This lecture include:

1-hip joint dislocation
2-fracture neck of femur
3-Intertrochanteric Fracture
4-Subtrochanteric Fracture
5-Femural shaft Fracture

Hip joint

Hip joint inherently stable due to:

- *bony anatomy*
- *soft tissue constraints including*
- *labrum*
- *capsule*
- *ligamentum teres*

General classification of hip dislocations:

1-simple :pure dislocation without associated fracture.

2-complex: dislocation associated with fracture of acetabulum or proximal femur.

Anatomic classification:

- **posterior dislocation (90%)**
- **anterior dislocation**
- **Central hip dislocation**

1-posterior dislocation (90%)

occur with axial load on femur, typically with hip flexed and adducted

axial load through flexed knee (dashboard injury) usually position of hip

determines associated acetabular injury

Usually either simple (pure dislocation) or complex (associated with fracture of acetabulum or proximal femur).

<u>complication;</u>

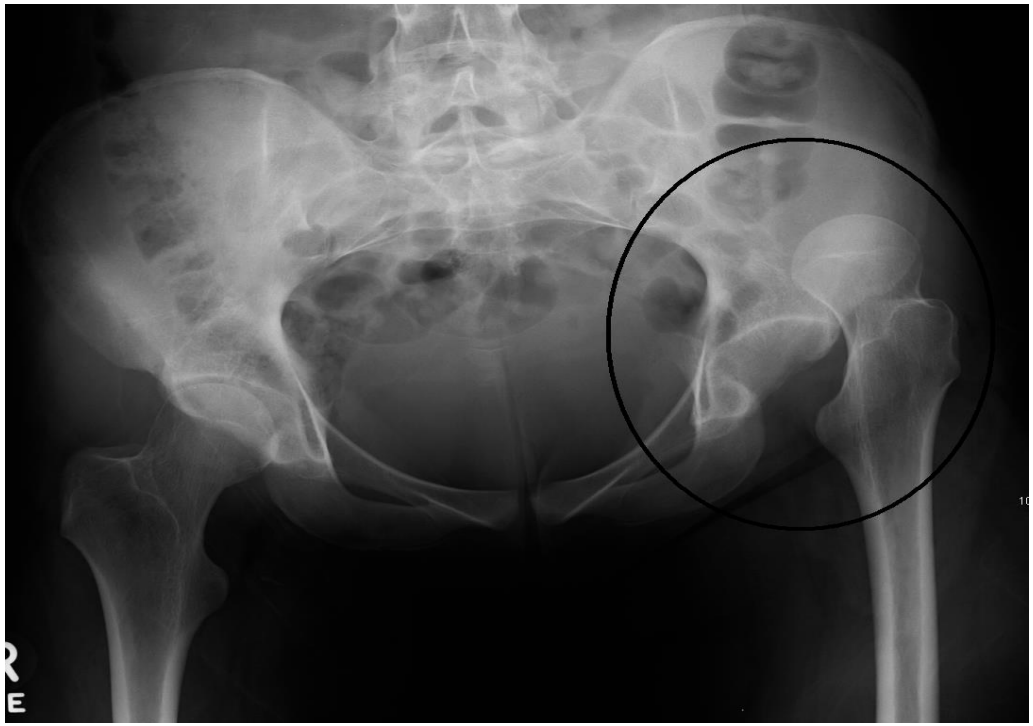
1-osteonecrosis

2-posterior wall acetabular fracture

3-femoral head fractures

4-sciatic nerve injuries

5-ipsilateral knee injuries (up to 25%)



2-anterior hip dislocation

associated with femoral head impaction or chondral injury

occurs with the hip in abduction and external rotation, mostly occur during electrical shock or during attack of fit in epileptic patients. We have 2 types:

1-superior ("pubic")

hip extension results in a superior (pubic) dislocation

Clinically hip appears in extension, abduction and external rotation

2-flexion results in inferior (obturator) dislocation

Clinically hip appears in flexion, abduction, and external rotation


L

Presentation

posterior dislocation

hip and leg in slight flexion, adduction, and internal rotation

anterior dislocation

hip and leg in extension, abduction, and external rotation

3-Central hip dislocation

Presentation:

Symptoms :acute pain, inability to bear weight, deformity

Physical examination include:

-ATLS (very important to exclude associated injuries)

-95% of dislocations with associated injuries either posterior dislocation (90%) or associated with posterior wall and anterior femoral head fracture clinically the hip and leg in slight flexion, adduction, and internal rotation or anterior dislocation usually the hip and leg in extension, abduction, and external rotation

-detailed neurovascular exam (10-20% sciatic nerve injury)

-examine knee for associated injury or instability

-chest X-ray ATLS workup for aortic injury

Imaging:

Radiographs

1-Ap &cross-table lateral (used to differentiate between anterior vs. posterior dislocation also femoral neck to rule out fracture prior to attempting closed reduction

2-AP, inlet/outlet, judet views after reduction

To see if there's loss of congruence of femoral head with acetabulum

by disruption of shenton's line (arc along inferior femoral neck + superior obturator foramen

in anterior dislocation:

femoral head appears larger than contralateral femoral head

femoral head is medial or inferior to acetabulum

in posterior dislocation

femoral head appears smaller than contralateral femoral head

femoral head superimposes roof of acetabulum

decreased visualization of lesser trochanter due to internal rotation of femur

***(CT) scan**

helps to determine direction of dislocation, loose bodies, and associated fractures ,anterior dislocation or posterior dislocation

sometimes post reduction CT must be performed for all traumatic hip dislocations to look for:

1-femoral head fractures

2-loose bodies

3-acetabular fractures

***MRI**

controversial and routine use is not currently supported

useful to evaluate labrum, cartilage and femoral head vascularity

Treatment:

1-Nonoperative :emergent closed reduction within 12 hours

-Indications: acute anterior and posterior dislocations.

-contraindications : ipsilateral displaced or non-displaced femoral neck fracture**.**

Techniques

Closed reduction :perform with patient supine and apply traction in line with deformity regardless of direction of dislocation &must have adequate sedation and muscular relaxation to perform reduction

,assess hip stability after reduction

&post reduction CT scan required to see femoral head fractures or intra-articular loose bodies/incarcerated fragments that may be present even with concentric reduction on plain films or to see acetabular fractures post-reduction.

-for simple dislocation, follow with protected weight bearing for 4-6 weeks

2-Operative :open reduction and/or removal of incarcerated fragments

indications

1) irreducible dislocation
2) radiographic evidence of incarcerated fragment
3) delayed presentation
4) non-concentric reduction

ORIF (open reduction & internal fixation)

indications

associated fractures of

1-acetabulum

2-femoral head

3-femoral neck

all of these should be stabilized prior to reduction

Complications:

1-Post-traumatic arthritis

2-Femoral head osteonecrosis

3-Sciatic nerve injury

4-Recurrent dislocations

Neck Femur Fracture

-increasingly common due to aging population

-women > men

-Caucasians > African Americans

-United states has highest incidence of hip # rates worldwide

-healing potential very low because:

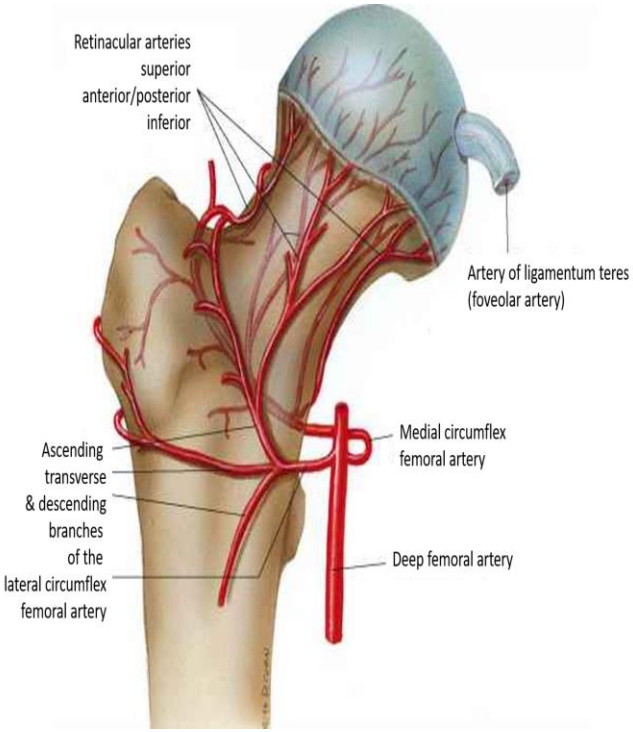
1-femoral neck is intracapsular, bathed in synovial fluid

2-lacks periosteal layer

3-callus formation limited, which affects healing

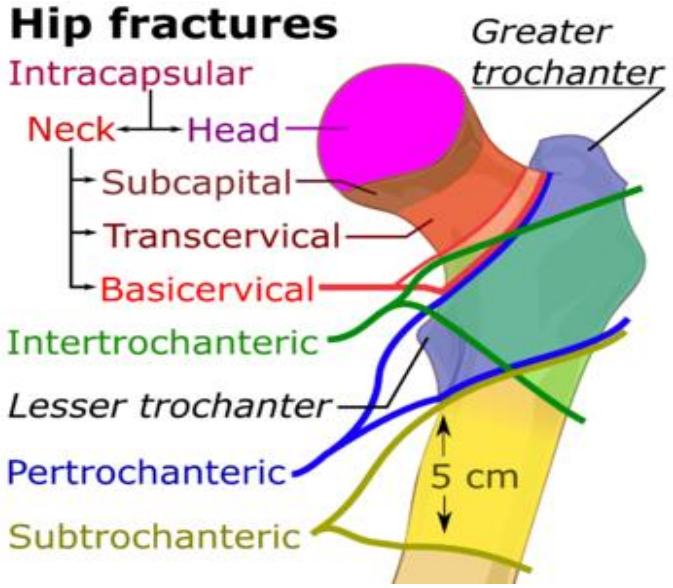
Blood supply to femoral head

1. **major contributor is medial femoral circumflex (lateral epiphyseal artery)**
2. **some contribution to anterior and inferior head from lateral femoral circumflex**
3. **some contribution from inferior gluteal artery**
4. **small and insignificant supply from artery of ligamentum teres**



Anatomical classification

1) **subcapital: femoral head/neck junction**
2) **transcervical: midportion of femoral neck**
3) **basicervical: base of femoral neck**



Classification

Garden Classification

1-Type I : Incomplete # (valgus impacted)

2-Type II: Complete #, nondisplaced

3-Type III: Complete #, partially displaced

4-Type IV :Complete #, fully displaced

Presentation :

1-slight pain in the groin or pain referred along the medial side of the thigh and knee

2-leg in external rotation and abduction, with shortening

Treatment

in children using cannulated

screw fixation

Old age using

1-cannulated screw fixation (young age group less than 50 years old & non dislaced #)

2-hemiarthroplasty or

total hip arthoplasty elderly age group)

Treatment

cannulated screw fixation

Arthoplasty

Complications:

1-Osteonecrosis

incidence of 10-45%

recent studies fail to demonstrate association between time to fracture reduction and subsequent AVN. The increased risk with increase initial displacement . AVN can still develop in nondisplaced injuries &non anatomical reduction

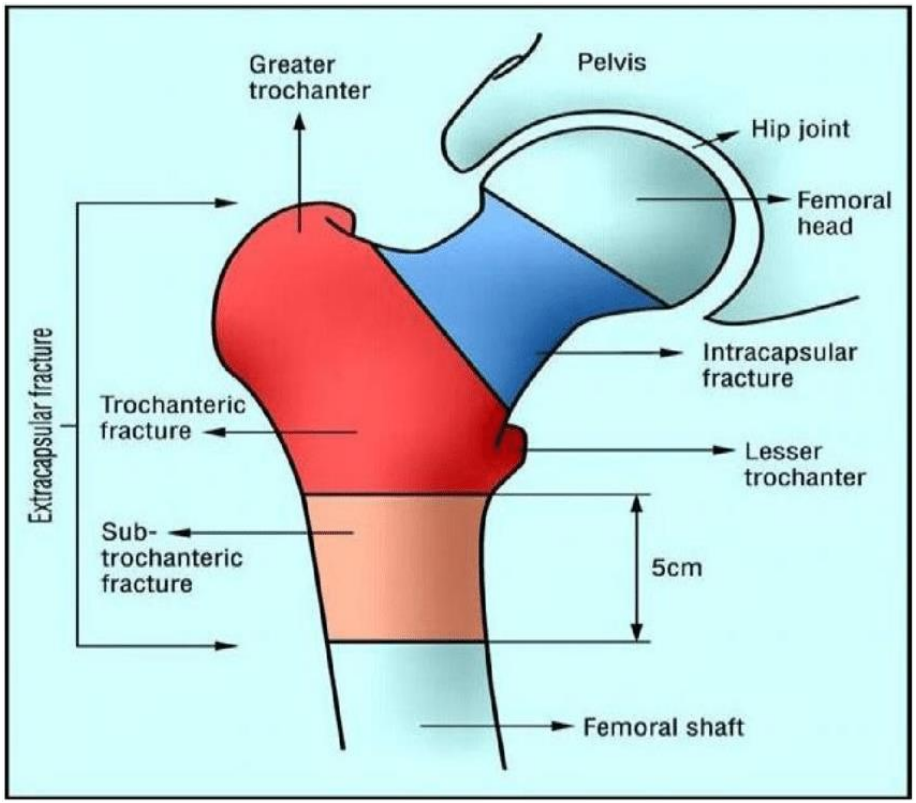
2-Nonunion

incidence of 5 to 30%

increased incidence in displaced fractures

INTERTROCHANTERIC FRACTURES OF FEMUR

EXTRACAPSULAR FRACTURES OF THE PROXIMAL FEMUR BETWEEN THE GREATER AND LESSER TROCHANTERS



demographics

-female: male ratio between 2:1 and 8:1

-typically older age than patients with femoral neck fractures, unite easily (nonunion and malunion rates) are low & rarely cause avascular necrosis.

Pathophysiology

mechanism

1-Elderly :low energy falls in osteoporotic patients with twisting injury, malignancies can also weakened bone structure.

2-Young :high energy trauma with direct trauma to greater trochanter.

Classification :

1-stable : Definition : there's intact posteromedial cortex , the clinical significance of it(posterior cortex)

is resistant medial compressive loads once reduced (figure2a)

2-unstable : Definition :comminution of the posteromedial cortex ,the clinical significance that fracture will collapse into varus and retroversion when loaded (figure.2b)

These are 3 types (unstable) : (figure1)

1-fractures with a large posteromedial fragment i.e., lesser trochanter is displaced

2-subtrochanteric extension

3-reverse obliquity :oblique fracture line extending from medial cortex both laterally and distally

Figure (2a) stable

Figure (2b) unstable

FIG.(2) STABLE; WILL RESIST MEDIAL COMPRESSIVE LOADS ONCE REDUCED WHILE UNSTABLE IN FIG.(B)

(a) (b)

TYPES OF UNSTABLE INTERTROCHANTERIC FRACTURES

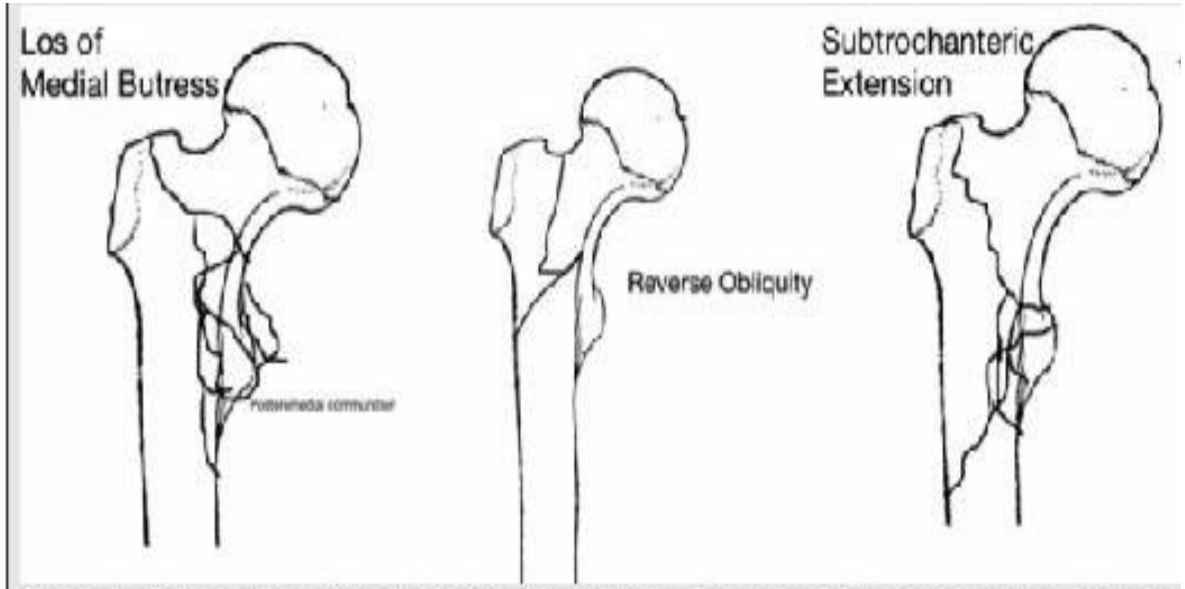


Figure 1: Various type of unstable fracture patterns: Posteromedial communition, Fracture extension of fracture line and reverse obliquity fractures

Presentation

-*Physical Exam* :painful, shortened, externally rotated lower extremity

-*Imaging: includes*

1-Radiographs (AP pelvis showing type of fracture, displaced or undisplaced stable or unstable)
2-CT or MRI :useful if radiographs are negative but physical exam consistent with fracture

Treatment

1-Nonoperative :non-weight bearing with early out of bed to chair

- **indications**

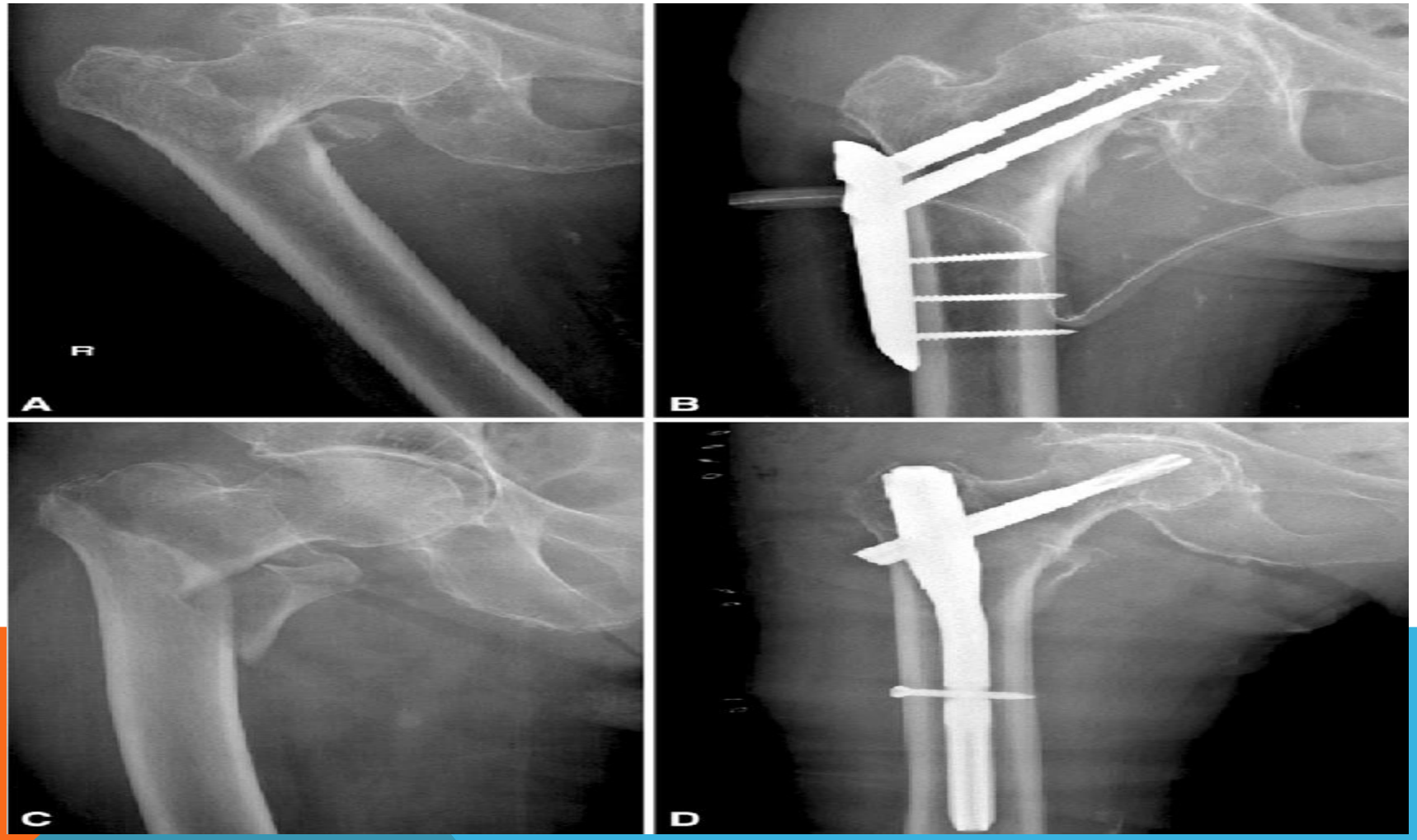
  a)non-ambulatory patients

  b)patients at high risk for perioperative mortality

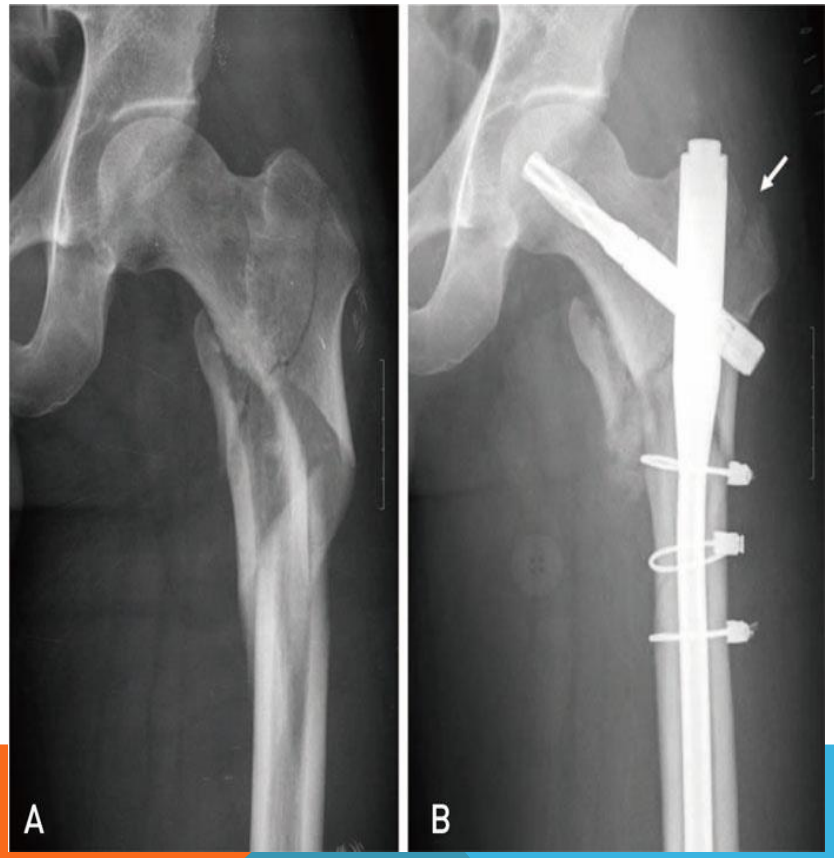
  COMPLICATIONS: high rates of pneumonia, urinary tract infections, bed sore, and DVT.

2-Operative :sliding hip compression screw or intramedullary hip screw (cephalomedullary nail) or fixed angle L – plate.

X-RAY (A)**STABLE** TREATED BY DYNAMIC HIP SCREW (B) WHILE IN X-RAY (C) **UNSTABLE** TREATED BY PROXIMAL FEMORAL NAILING I.E. ”LOCKED NAIL ”(D)



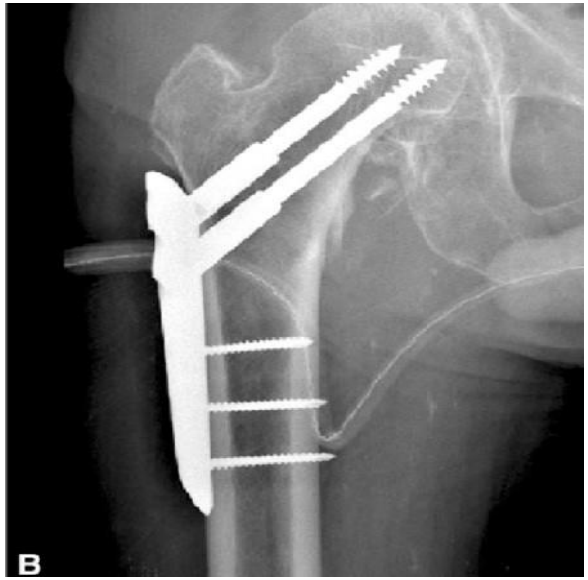
X-RAY (A) UNSTABLE
(SUBTROCHANTERIC EXTENSION)



X-RAY (A) UNSTABLE

(REVERSE OBLIQUITY)

(B)SLIDING HIP COMPRESSION SCREW OR (D)INTRAMEDULLARY HIP SCREW (CEPHALOMEDULLARY NAIL) OR (E) FIXED ANGLE L – PLATE.



SUBTROCHANTERIC FRACTURE OF FEMUR:

distal

Subtrochanteric typically defined as area from lesser trochanter to 5cm distal ,fractures with an associated intertrochanteric component may be called intertrochanteric fracture with subtrochanteric extension.

Epidemiology

usually in younger patients with a high-energy mechanism ,may occur in elderly patients from a low-energy

Pathoanatomy **:Figure (1)**

deforming forces on the proximal fragment are:

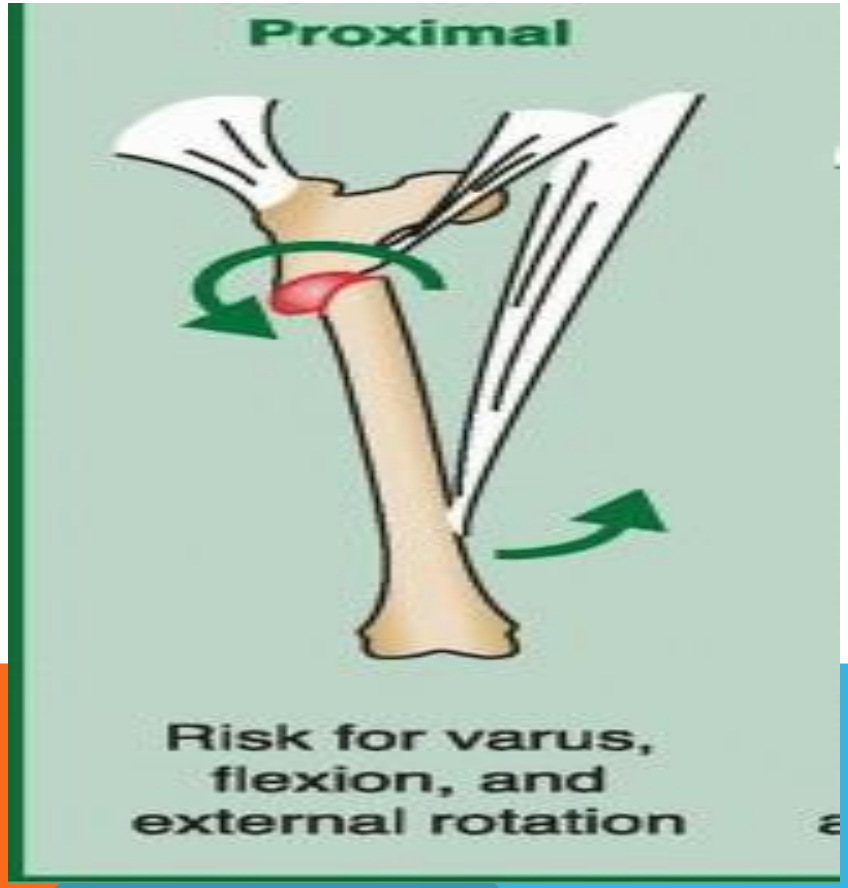
- abduction by gluteus medius and gluteus minimus
- flexion by iliopsoas
- external rotation by short external rotators

deforming forces on distal fragment

adduction & shortening by adductors

adductors

FIGURE (1)



Presentation

+Symptoms :hip and thigh pain ,inability to bear weight

+Physical exam:

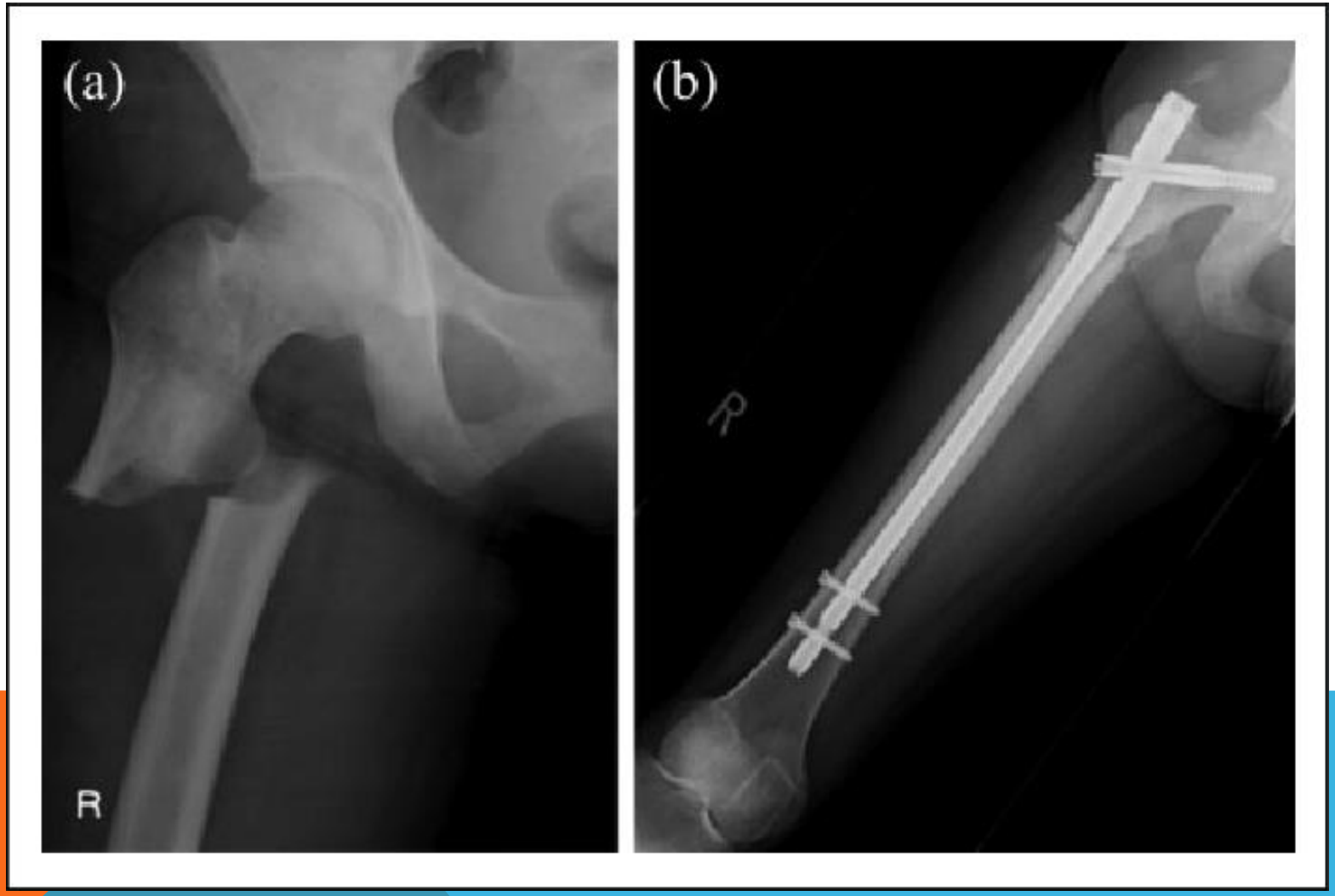
- pain with motion
- typically associated with obvious deformity (shortening and varus alignment)
- flexion of proximal fragment may threaten overlying skin

+Imaging:

Radiographs : required views

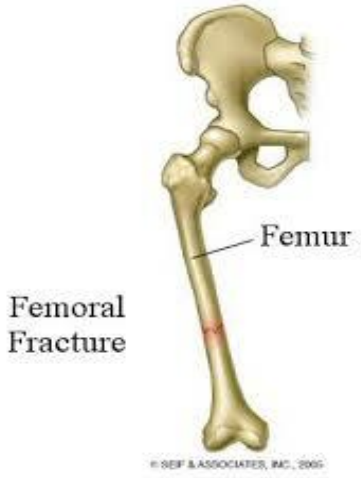
- AP and lateral of the hip
- AP pelvis
- full length femur films including the knee

SUBTROCHANTERIC # FIXED BY PROXIMAL FEMORAL NAILING (LOCKED NAIL)



FEMORAL SHAFT FRACTURE

The femoral shaft is well padded with muscles(an advantage in protecting the bone from most powerful forces)but the disadvantage is that fractures are often severely displaced by muscle pull ,making reduction s



Specific features:

1-It's essential a fracture of young adult& usually results from a high energy injury.

2-Diaphseal fracture in elderly patients should be considered pathological unless proved otherwise

3- In children under age 4 years of age , the possibility of physical abuse must be kept in mind.

X-ray:

1-Most fractures of femoral shaft have some degree of comminution, it is the reflection of the amount of force involved in these injury .

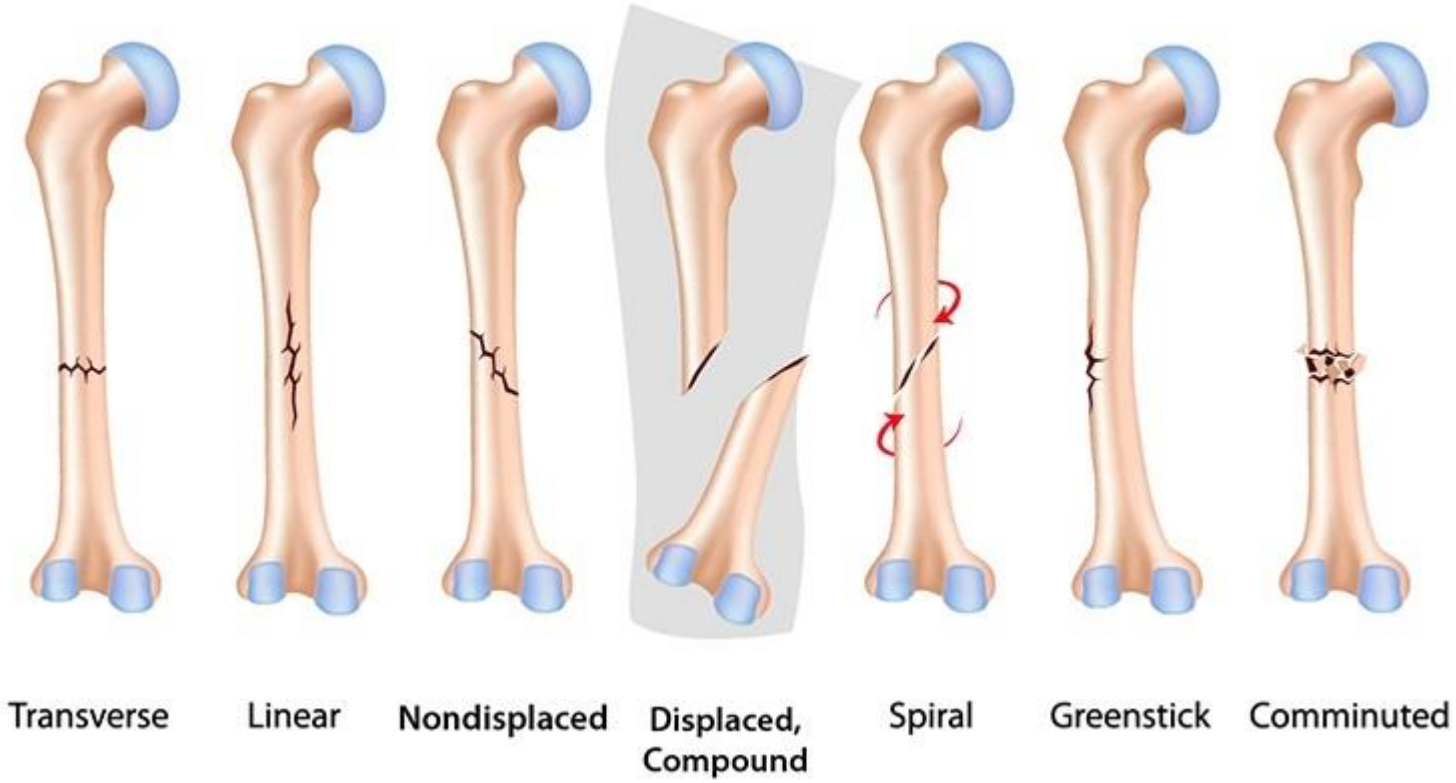
2-Displacement may be in any direction.

3-Sometimes there are two fracture lines separated by unbroken length of bone " Segmental fracture"

4-The pelvis & knee must be always be x-rayed to avoid missing fracture in them .

SPIRAL # SHAFT OF FEMUR (AP & LAT. VIEW) HIP & KNEE JOINTS INVOLVED

Femoral shaft fracture



(A) SPIRAL

(B) COMMINUTED

(C) TRANSVERSE WITH BUTTERFLY

Treatment:-

The risk of systemic complications can be largely reduced by early stabilizing of the fracture.

1-General:-assessment of blood loss and resuscitation of patient.

2-Traction & bracing: the main indications of traction are:

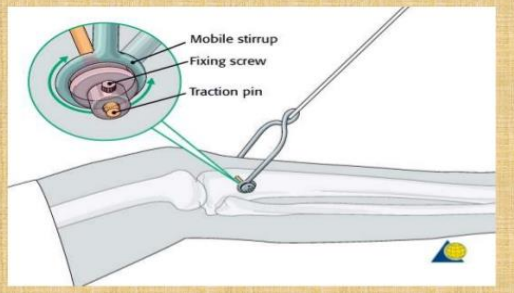
a-Fracture in children.

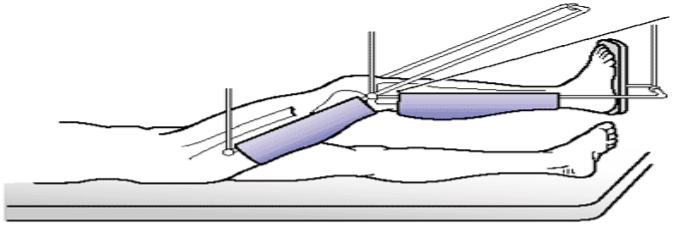
b-Contra-indications to anesthesia.

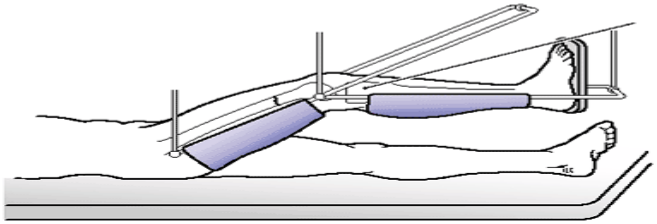
c-Lack of suitable skill or facilities of internal fixation.

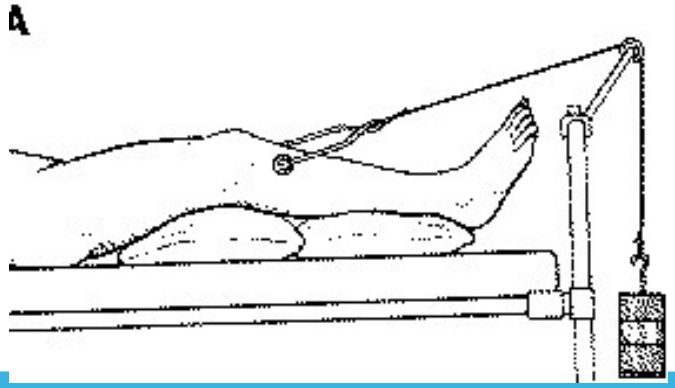
NOTE: The chief drawback is the length of the time spent in bed (10-14) weeks for adults with its attendant problems. Some of the difficulties are overcome by reducing the time in traction & then change to a plaster spica or functional bracing (in case of lower third fracture) for 6-8 weeks. While the patient in traction, joint mobility must be preserved by encouraging movement & exercise.

SKELETAL TRACTION









Treatment of Femoral fracture in infant & children:

1-Infant: 1-2 weeks in balanced traction followed by spica for another 3-4 weeks.

2-Children: up to 10 years can be treated in similar manner but with 2-4 weeks of traction & 6 weeks in spica.

3-Teenagers: may require longer duration of traction and Spica. If satisfactory reduction cannot be obtained oe healed, internal fixation with plate & screws is justified especially in those with multiple injuries.

SKIN TRACTION

HIP SPICA

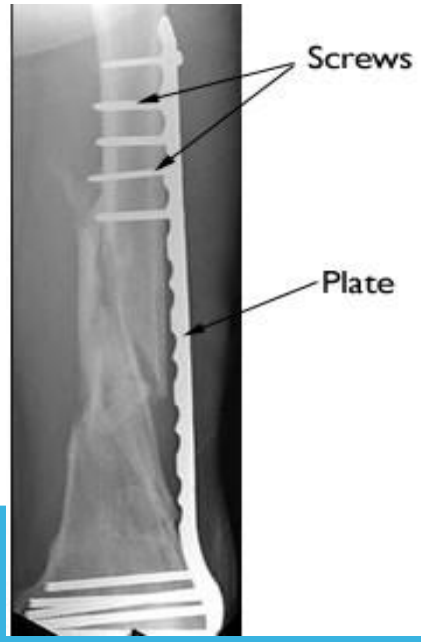
3. Open reduction & internal fixation by plating:-

Fixation with plates and screw was popular but now it is limited due to complications including implant failure.

The main indications are :-

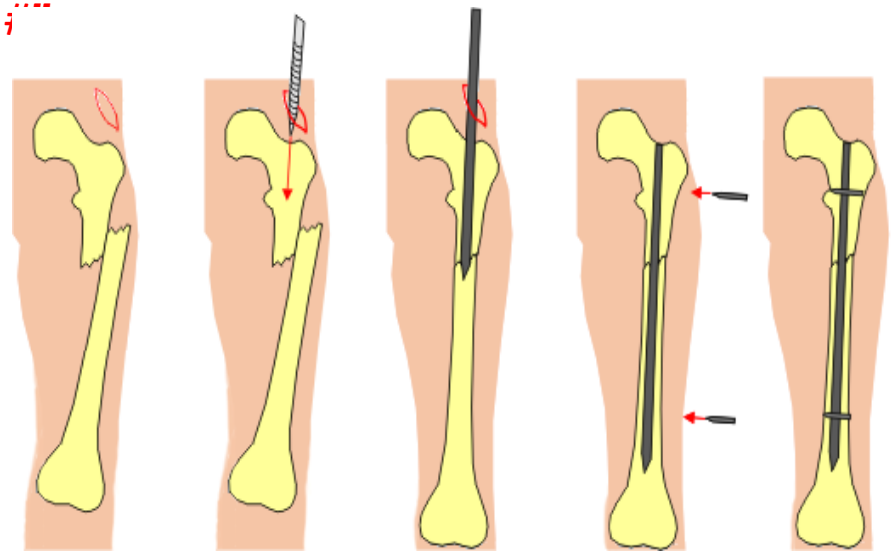
A. Combination of femoral neck and shaft fractures.

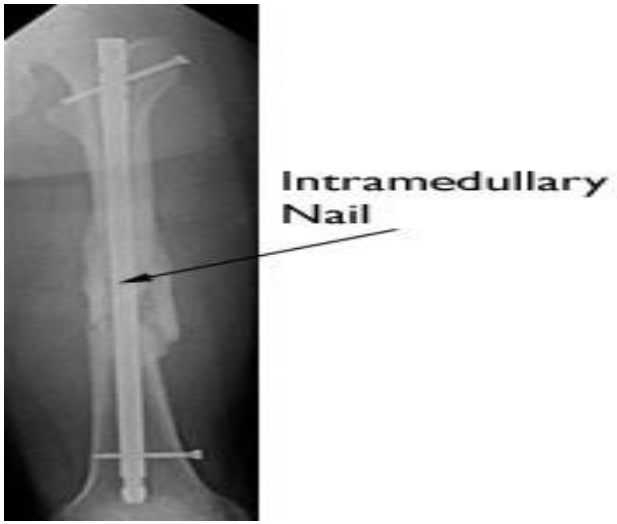
B.A shaft fracture with associated vascular injury.



4. Intra-medullary nailing (locked & unlocked):-

Is the method of choice for most femoral shaft fractures. it controls rotation and ensure stability even for sub-trochantric and distal third fractures "*in this pictures using closed "locked nailing for femoral shaft*"





5-External fixation:

Indication:

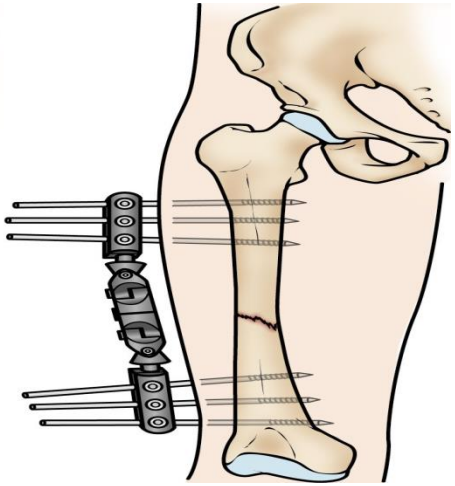
A-Severe open injuries
B-Multiple injured patients when there is need to reduced operating time
C-Dealing with severe bone loss by bone transport
D-Treatment of femoral shaft fractures in adolescents

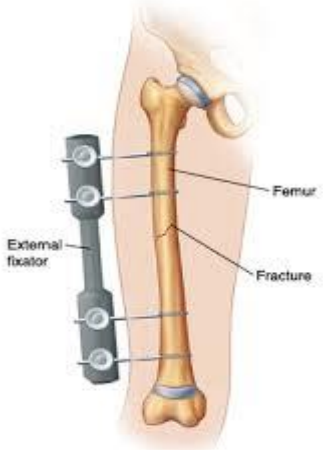
Management of open femoral shaft fractures:

Open femoral fractures should be carefully examined for:
1-skin loss
2-wound contamination
3-muscle ischemia
4-injury to vessels & nerves

The immediate treatment :

1-Antibiotic, A.T.S, wound cleansing & debridement.
2-With little skin loss or small clean wound , the fracture can be treated as closed fracture .
3-With massive skin loss , large wound , contaminated wound ,tissue destruction ,internal fixation should be avoided & the wound left open & do external fixation.




Femur
External fixator
Fracture


A
B
C

Complications of femoral shaft fractures:

1-General: severe blood loss, shock, fat embolism, acute respiratory distress, is common in high energy fractures. Thromboembolism due to prolong traction in bed, movement & exercise are important to prevent it.

2-Vascular injuries: the vascular lesion takes priority & the vessels must be repaired or grafted without delay. At the same operation, the fracture is secured by internal fixation.

3-Infection: in open injuries & following internal fixation, there's always a risk of infection, so give prophylactic antibiotics and by careful attention to principle of surgery.

4-Delyed union & non union: it's said that fractured femur must be united in 100 days plus /minus 20 days.

5- Malunion: fractures treated by traction& bracing often develop some deformity, no more than 15^0 angulations.

6-Joint stiffness: the knee joint is affected & may be injured at the same time of insult, or its stiffness is due to soft tissue adhesion during treatment.

THANK YOU

MY BEST WISHES TO YOU ALL