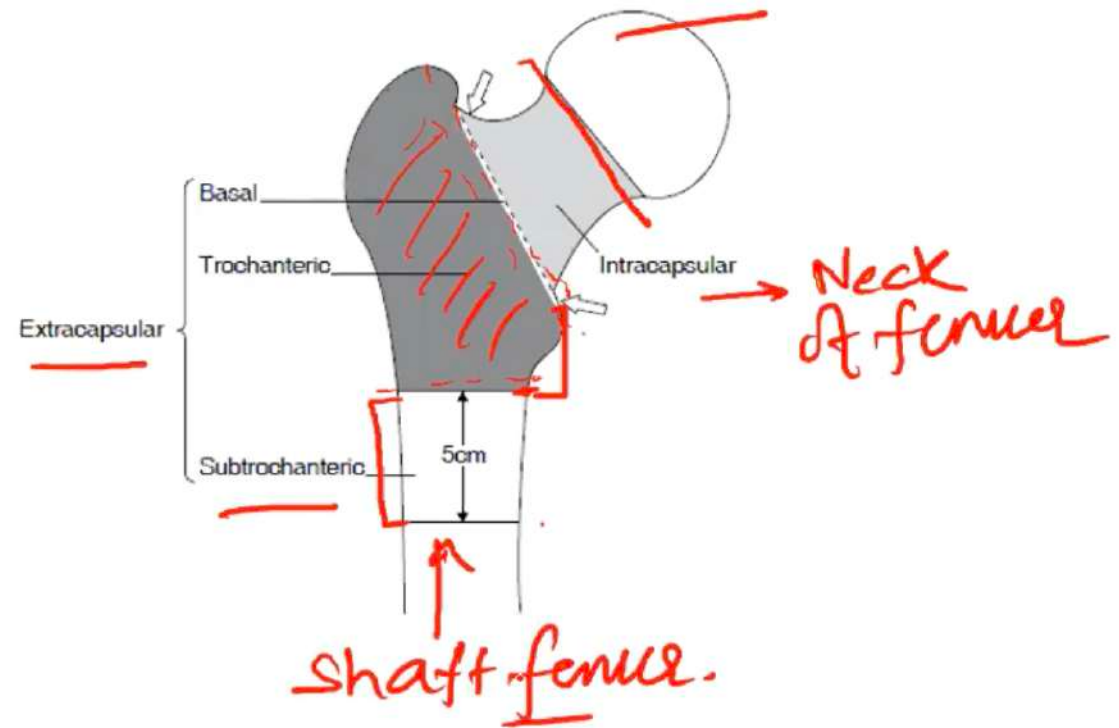


# Proximal femur & Shaft femur #

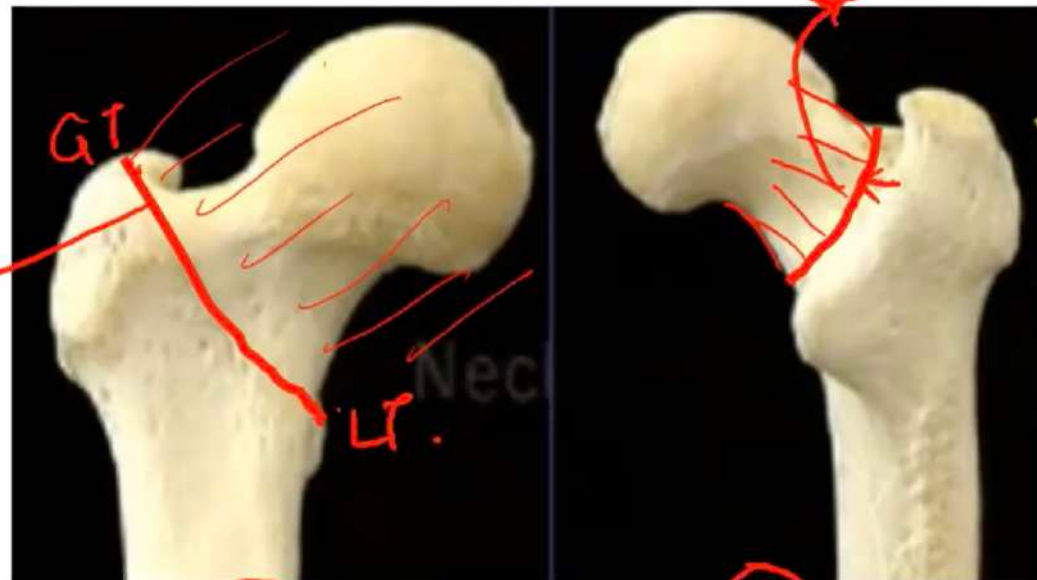
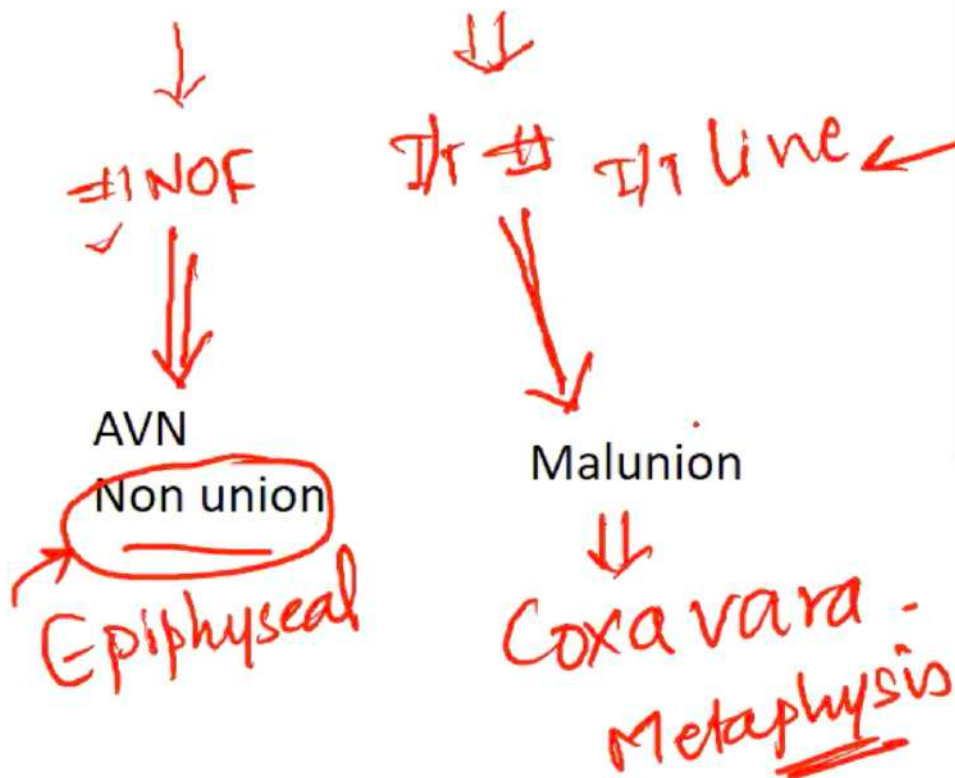
DR ANURAG TIWARI

- Neck femur #
- Inter-trochanteric # (N/T)
- Sub-trochanteric #
- Shaft femur #



# Cooper Classification

- Intra Vs Extracapsular



(A)

(P)

# Anatomy

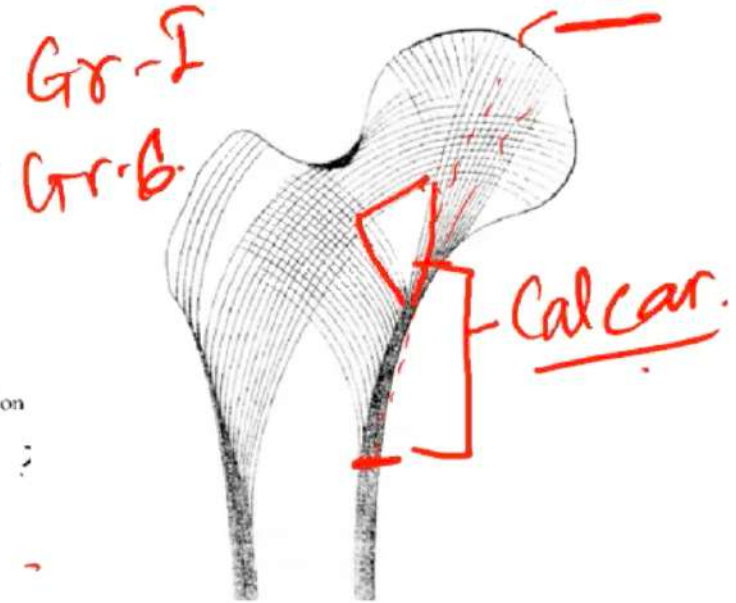
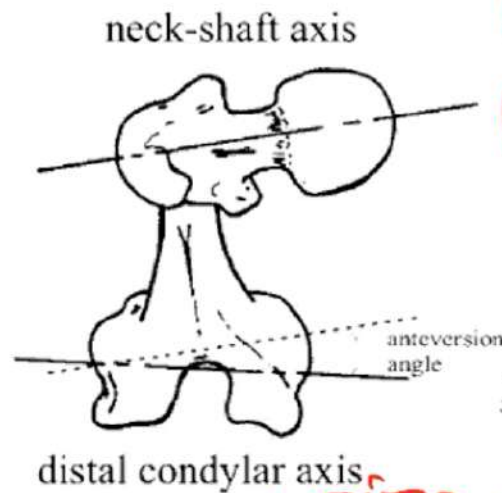
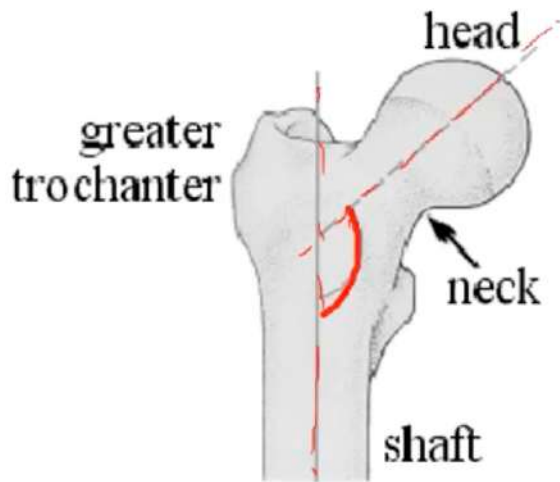


- Per-trochanteric
- Inter-trochanteric
- Peri-trochanteric



PROXIMAL FEMUR AND SHAFT FEMUR #: DR ANURAG TIWARI

# Few anatomical features of Proximal femur



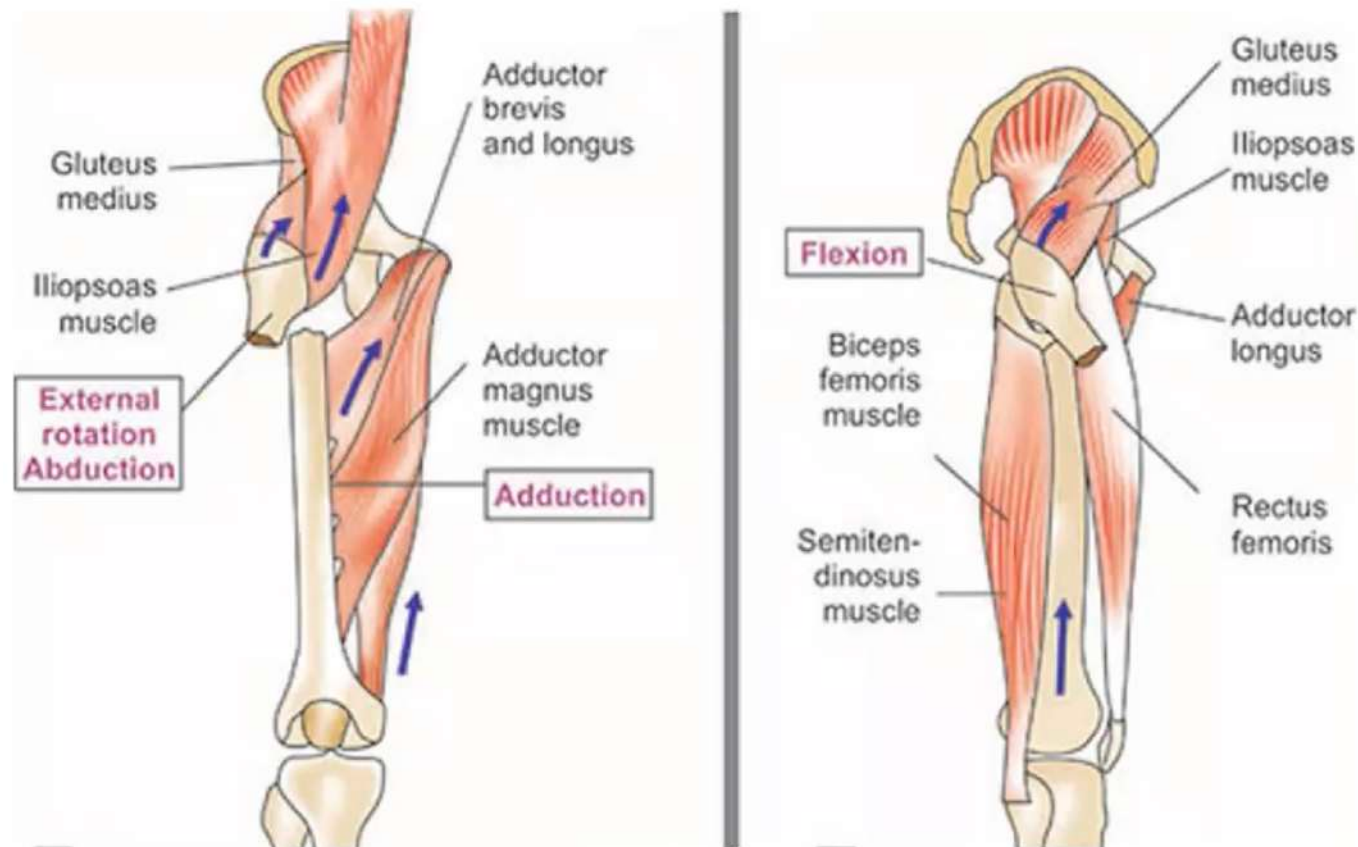
Neck shaft angle -  
 $127^{\circ}$  (120-135)

anteversion (coronal)



1-6  
 Medial  $\rightarrow$  Comp  
 Lat - Tensile

# Muscle displacements in proximal femur #



PROXIMAL FEMUR AND SHAFT FEMUR #: DR ANURAG TIWARI

# Clinical presentation

- Pain
- Ecchymosis
- Limb- External rotated and shortened
- Crepitus
- Loss of transmitted movements



# In case of occult fracture

“Pain on weight bearing”

↓  
IOC - MRI

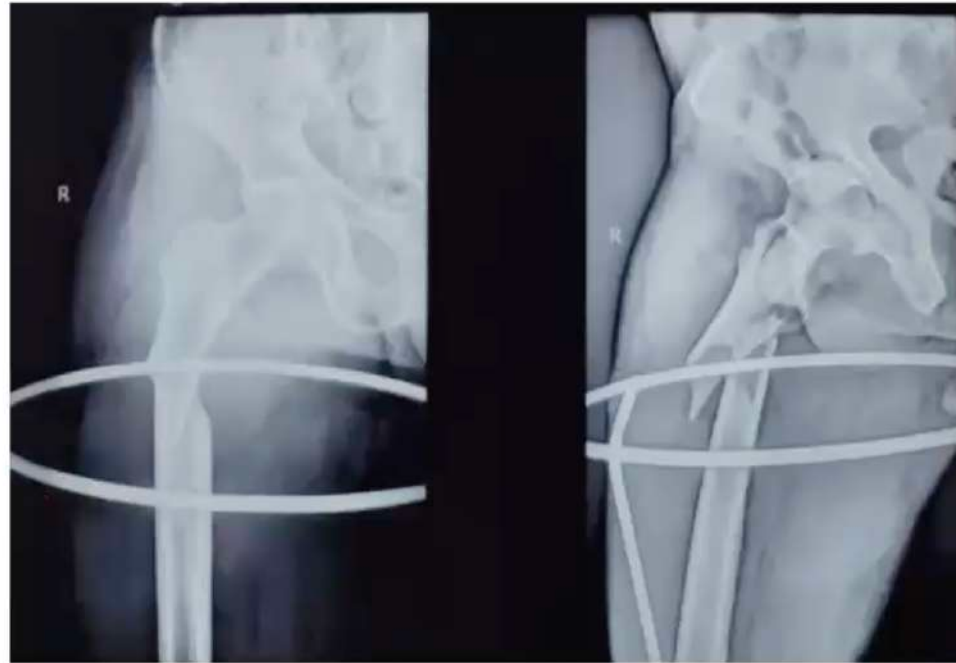
# Xray

- Xray Pelvis with Both hip in 15 degree IR

anteversion



## Xray in subtroch #



- ✓ Comminution
- ✓ Extension to LT and GT
- ✓ Extension to piriformis fossa

PROXIMAL FEMUR AND SHAFT FEMUR #: DR ANURAG TIWARI

# Stable Vs Unstable IT #

- plate or Nail calcar ↓↓
- Posteromedial comminution
  - Reverse oblique #
  - Subtroch extension

↓↓

✓ Tendency to collapse to varus  
Nails



# Stable Vs Unstable IT #

Plate or Nail Calcaneus Reverse oblique #

- Posteromedial comminution

- Reverse oblique #

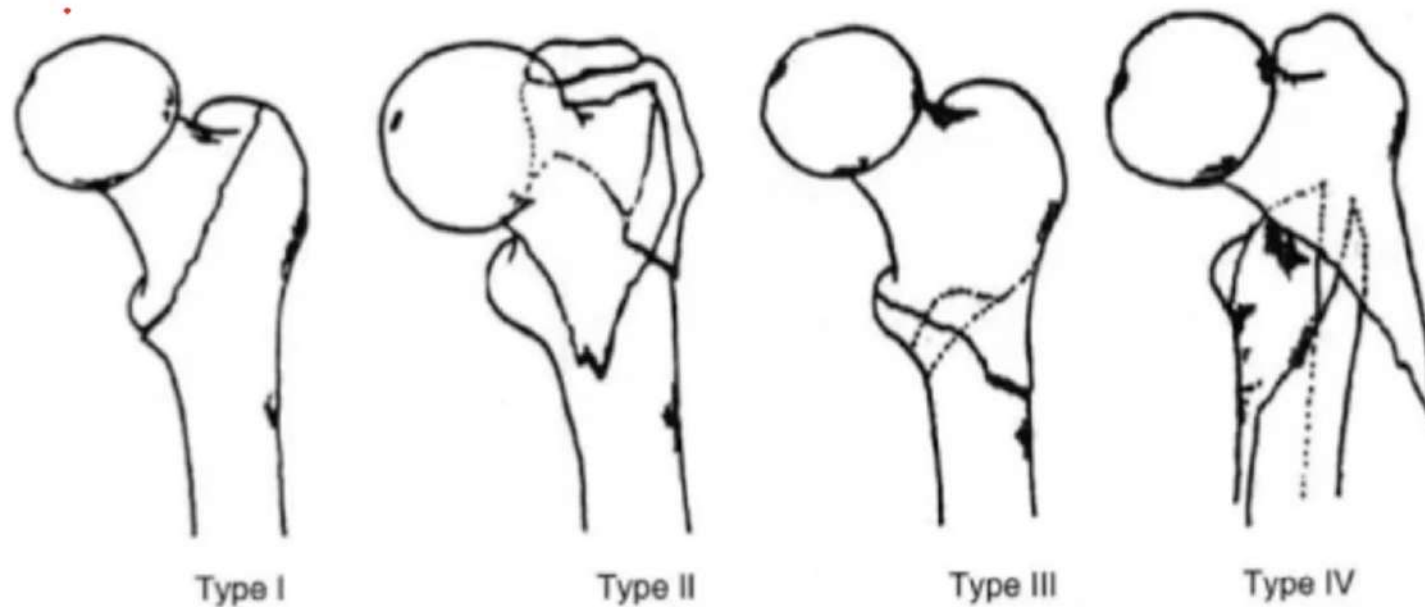
- Subtroch extension

✓ Tendency to collapse to varus

Nails



# Boyd and Griffin Classification



# Stable Vs Unstable IT #

↓  
↓  
plate  
or  
Nail

Calcaneus

- Posteromedial comminution

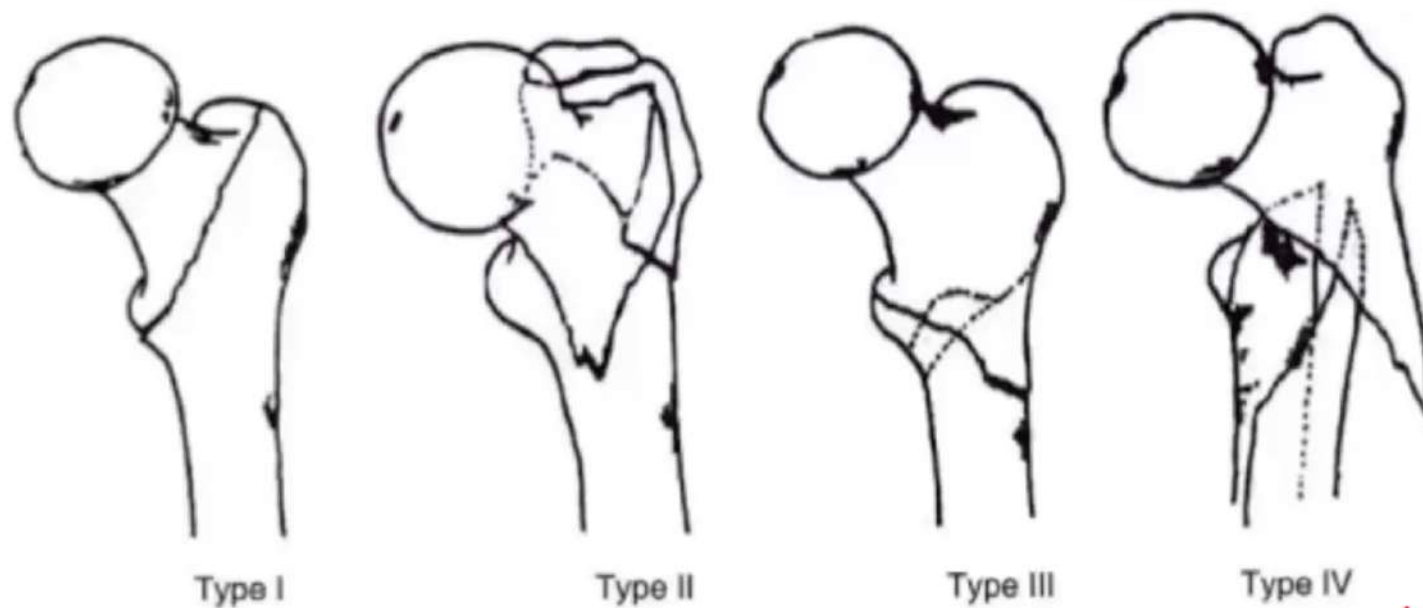
- Reverse oblique #

- Subtroch extension

✓  
Tendency to collapse to varus  
Nails -

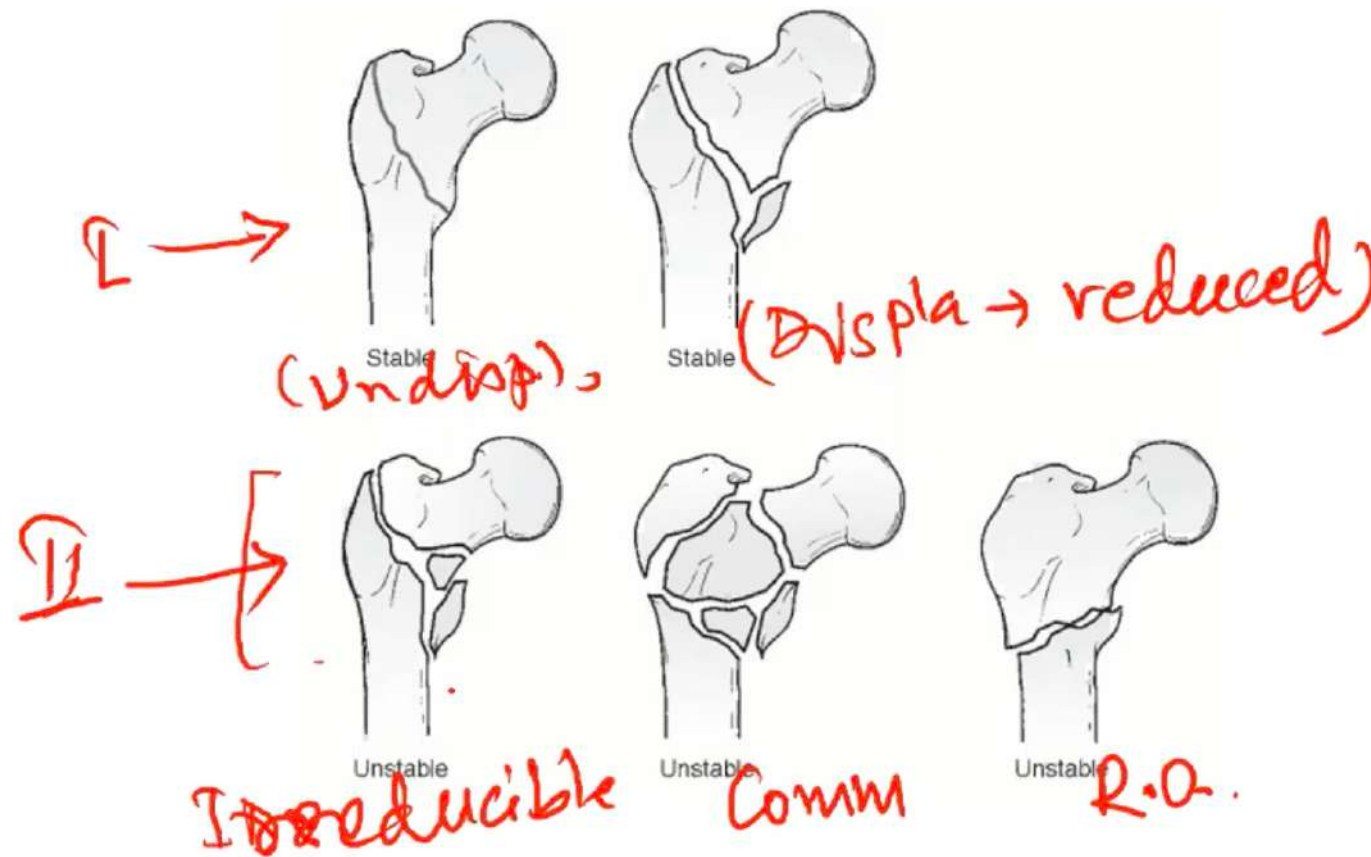


# Boyd and Griffin Classification



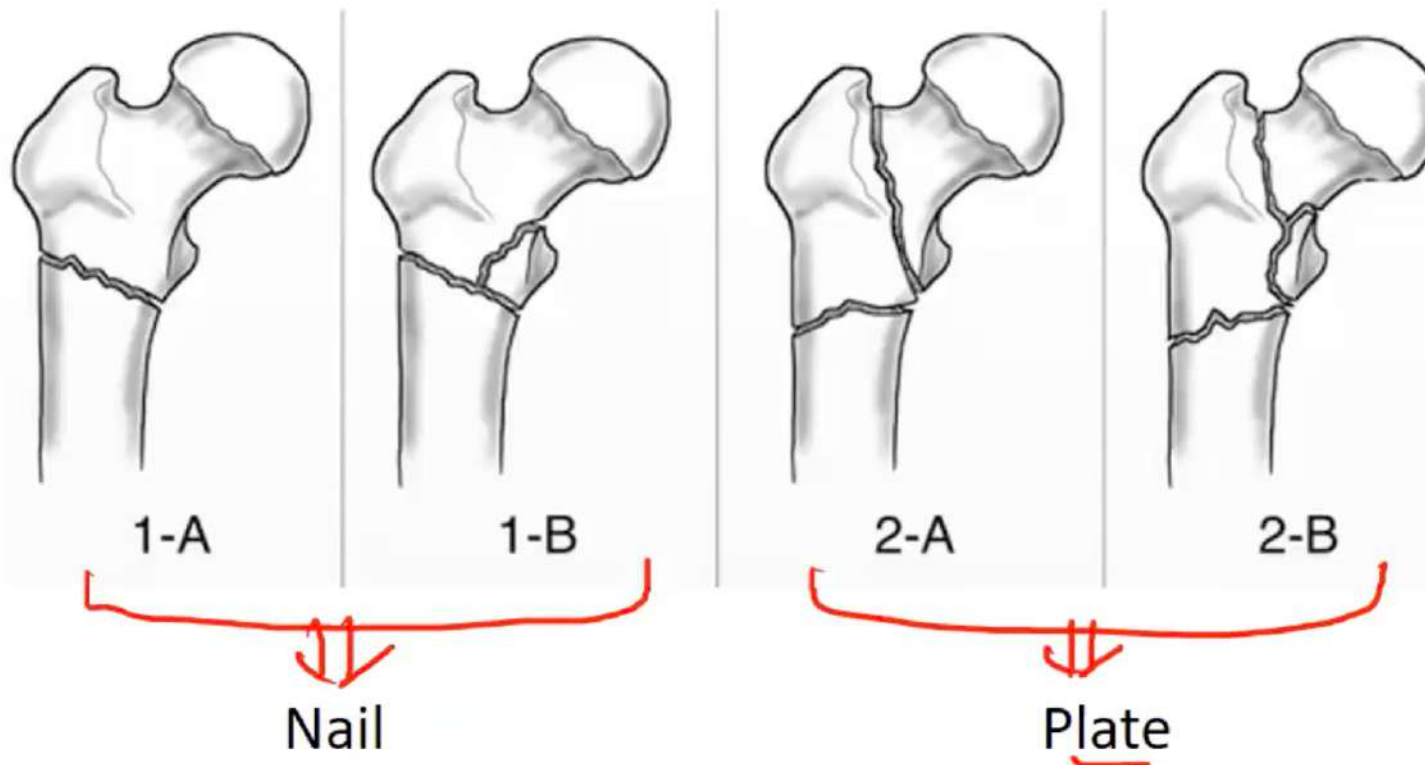
Stable -      Commu.      R.O.      St ex.

# Evans Classification

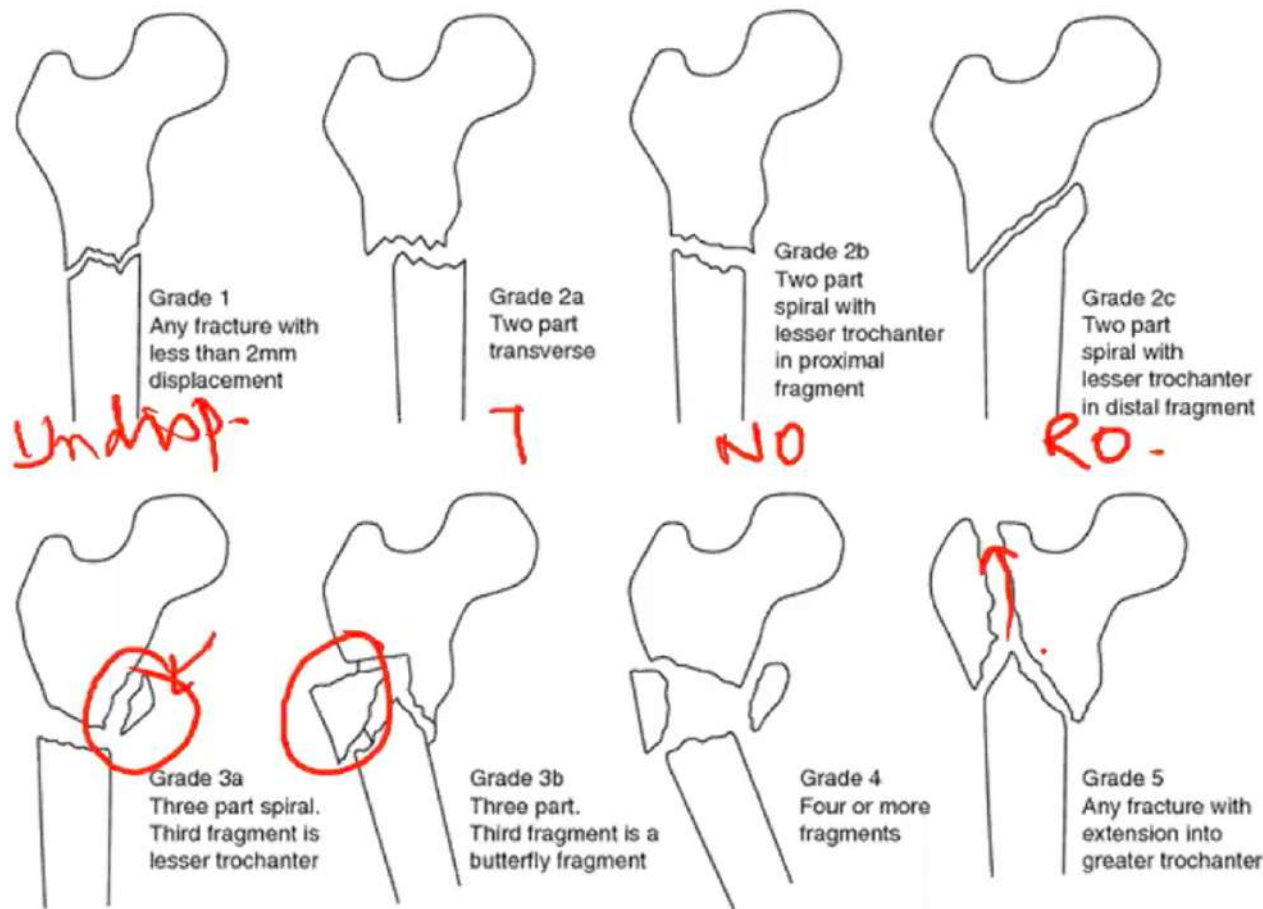


# Russell and Taylor classification

- Piriformis fossa inv - II
- Lesser trochanter inv - B



# Seinsheimer



PROXIMAL FEMUR AND SHAFT FEMUR #: DR ANURAG TIWARI

# Management

## • Non operative

- Medically unfit patient
- Non ambulatory patient and undisplaced #
  - Skin traction
  - Russel's traction
  - Boot and Bar traction

## • Operative

- Fracture reduction
- Implant choice

# Modified Russels traction- Principle?

Law of Parallelogram<sup>9</sup>

$$\begin{aligned}\vec{F} &= T^2 + (2T)^2 \\ &= \sqrt{5} T \\ &= \underline{\underline{N. \sqrt{2.236} T.}}\end{aligned}$$



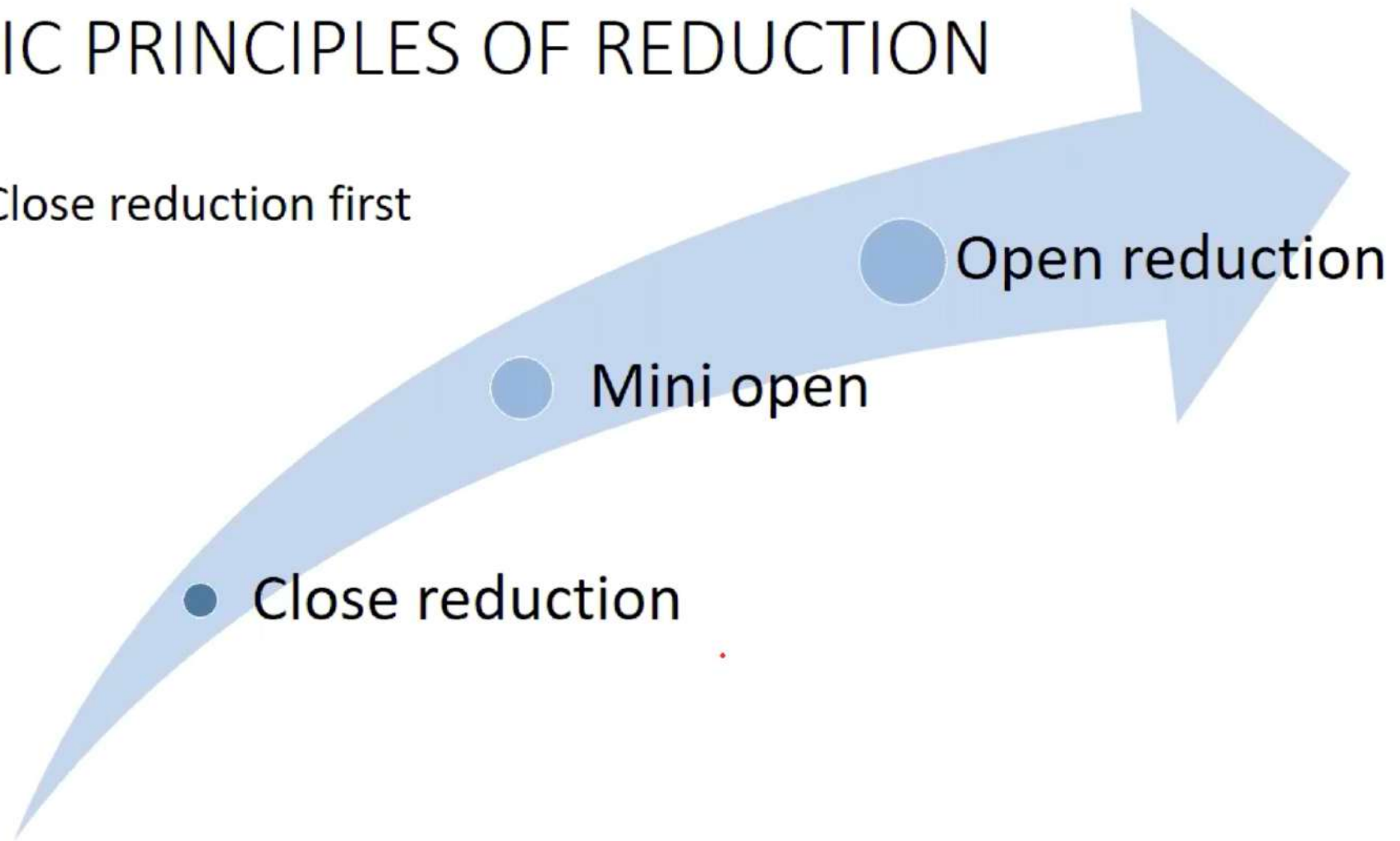
# Boot and Bar traction



PROXIMAL FEMUR AND SHAFT FEMUR #: DR ANURAG TIWARI

# BASIC PRINCIPLES OF REDUCTION

- Try Close reduction first



# Not acceptable reduction

- It should never be fixed in –
  - ✓ Varus
  - ✓ Internal Rotation
  - ✓ Retroversion
- [ Valgus and anteversion are more acceptable

# Reduction techniques

- Close reduction

✓ Tip 1: Always perform reduction before making entry for implant (PFN)

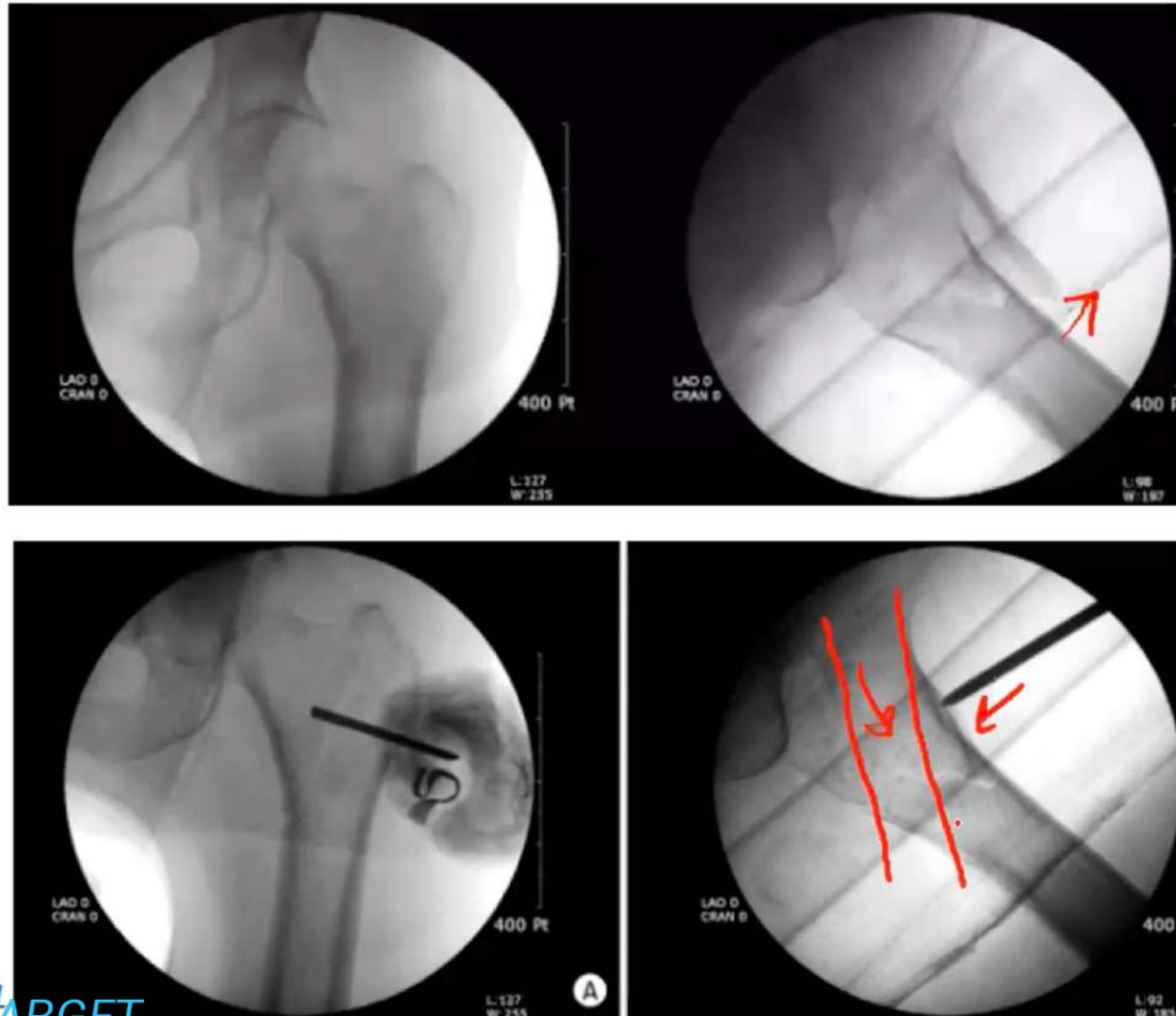
Tip 2: Use of Blunt Steinman pin

Tip 3: Posterior sag correction

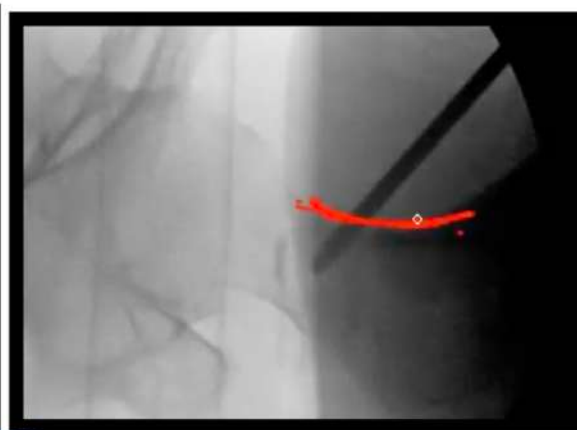
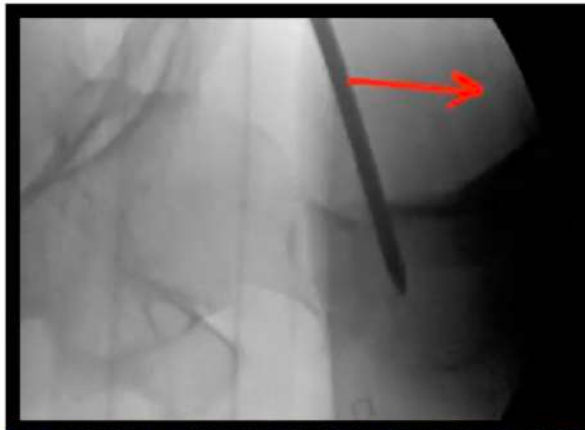
Tip 4: Use of reamer as reduction tool

Tip 5: Provisional fixation with 2 k wires / Steinman pin

## Tip 2: Use of blunt Steinman pin

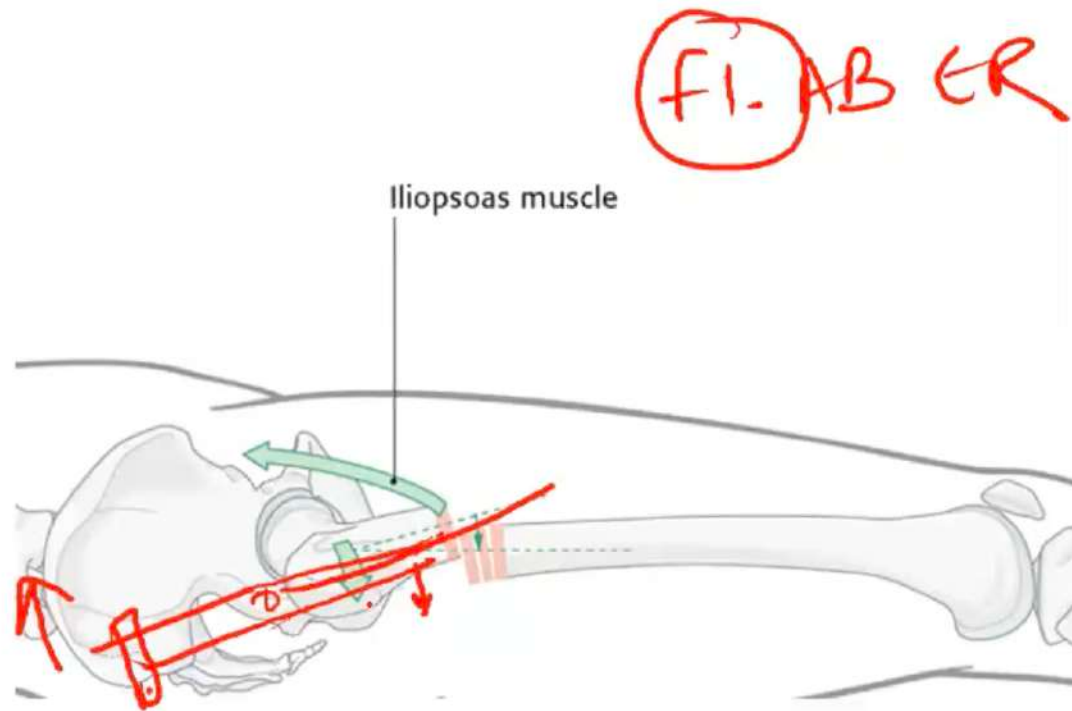


## Tip 3: Posterior sag correction



PROXIMAL FEMUR AND SHAFT FEMUR #: DR ANURAG TIWARI

## Tip 4: Use of reamer



# Implant choice

- Extramedullary



- Plate



- Blade Plate
- Sliding Hip screw - DHS
- Proximal Femur Locking plate

- Intramedullary



- Cephalomedullary Nail



- PFN

- Prosthesis



- Hemi/ THR

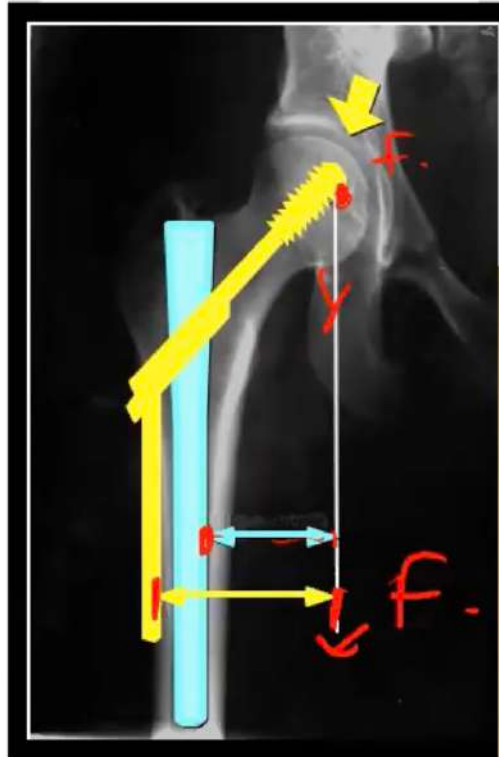
- Unipolar Hemi
- Bipolar Hemi
- THR

## DHS Vs PFN

- Which is better ??
- Stable Vs Unstable #
- Torque = Force (F) X Distance

less c'

More Complications



- Most common complication of DHS
  - a. Screw breakage
  - b. Screw cutout
  - c. Plate breakage
  - d. Medialization of shaft

# DHS

- Principle – CCC

✓ Controlled Cancellous Collapse

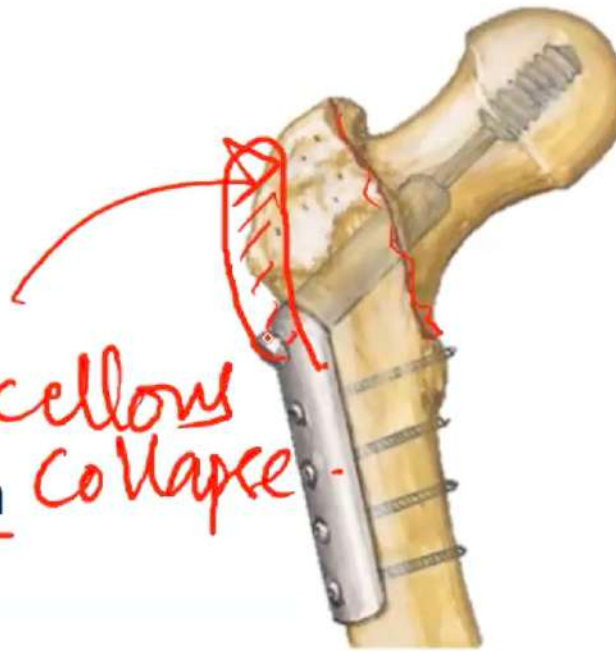
- Tip apex distance < 25 mm

- Position of lag screw

- Length of lag screw

- Contraindicated in unstable # and reverse oblique #

↓  
TSP.



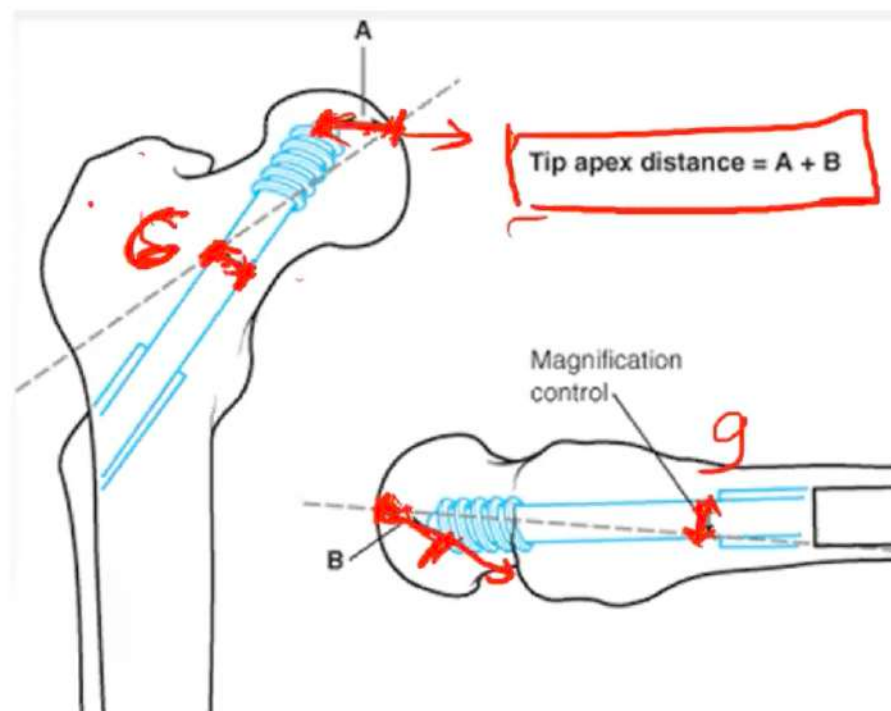
# Implant position

- Position of lag screw — Centre - Centre.  
Posterior - Inferior.
- Tip Apex Distance (TAD)



TAD

$\leq 25\text{mm}$



$$\frac{C}{12.5}$$

$$\left( A \times \frac{10}{12.5} \right) + \left( B \times \frac{10}{12.5} \right)$$

- What if TAD is  $> 25$  mm

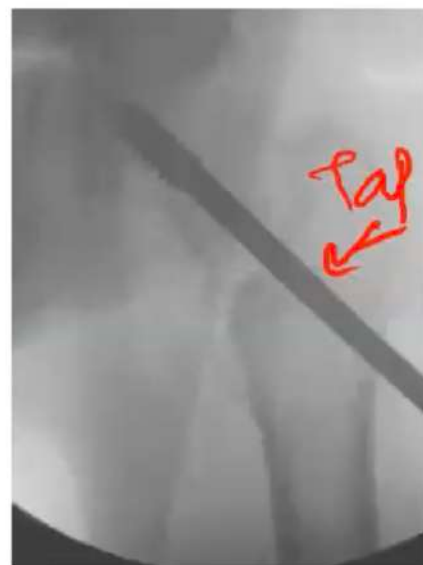


# Implant position

- Position of lag screw
- Tip Apex Distance (TAD)

— Centre Centre.  
Posterior-Inferior.



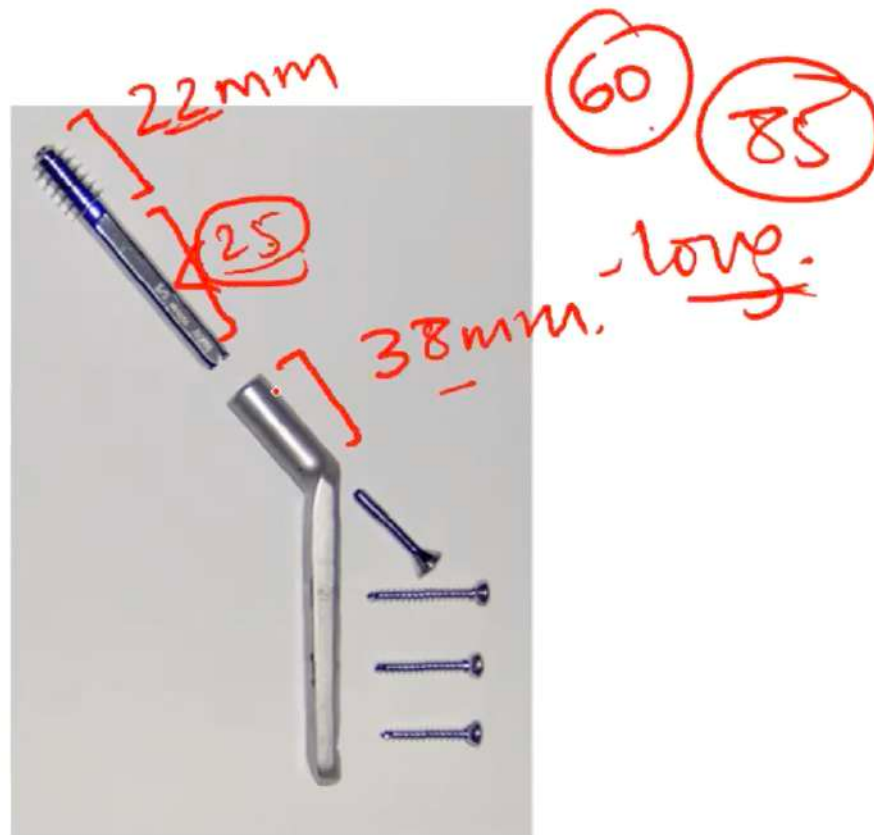


Triple Reamer

PROXIMAL FEMUR AND SHAFT FEMUR #: DR ANURAG TIWARI

# Barrel length- long vs short

- < 80 mm- Short barrel
- > 85 Long barrel



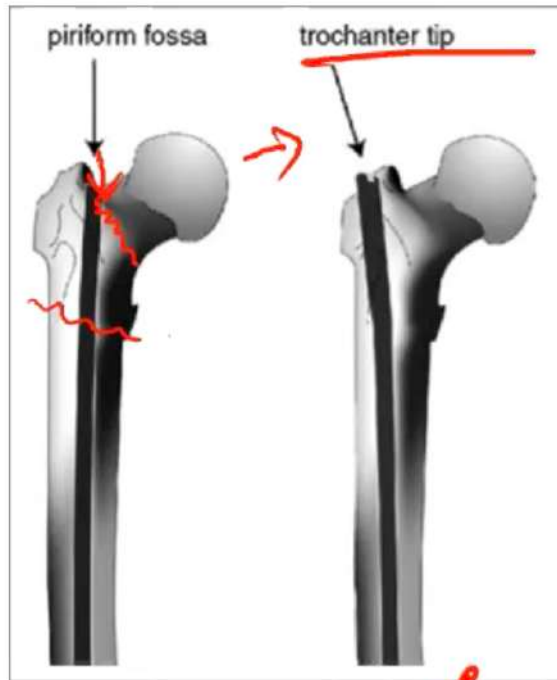
# Cepahomedullary Nail

- Single screw ✓
- Double screw ✓
- Single Helical Blade ✓

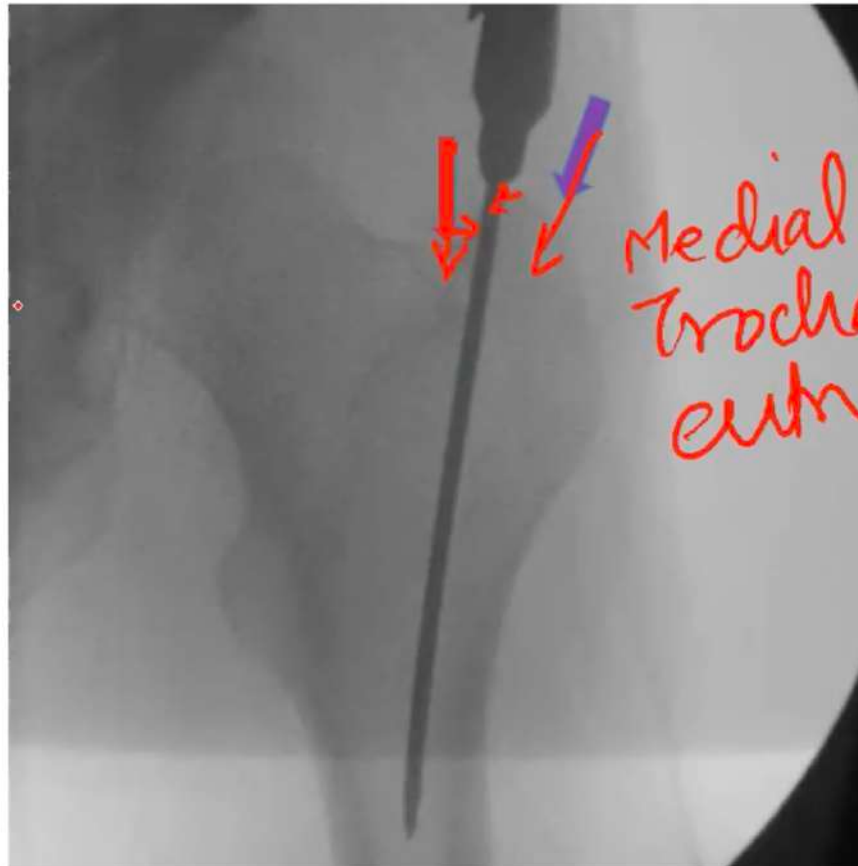


Osteoporosis

# Nails- Entry point



5-6°  
varus



# Unique complication

- Z effect



## Reverse oblique #



PROXIMAL FEMUR AND SHAFT FEMUR #: DR ANURAG TIWARI

# Arthroplasty

- ~~Early return to weight bearing~~
- Salvage for failed previous internal fixation
- GT must be fixed.



# Tips and tricks for arthroplasty

- Hemi Vs THR

OA → screw

- If THR- Acetabular reaming – Be cautious

- ✓ If previous implant present, stem length should bypass distal screw hole site by 2 cortical diameter.

## Reverse oblique #



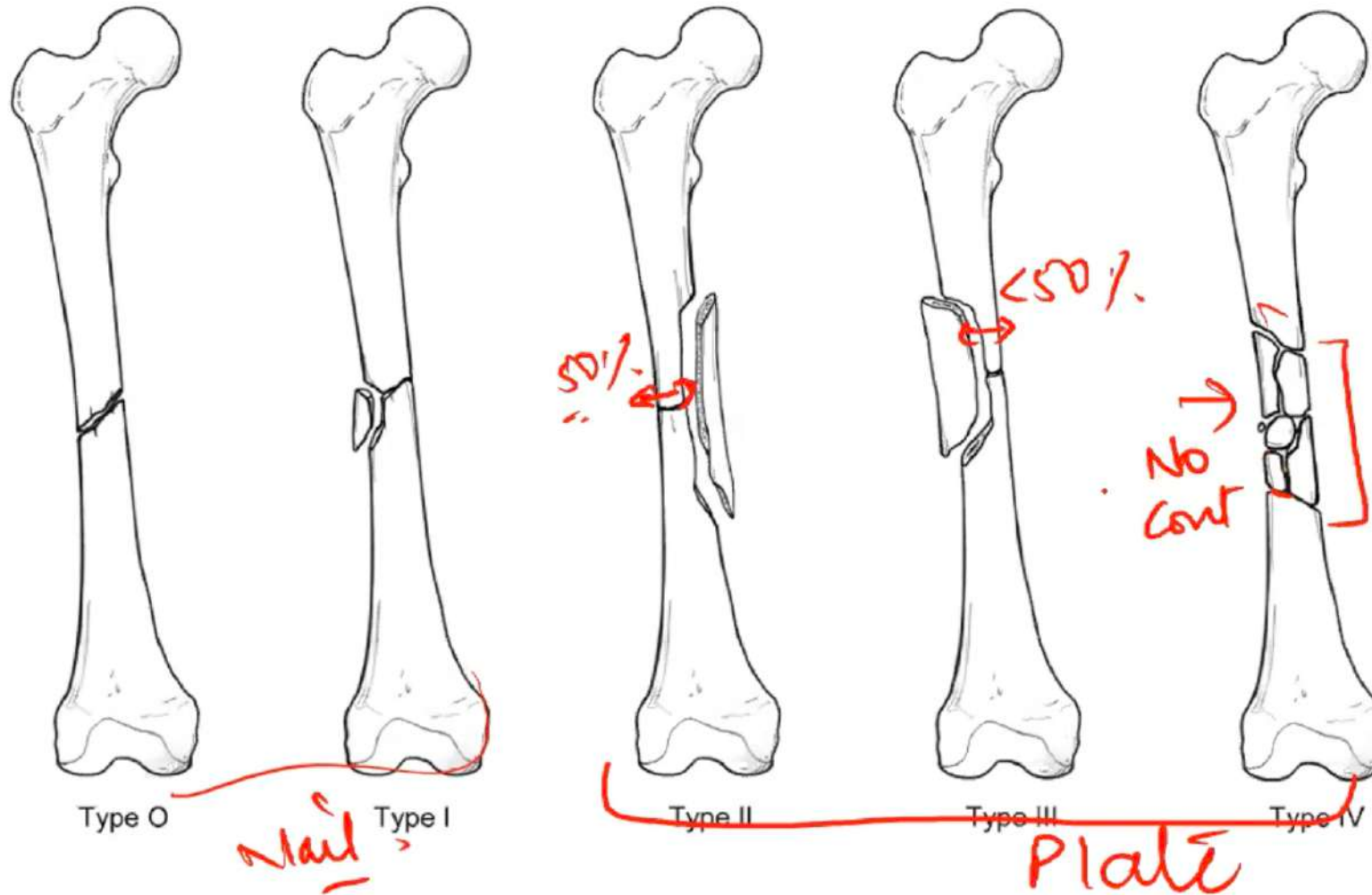
PROXIMAL FEMUR AND SHAFT FEMUR #: DR ANURAG TIWARI

# Femur Fracture

- More common in young individuals
- Often associated with life threatening injuries or complications
- 1- 1.5 Litres of blood loss
- ✓ Fat embolism syndrome
- Evaluation – follow ATLS protocol

A  
B  
C  
D.

# Winquist and Hansen Classification - *Comminution*



PROXIMAL FEMUR AND SHAFT FEMUR #: DR ANURAG TIWARI

- Operative – Gold standard
- CR/OR with fixation

# Implant choice



## External fixator

✓ Polytrauma patient-  
Damage Control

✓ Open #

✓ Vascular repair



## Plate

✓ Pediatric patients

✓ No canal

✓ Extension of # to periarticular area

Periprosthetic #



## Nail

Gold standard

PROXIMAL FEMUR AND SHAFT FEMUR #: DR ANURAG TIWARI

# Management

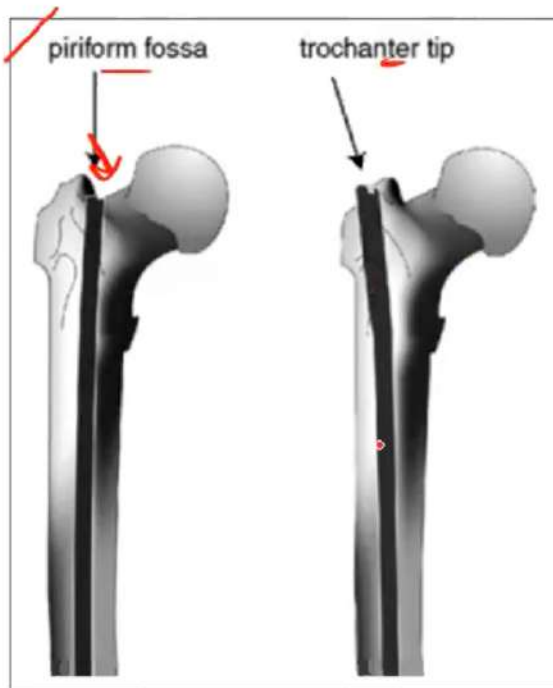
- Intramedullary Interlock nail

- Antegrade

- Retrograde

# Antegrade nailing

- Entry point-

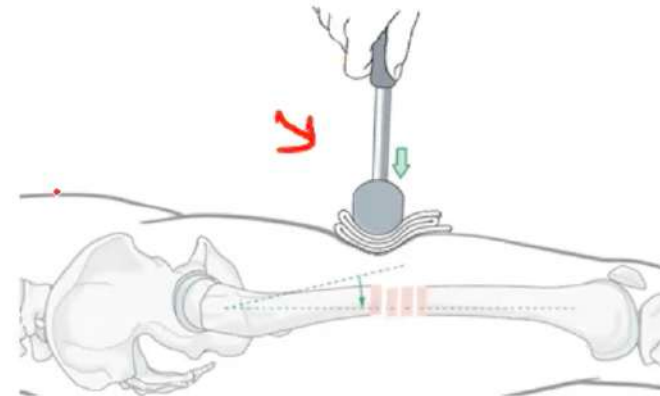
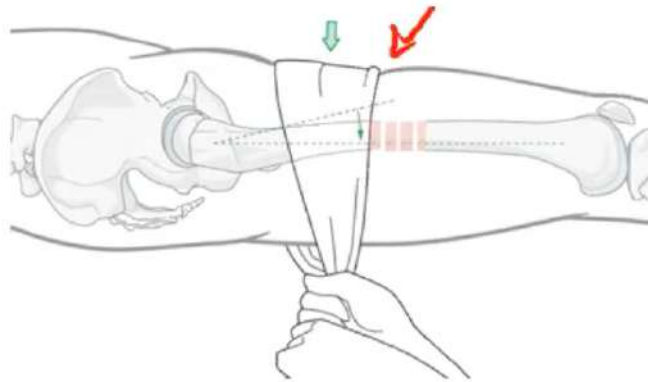


# Reduction tips

- Use of bent guide wire

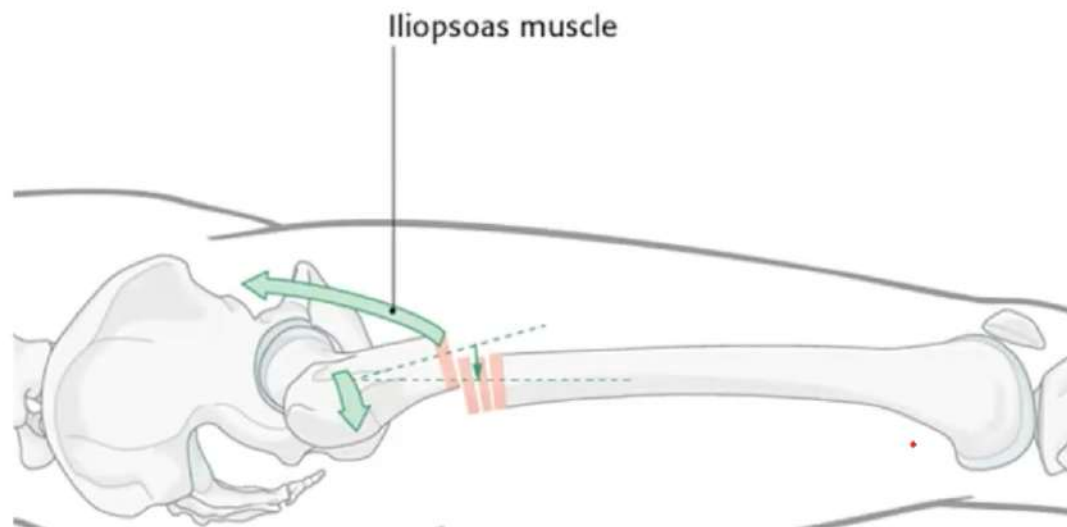


- Use of sheet or Hammer



PROXIMAL FEMUR AND SHAFT FEMUR #: DR ANURAG TIWARI

# Use of reamer

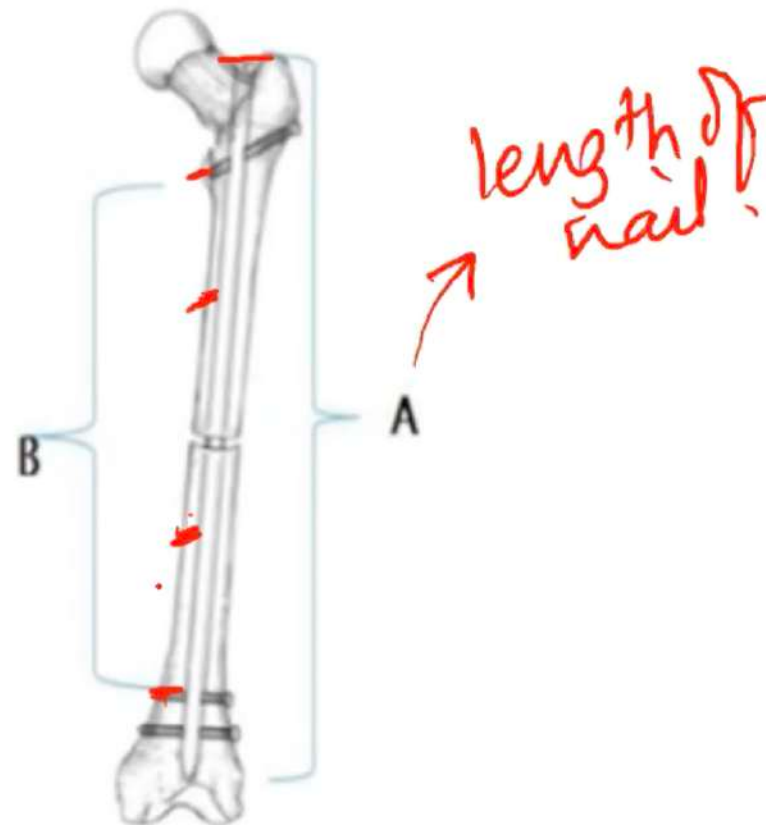
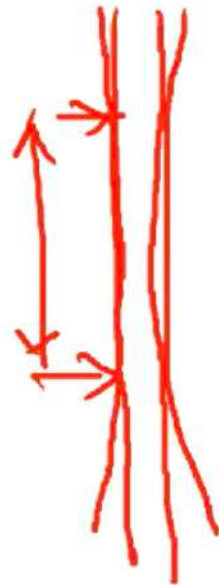
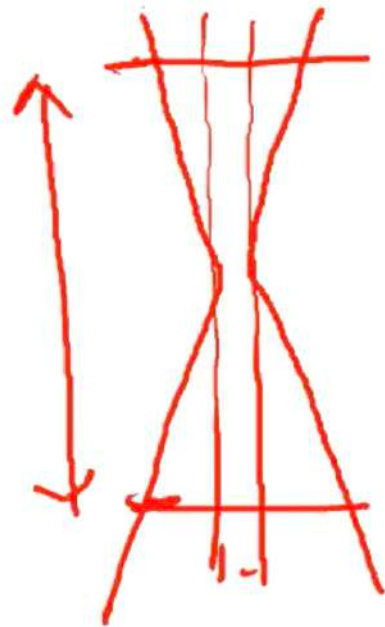


PROXIMAL FEMUR AND SHAFT FEMUR #: DR ANURAG TIWARI

# Ream or not to ream ??

- Disadv of reaming
- Cortical perforation
- Thermal necrosis
- Fat embolism
- Bleeding
- Increase operative time
- Adv of reaming
- Larger diameter nail can be inserted
- Bone graft gets deposited
- Decrease working length → More stability
- Increased blood supply

# Working length



# Indications of Retrograde nailing

- Bilateral shaft femur #
- Morbid obese patient
- Polytrauma patient
- Floating knee
- Ipsilateral acetabulum #
- Ipsilateral neck femur #
- Ipsilateral patella #

Tibial -

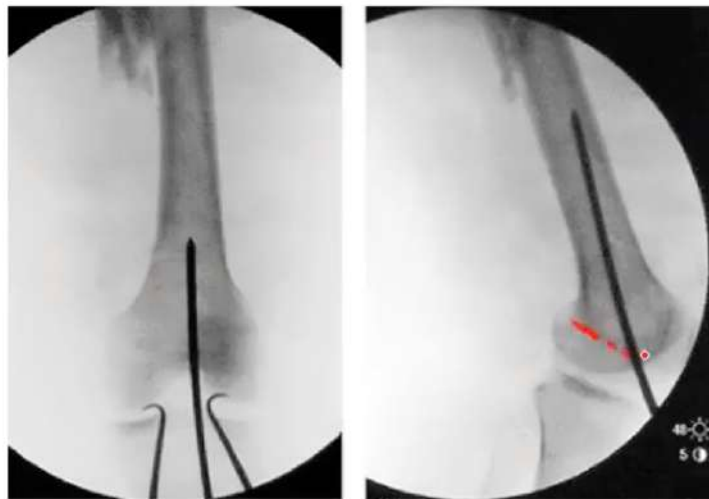
## Contraindications of Retrograde nailing

- ??

✓ Knee flexion -  $\uparrow$  x.  
Ankylosis / 30-45° 90°-  
stiff

# Retrograde nailing

- Entry point-
- Knee flexion 30-50 degree required
- Just anterior and medial to PCL attachment
- At apex of Blumensaat line



PROXIMAL FEMUR AND SHAFT FEMUR #: DR ANURAG TIWARI

# Length of retrograde nail

- At or above lesser trochanter



PROXIMAL FEMUR AND SHAFT FEMUR #: DR ANURAG TIWARI

## Neck with shaft femur #

- Two implants Vs  
*Reduction better*



- Single implant

*-Stress riser  
less of  
less Bl.*



PROXIMAL FEMUR AND SHAFT FEMUR #: DR ANURAG TIWARI