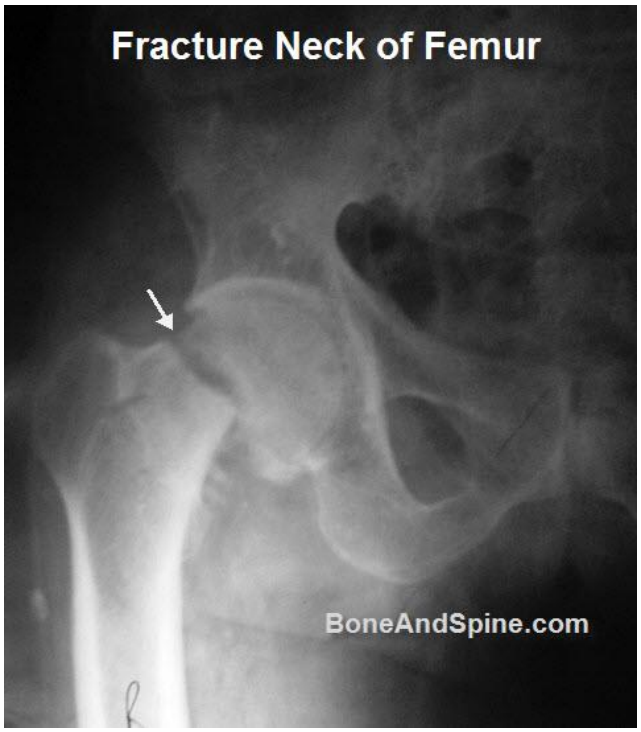
1- The patient is **unable to raise** the affected limb from the bed.

3- Deformity: Adduction (80%), or Abduction (20%), **flexion** (iliopsoas) & **external rotation** (iliopsoas & the weight of the limb) with real **supratrochanteric shortening** (Mention in short).

* **Investigation :**

- **Plain x-ray :**
  - It is essential for accurate diagnosis .
  - Impacted fractures may be missed in the x-ray .

Typical deformity



* **Treatment :**

- Relieve of **pain** and treatment of **osteoporosis** (increase bone density , increase strength of bones & improve healing of bones) .
- **Prophylaxis to prevent complications of prolonged be rest .**
- **Emergency surgery** is usually recommended as soon as possible for high femoral neck fractures to relieve pain, restore mobility and the proximal fragment cannot be fixed by conservative measures.
  - **Methods :** depends on displacement and age of the patient .

1) Impacted undisplaced fracture: In all ages, no reduction & internal fixation should be done, with 2-3 canulated screws .

2) Displaced fracture:

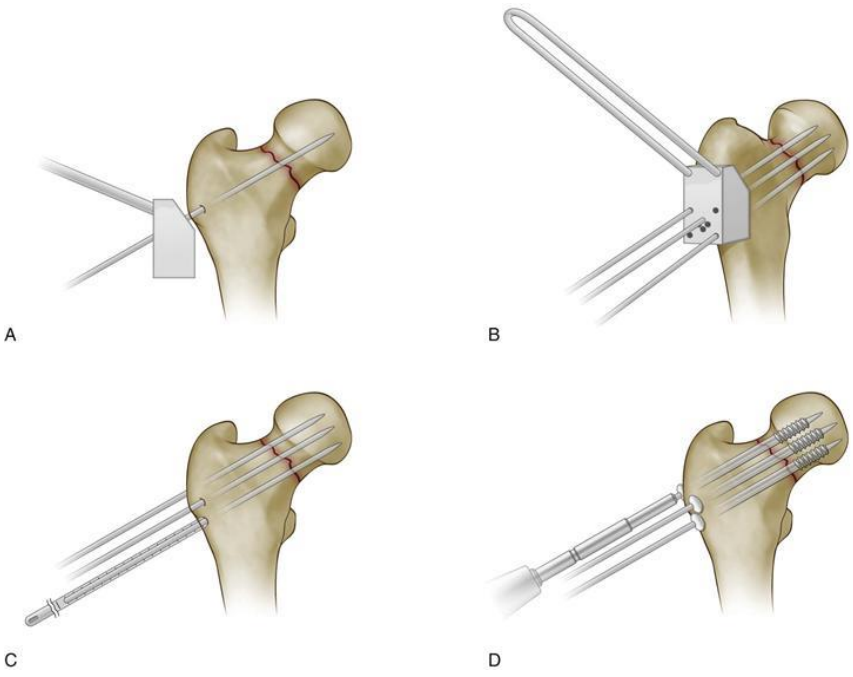
a- If the patient is **under 65 years** old: closed reduction (open reduction if this fails) & internal fixation by 2-3 canulated screws.

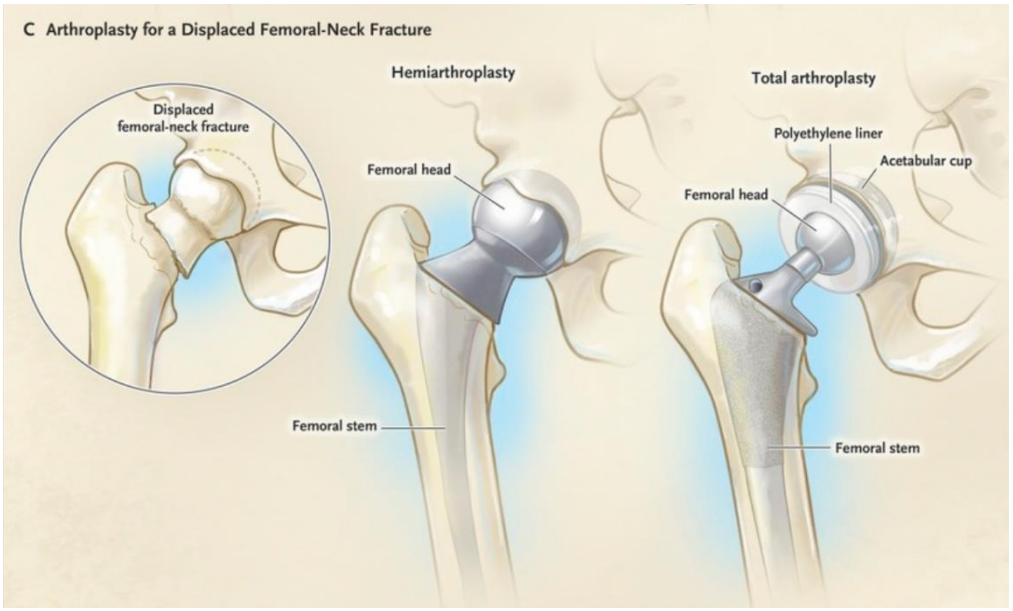
b- If the patent is **over 65 years old** (osteoporosis + high risk of avascular necrosis)

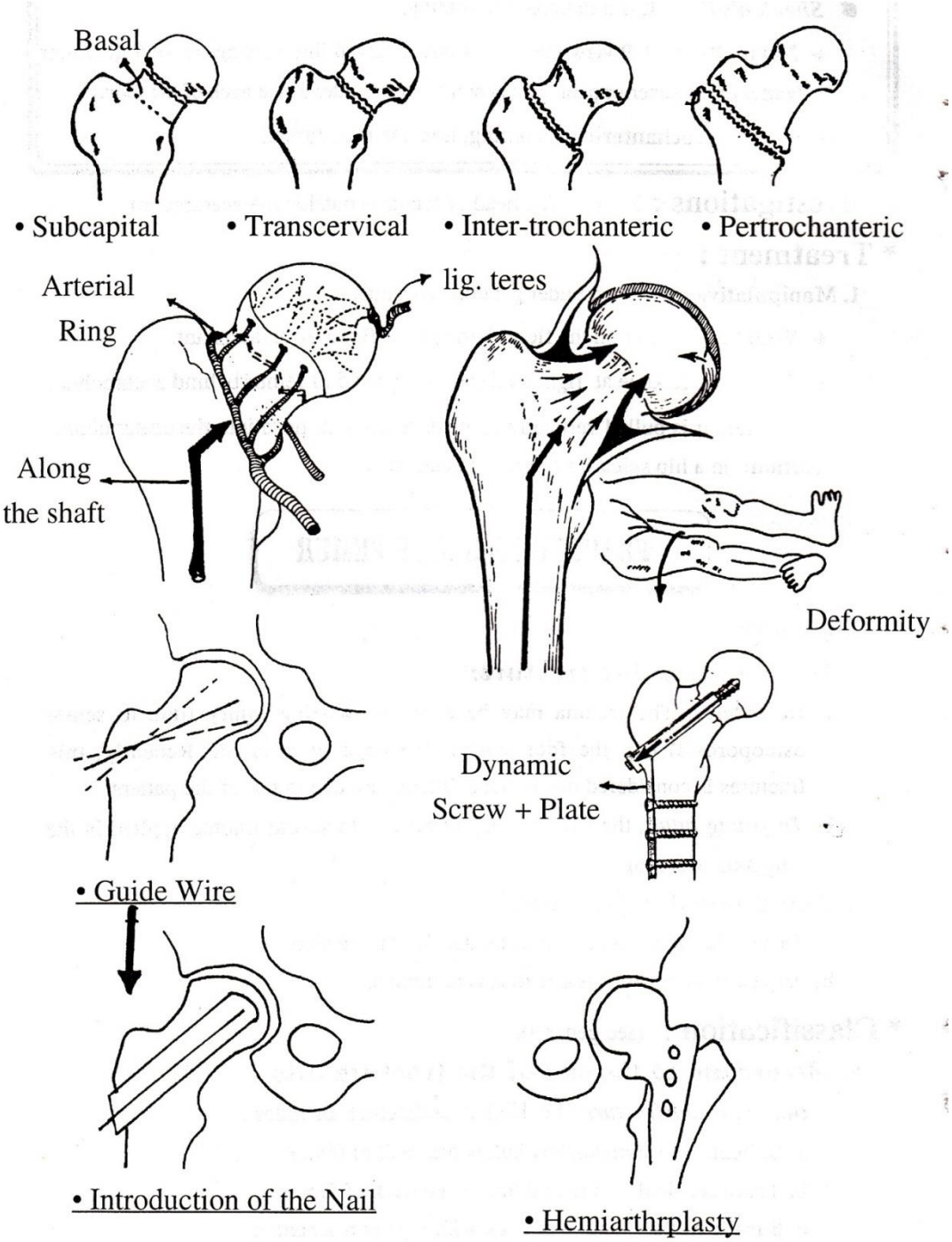
- The treatment of choice is replacement of the head of the femur with prosthesis (cemented **hemiarthroplasty**) to allow early weight bearing .
- **Total hip replacement :** (**Complete arthroplasty)**
  - Better long term results than prosthesis, especially if there is severe osteoporosis.
  - **Disadvantages:** more surgical trauma and more expensive.

- **Post-operative** early mobilization of the patient as soon as the general condition allows with physiotherapy to avoid complications of prolonged bed rest .

Internal fixation by canulated screws




C Arthroplasty for a Displaced Femoral-Neck Fracture
Displaced femoral-neck fracture
Hemiarthroplasty
Femoral head
Femoral stem
Total arthroplasty
Polyethylene liner
Acetabular cup
Femoral head
Femoral stem


Basal
• Subcapital
• Transcervical
• Inter-trochanteric
• Pertrochanteric
Arterial Ring
Along the shaft
lig. teres
Deformity
Dynamic Screw + Plate
• Guide Wire
• Introduction of the Nail
• Hemiarthrplasty

Extracapsular neck fractures

* **Definition :** This term is applied to fractures extending from intertrochanteric line to 5 cm below the lesser trochanter .

* **Incidence :**

  ▪More common in **elderly females** (due to postmenopausal osteoporosis).

  ▪ It is 60% of proximal femoral fractures .

* **Aetiology :**

  1- **In young adult :** the fracture may occur due to severe major trauma applied to the upper part of the thigh .

  2- **In elderly patient with** senile osteoporosis , the trauma usually a minor injury as fall on the side i.e on the greater trochanter .

* **Pathology :**

  - **Extracapsular fractures differ** from intracapsular fractures in 2 aspects:

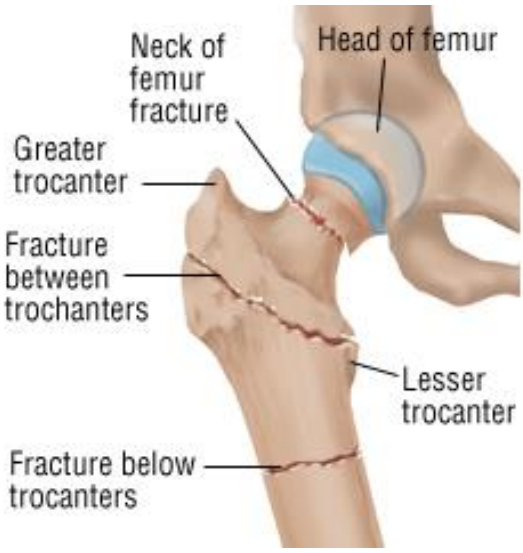
    1. Blood supply is not impaired → no avascular necrosis or non union.

    2. The proximal fragment can be controlled conservatively , therefore operative treatment is not mandatory .

  - Extracapsular fractures: (or also called low neck fracture), are divided into :

    1-**Trochanteric fracture:** Down to the level of lesser trochanter , have good healing capacity because of the wide fracture surface in cancellous bone with good blood supply.

    2-**Subtrochanteric fractures** from the lesser trochanter to 5 cm below (i.e in the upper part of shaft of femur. They occur in cortical bone and have low healing potential.



* **Complications ,clinical picture and investigations**:(as intracapsular fractures)
* **Treatment :**

I) Stable trochanteric fractures :

- Open reduction & internal fixation by dynamic hip screw .

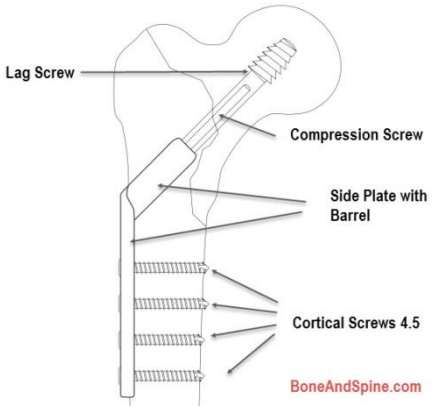
II) Unstable trochanteric and subtrochanteric fractures :

a) **Less than 70 years or non ambulatory patient :**

- Open reduction & internal fixation by proximal femoral nail .

b) **More than70 years or ambulatory patient :**

- **Hemiarthroplasty .**



Proximal femoral nail

* **N.B : Fractures s proximal part of femur :**

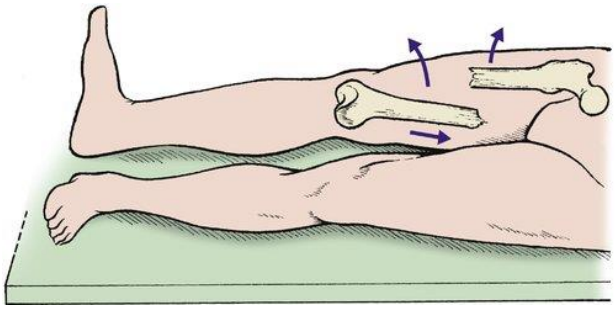
  1) Fractures of neck of femur 40% (intra-capsular fractures).

  2) Trochanteric fractures 50% .

  3) Subtrochanteric fracture 10% .

FRACTURE SHAFT OF FEMUR

* **Incidence:** Common in all ages even newly born (e.g. breech with extended legs).
* **Aetiology :** usually suspected with **major** (high energy) **trauma** as road traffic accidents and associated injuries are common.

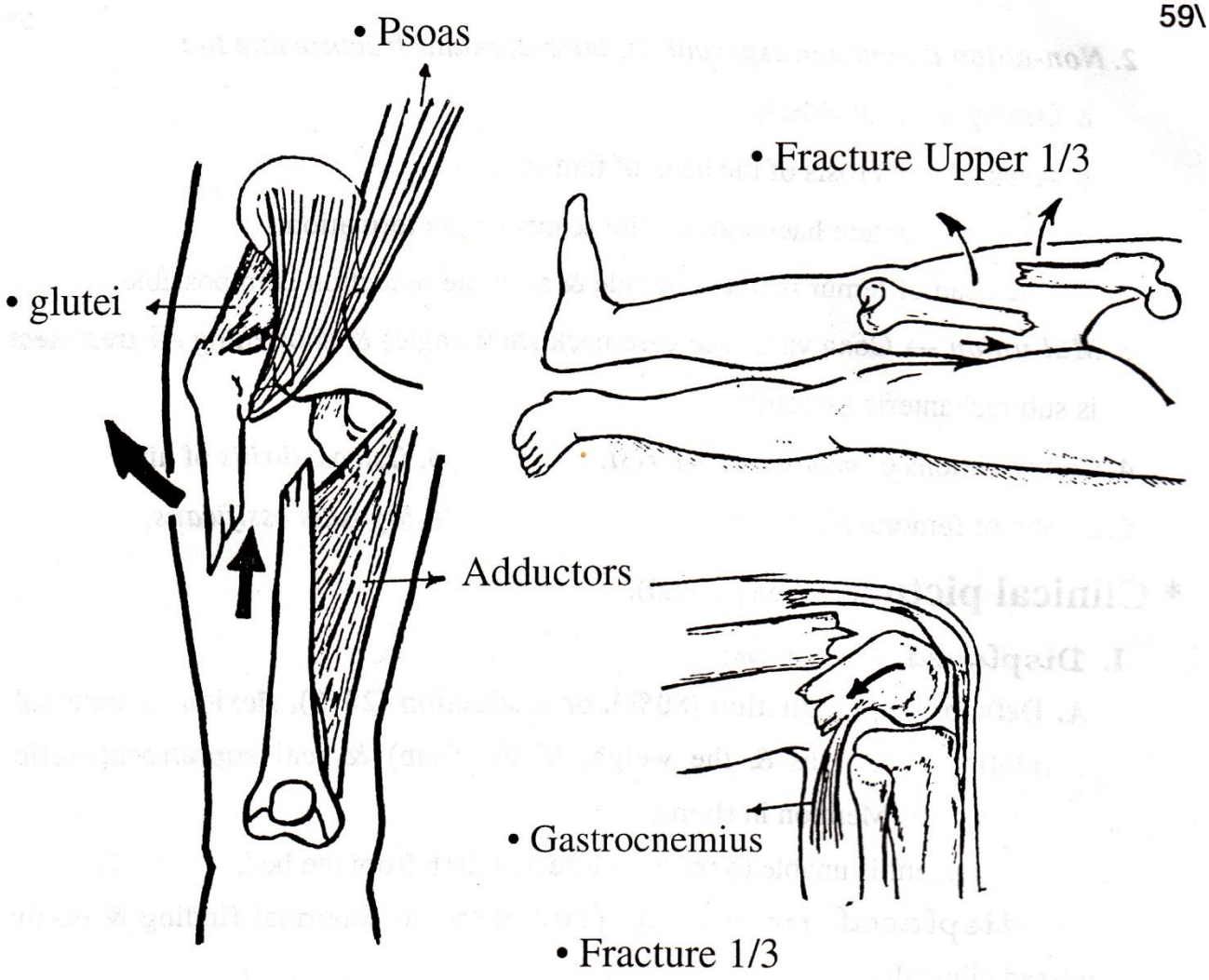


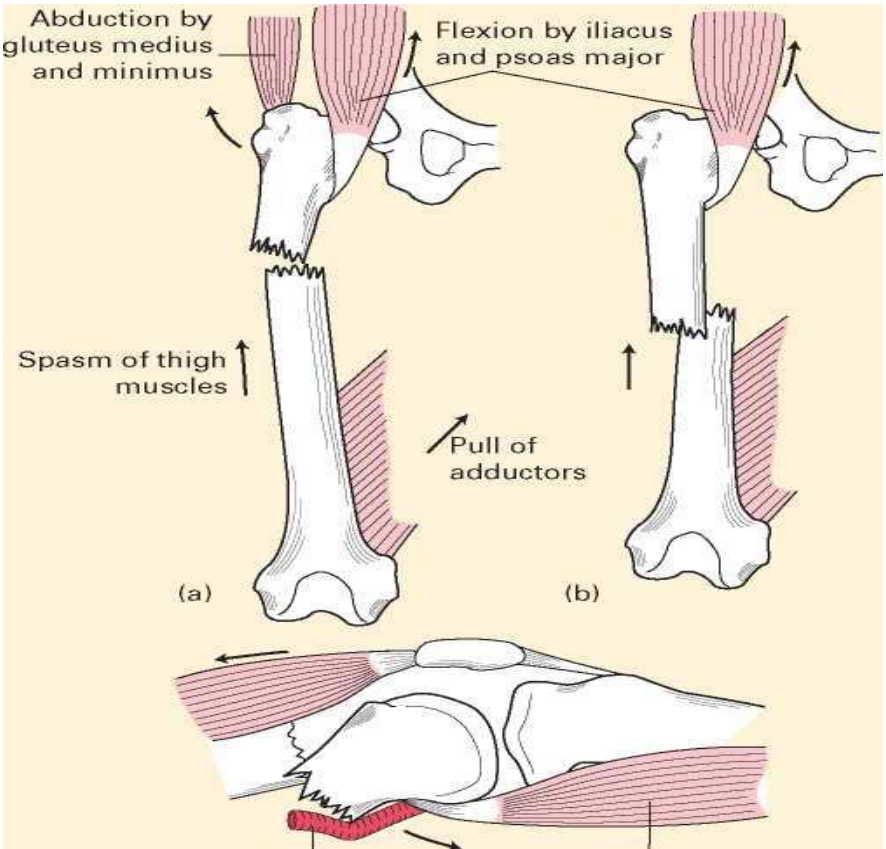
* **Classification**:

1) As general principles of fractures .

2) According to the site of the fracture into :

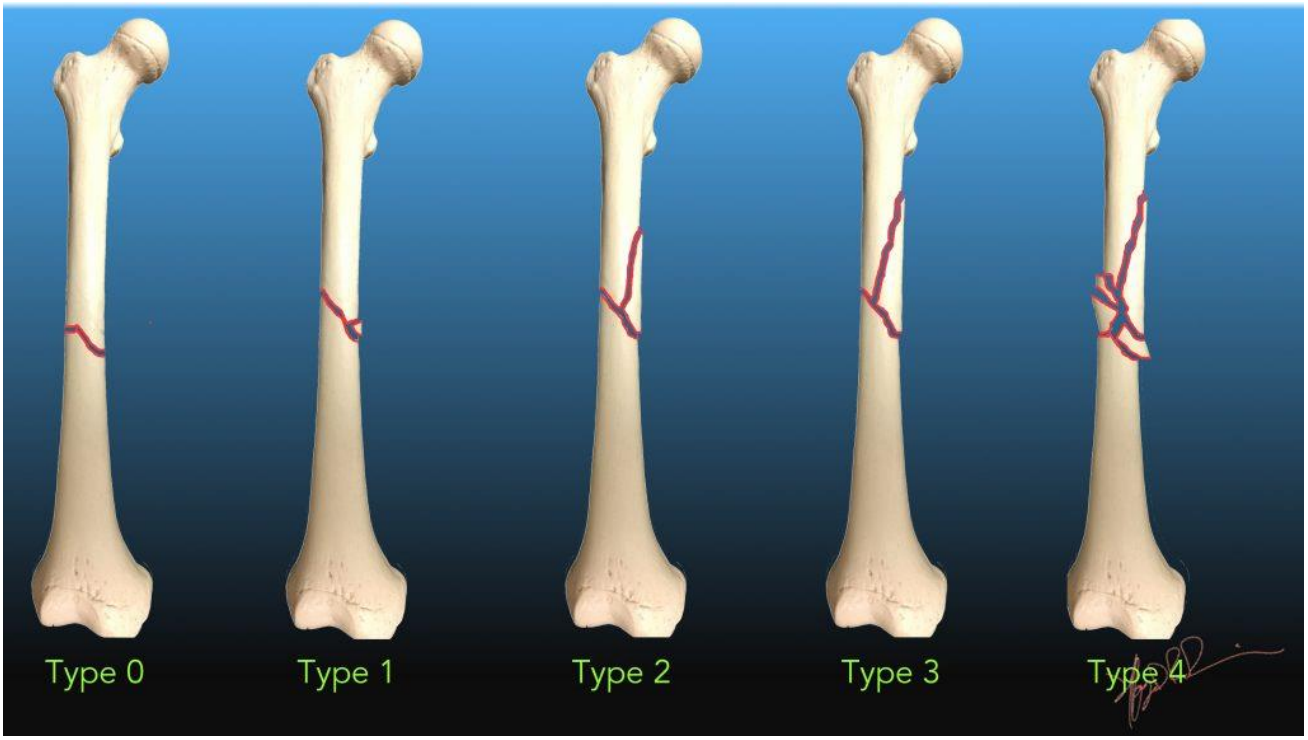
	Proximal fragment	**Distal fragment**
a. Fracture upper 1/3 (Subtrochanteric fracture)	• Flexed by iliopsoas . • Abducted by glutei. • Laterally rotated by iliopsoas and 6 lateral rotators.	• Pulled upwards by hamstrings , quadriceps & adductors . • Adducted by the adductors. • Laterally rotated by the weight of the limb.
b. Fracture middle 1/3	• Flexed by the iliopsoas & quadriceps.	• Pulled upwards , adducted & lateral rotation (as before). • Pulled forwards s by quadriceps.
c. Fracture lower 1/3 (supracondylar fracture).	• Flexed by the quadriceps.	• Pulled upwards , adducted & lateral rotation (as before). • Pulled backward by gastrocnemius.


• Psoas
• glutei
• Fracture Upper 1/3
Adductors
• Gastrocnemius
• Fracture 1/3


Abduction by gluteus medius and minimus
Flexion by iliacus and psoas major
Spasm of thigh muscles
Pull of adductors
(a)
(b)

3) Winquist classification :

- **Type 0 :** no comminution
- **Type I :** Small butterfly fragment .
- **Type II :** Larger butterfly fragment, but more than 50% cortical contact between major proximal and distal fragments .
- **Type III :** Large butterfly fragment with less 50% cortical contact between major proximal and distal fragments .
- **Type IV :** Segmental comminution with no direct contact between major proximal and distal fragments .



* **Complications:** (As general principles of fracture).

- The commonest complications are:

1- **General complications** especially hemorrhage , shock (1-2 liters of blood may be lost) & complications of prolonged bed wrist .

2- **Myositis ossificans** of quadriceps femoris.

3- **Non-union** which is common due to soft tissues interposition.

4- **Mal-union:** Shortening, varus & lateral rotation are common because the fracture is severely displaced in most cases and reduction is difficult because it is surrounded by powerful muscles .

5- Injury of popliteal or femoral **nerves & vessels.**

6- Stiffness of knee joint.

* **Clinical picture**: (As general principles of fracture) +

1- Deformity: angulation, over riding & real subtrochanteric shonening due to powerful muscles of the thigh.

2 - Manifestations of complications.

* **Investigation:** (As general principles of fracture)

* **Treatment** (As general principles of fracture, especially **general measures**).

A. Fracture upper 1/3 :

- The best is open reduction & internal fixation by **proximal femoral nail** or hemiarthroplasty .

A. Fracture lower 1/3 :

- The best is open reduction & internal fixation by :

  1- Condylar plate & screws .

  2- Locked retrograde intramedullary nail (introduced from intercondylar notch) .

Condylar plate & screws

B.*Fracture middle 1/3:* Depends on the age:

I) In children :

1) 0-6 months : 2 option

- **Pavlik harness** (treatment of choice) is a brace that is most commonly used to keep the hips and knees flexed and thighs abducted.
- Hip spica cast may be used but skin complications occasionally occur in this age group .

2) 6 months – 5 years :

- **Hip spica cast** is commonly used as it decreases hospital length of stay and cost of treatment .
- Children have great remodeling power; any deformity and shortening will be corrected spontaneously.

3)5-11 years :

a- Skin traction by Thomas splint or sliding traction to avoid shortening is rarely used nowadays except if operative measure cannot be performed .

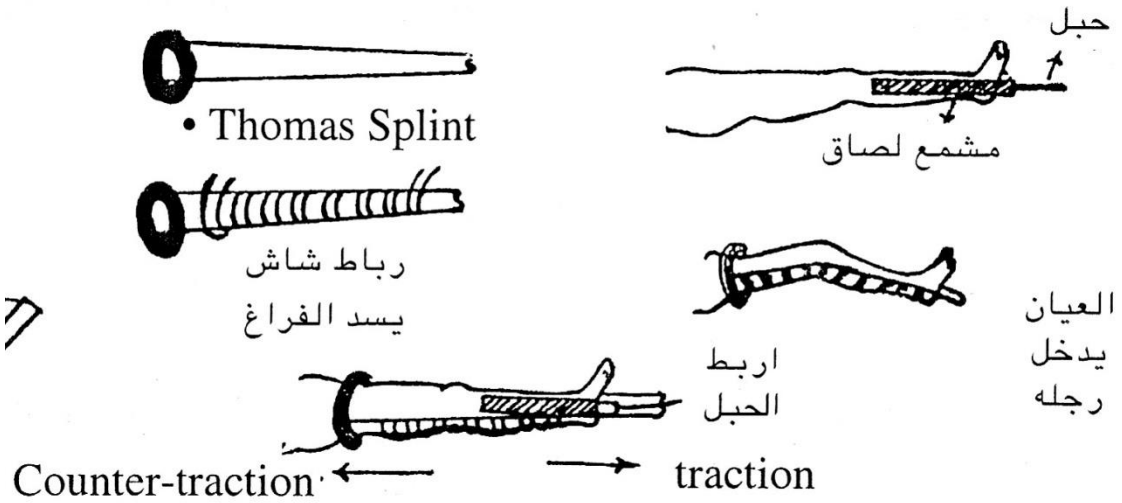
- **Disadvantage:** prolonged hospitalization & knee stiffness.
- **Indication:** Children with weak muscles.
- **Contraindications:**
  - Old pt. (inelastic skin).
  - Compound fracture.
  - Strong muscles.
- **Methods:** One of the followings:

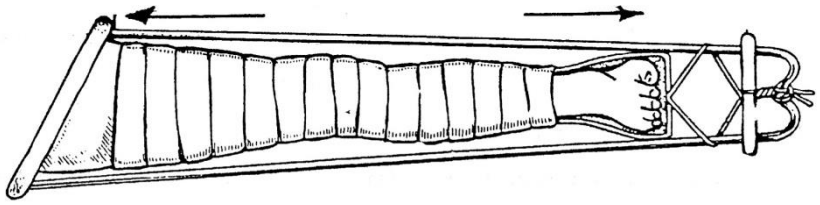
1- Traction on Thomas splint:

- **Traction** is applied by adhesive plaster & ropes which are tied to the lower end of Thomas splint.
- **Counter-traction** is obtained by the pressure of the splint on the groin.

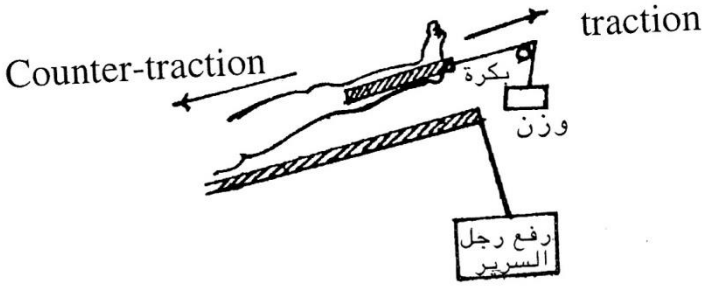
2-Sliding traction :

- **Traction** is applied by adhesive plaster & rope which passing over a pulley and attaching its distal end to suitable weights.
- **Counter-traction** is made by the body weight by rising the foot of the bed.

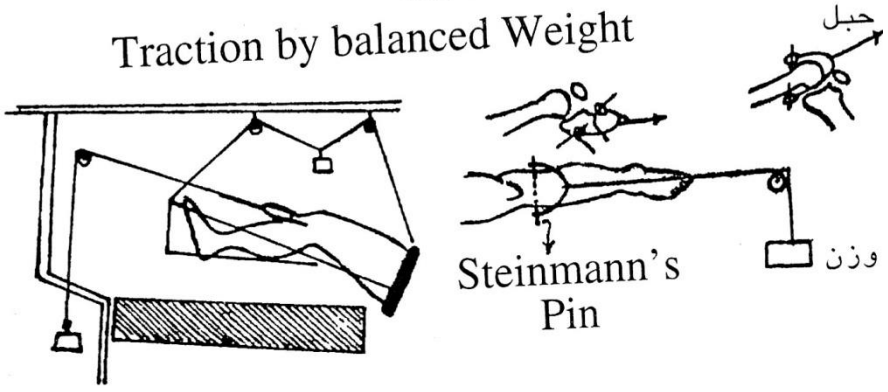




*** Traction By Thomas Splint ***



Traction by balanced Weight



*** Skeletal Traction ***

b- Operative treatment may be done if the deformity is severe or there are multiple fractures :

1- Flexible intramedullary nails :

- The main line of treatment in this age in patient less 50 kg . .
- The nails are introduced from the medial and lateral sides of the lower femoral metaphysis after closed reduction under image radiological control .
- May need plate removal after healing of the fracture .

2- Open reduction & internal fixation by plate & screws: (best results).

- ***Disadvantage*** is long incision and second operation to remove the metal after 6 months.

4) 11 years - skeletal maturity :

a) Rigid intra-medullary nail .

b) Open reduction & internal fixation by **plate & screws .**

II) In adults : Surgical treatment is the best

a) Skeletal traction :

- **Indications:** if surgical treatment is not available or until surgery become available .
- **Method:** Steinmann's pin is passed side way in tibial tuberosity or distal femur and ropes are connected to it & traction is applied through the ropes.
- **Disadvantages of traction : (skin & skeletal)**
  - Prolonged fixation → complication of prolonged bed rest .
  - Very difficult to adjust traction → over riding or distraction of bone ends → shortening or delayed union respectively.
  - Knee stiffness .
  - Compression of common fibular nerve by the lateral bar of Thomas splint .

b) **Surgical treatment :**

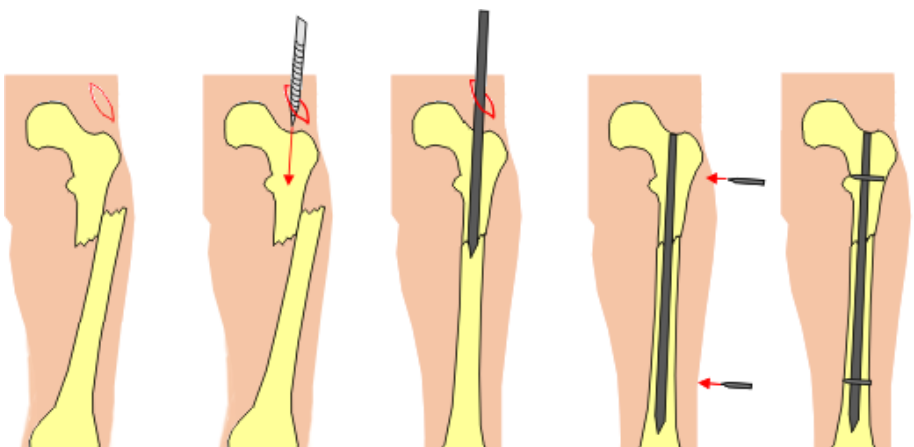
- **Indications :**
  - It is the main line of treatment to avoid complications of traction .
  - Vascular injury : Correct the fracture first to avoid disruption of vascular repair .

- Unstable fracture.

- **Methods :**

1- **Intra-medullary nailing :**

- **Indications: It** is the treatment of choice if facilities are available .
- **Contraindications:** Compound fracture & infection .
- **Advantages:** Early mobilization as it allows early post-operative partial weight bearing → avoid prolonged bed rest.
- **Method :**
  - ♣ Under radiological control ,the nail is introduced by closed technique in ante-grade (from greater trochanter or piriformis fossa) way to preserve the fracture haematoma and soft tissue attachment of the fracture fragments .
  - ♣ Widening the medullary cavity by reaming allows use of thicker nail for better stability.
  - ♣ Locking screws are added to control rotation; and maintain length (in comminuted fractures).
- **Complications of intra-medullary nail:**
  - ♣ Osteomyelitis : If occurs remove the nail immediately.
  - ♣ If the nail is too long, it will injury the knee joint.
  - ♣ If the nail is too short or thin → no proper fixation.
  - ♣ If the nail is too thick, it impacts or breaks the femur.



2- Open reduction & internal fixation by **plate and screws** .