

BRIGHAM HEALTH



**BRIGHAM AND
WOMEN'S HOSPITAL**

Femoral shaft fractures

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Overlæge

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**HARVARD MEDICAL SCHOOL
TEACHING HOSPITAL**



Mass General Brigham

AO

Learning objectives

- Determine factors that influence decision making
- Outline surgical reduction techniques utilizing tools of distraction to achieve length and alignment
- Outline surgical fixation techniques (plating, external fixation, intramedullary nailing)

Epidemiology

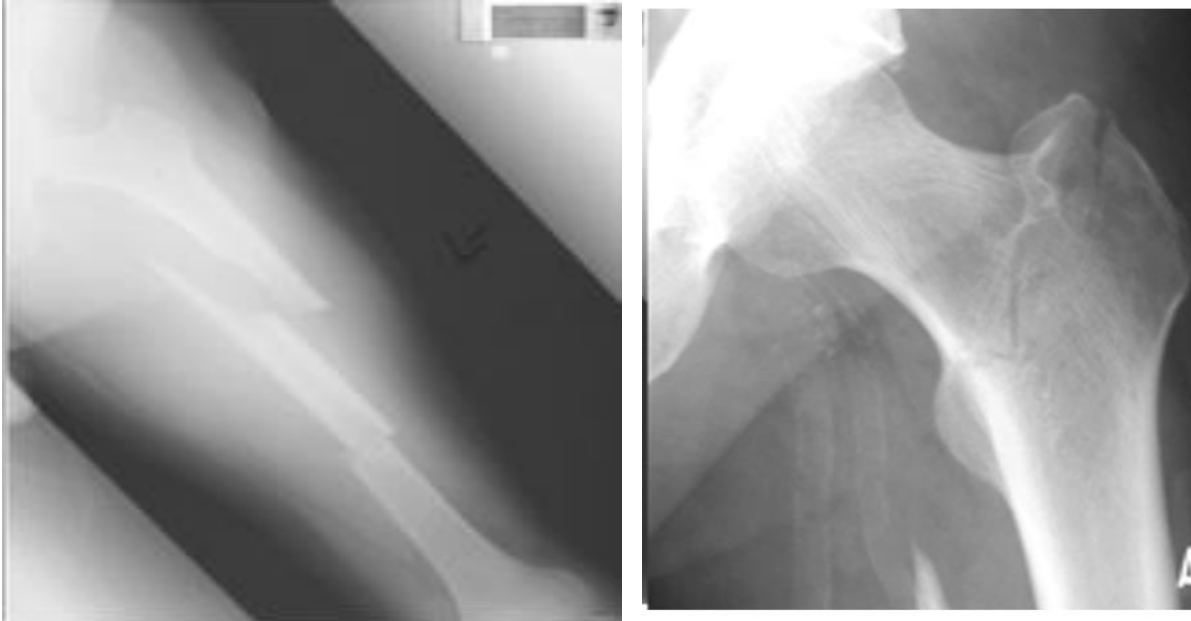
- Who gets this injury
 - Age: 25–65 years
 - 1:10,000
- High-energy injury
 - Risk of associated injuries of the head, chest, or abdomen
 - Blood loss of 1–1.5 liters (20% total blood volume)
 - Risk of shock, fat and pulmonary embolism
 - Open/closed injury
- Low-energy falls in the elderly

Early treatment



- Assessment
 - Airway, breathing, and circulation (ABC)
 - Life threatening injuries
- Analgesia
- Splintage
- Resuscitation

Early treatment



- Good quality, full length x-rays including hip and knee joints
 - Location of fracture, degree of comminution
- When severely comminuted, take x-rays of uninjured leg
- Must rule out extension into hip/knee
- Easy to treat if you know it beforehand
- Displace during nailing—difficult to treat

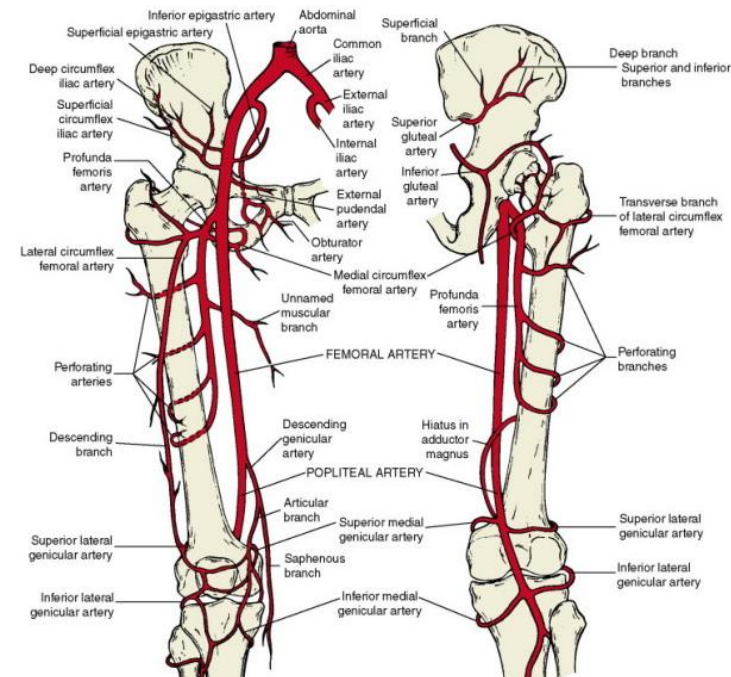
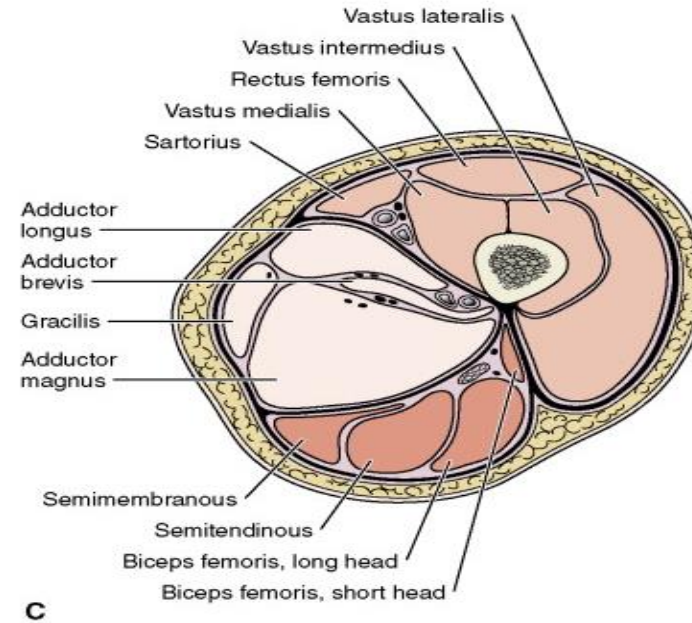
Treatment options

- Nonoperative
 - Pediatric patients
 - Medically unfit
 - Operative treatment not possible (lack of trained personal and/or resources)
- Skeletal traction
 - “Simple”, low risk, cheaper
 - High nursing demand
 - Long stay
 - Malunion, joint stiffness, wasting



Operative treatment

- Plating
 - External fixation
 - Intramedullary (IM) nailing
-
- Pros and cons:
 - Accurate reduction
 - Early mobilization, short stay
 - Infection



Factors influencing decision making

- Age
- Closed versus open injury
- Extension into proximal and distal joint
- Other injuries: chest and head injury
- Presence of previous implants (ie, hip and knee prosthesis)
- Bilateral femur fractures

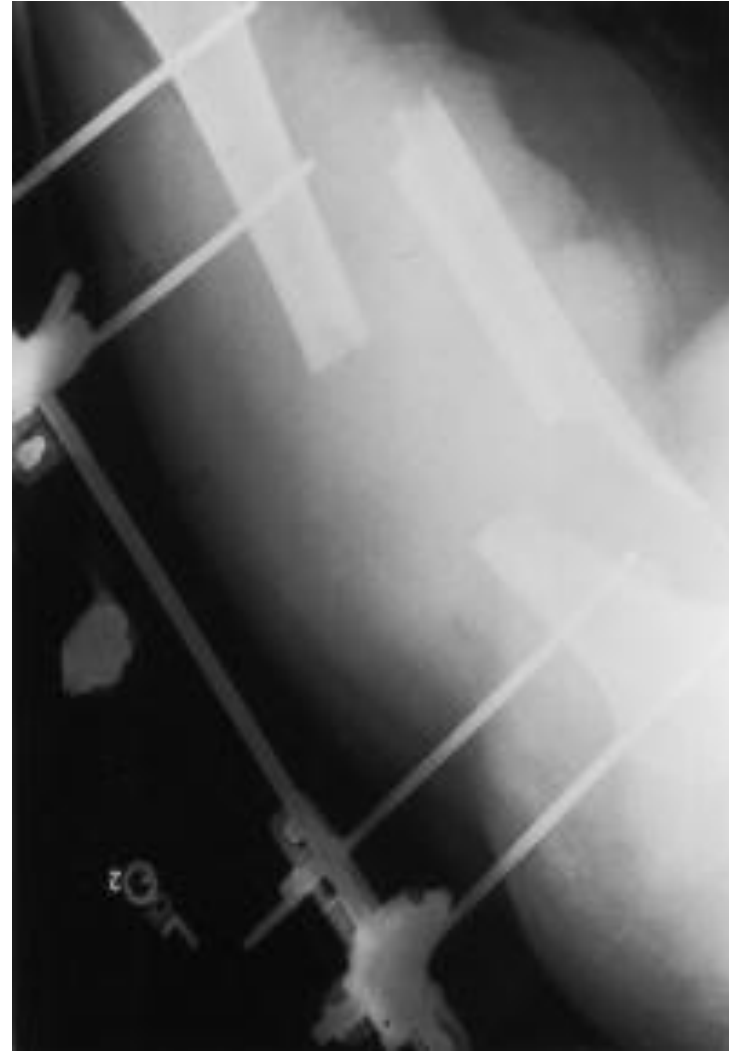
Plating—indications

- Metadiaphyseal fractures
- Narrow canal
- Endoprosthesis—canal not available
- Preexisting deformity
- Pediatric patients



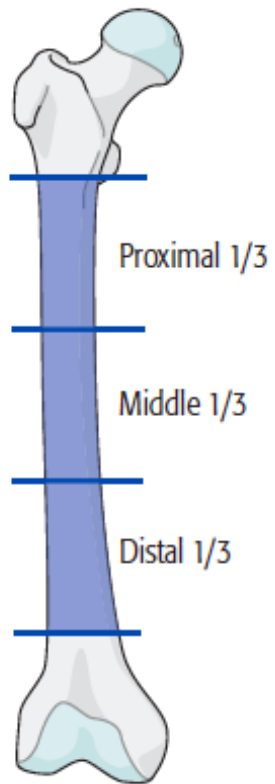
External fixation—indications

- Gross contamination
- Provisional stabilization and damage control
- Fracture with bone loss

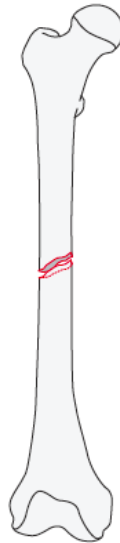


IM nailing

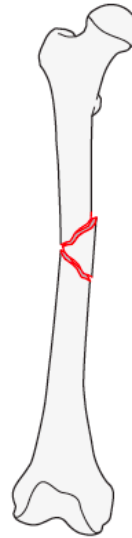
- Treatment of choice for virtually all femoral shaft fractures
- From lesser trochanter to within 7 cm of knee joint



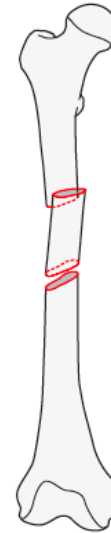
Types:
Femur, diaphyseal segment,
simple fracture
32A



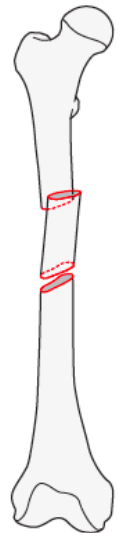
Femur, diaphyseal segment,
wedge fracture
32B



Femur, diaphyseal segment,
multifragmentary fracture
32C

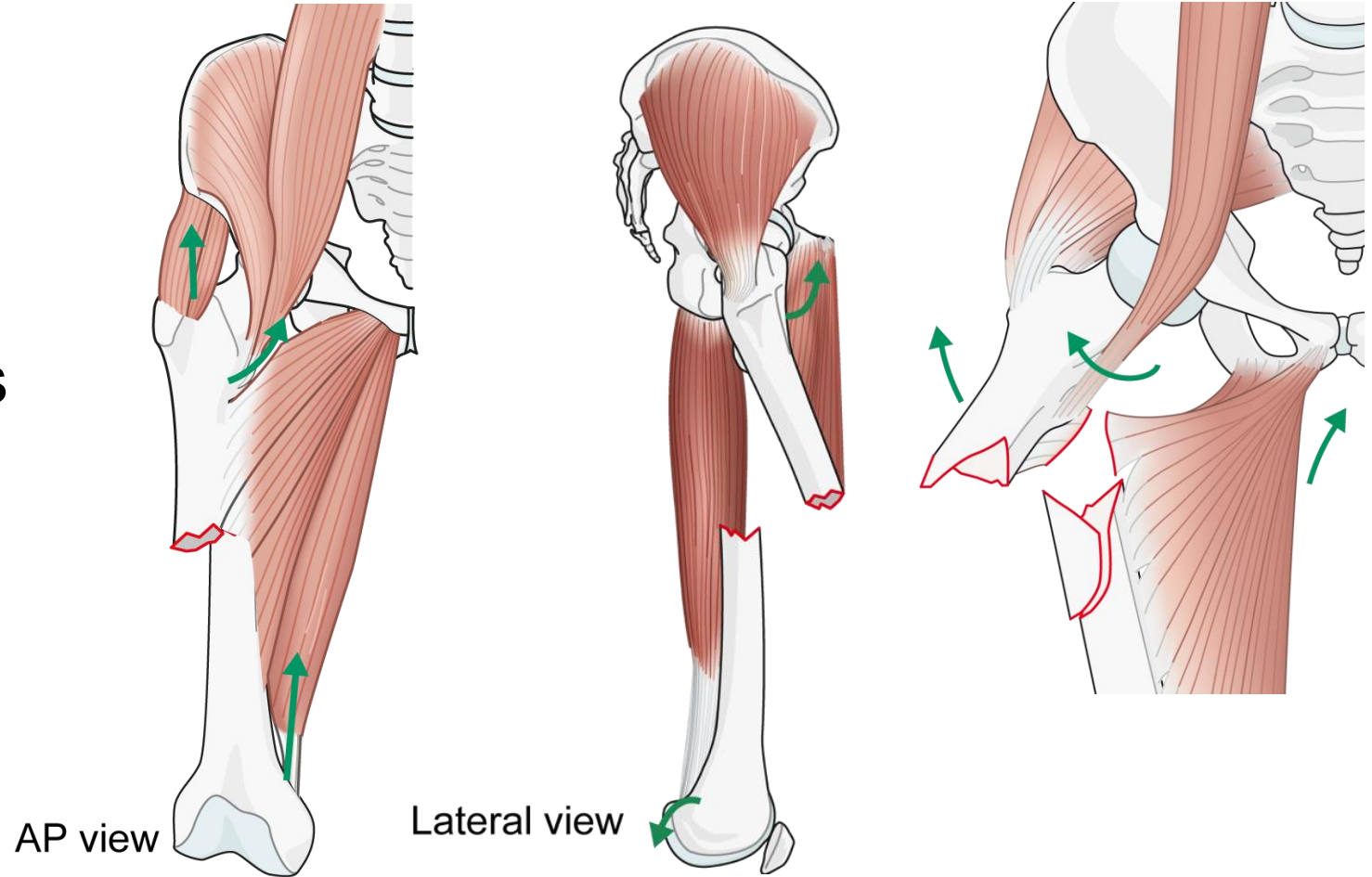


Femur, diaphyseal segment, multifragmentary,
intact segmental fracture
32C2*



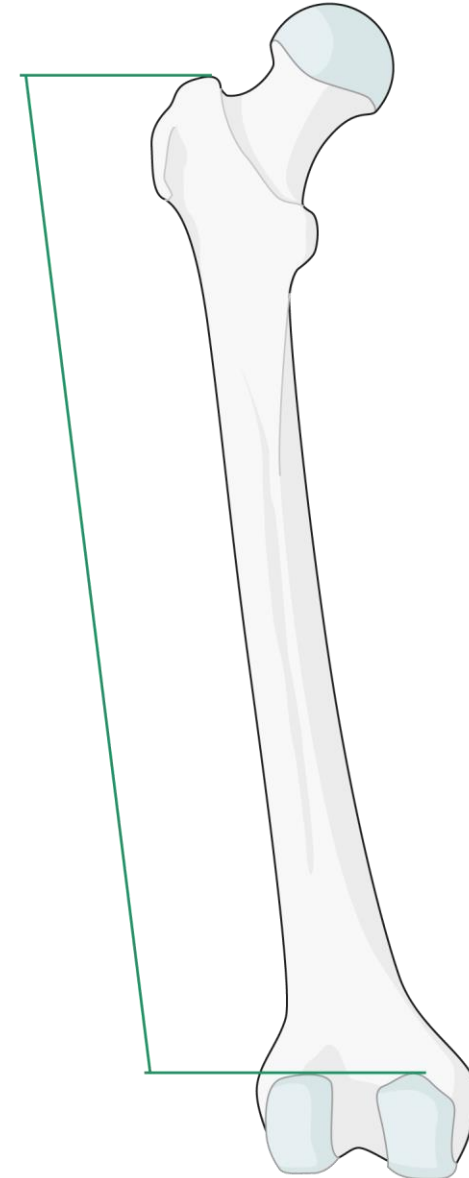
Deforming forces

- Proximal fragment flexion adduction
 - Psoas
- Adductors cause varus
- Quadriceps cause shortening
- Gastrocnemius cause hyperextension



Preoperative planning

- Measure diameter
- Measure length
 - Opposite side
- Nail length
 - Tip of the greater trochanter to adductor tubercle



25 YO Male

MCC

Ripped half his left foot off

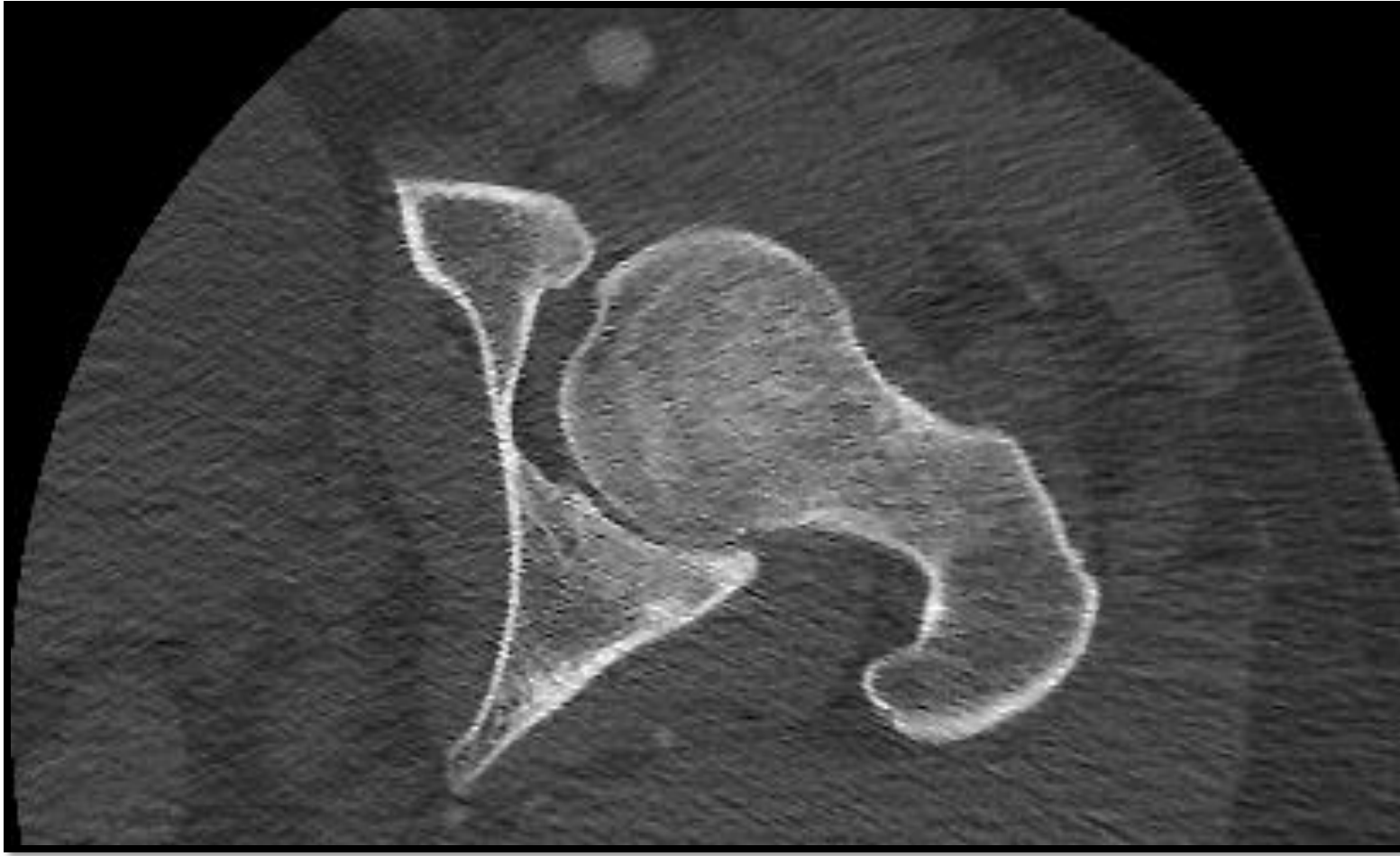
Left Femur Fracture

No Other Injuries





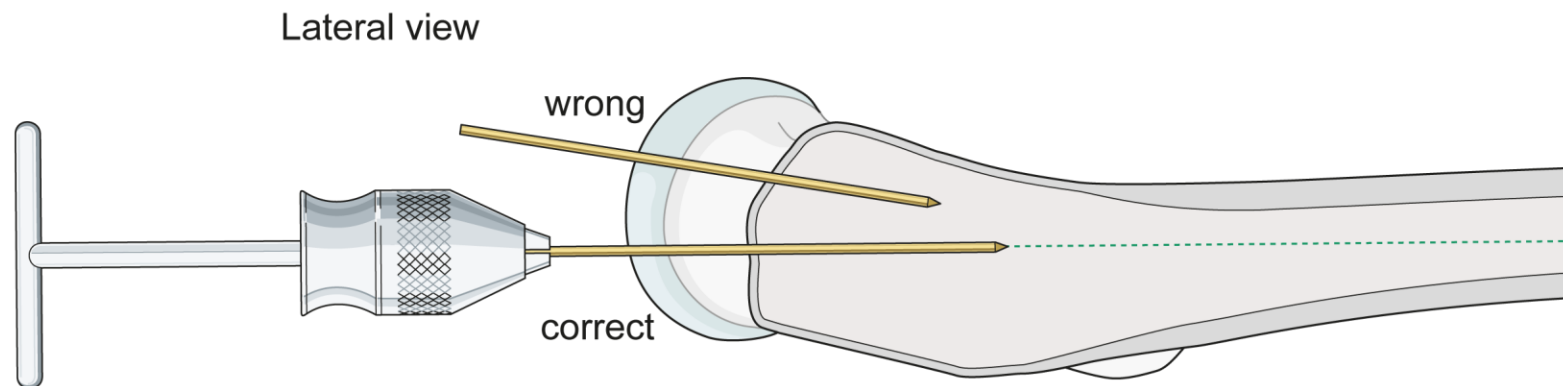
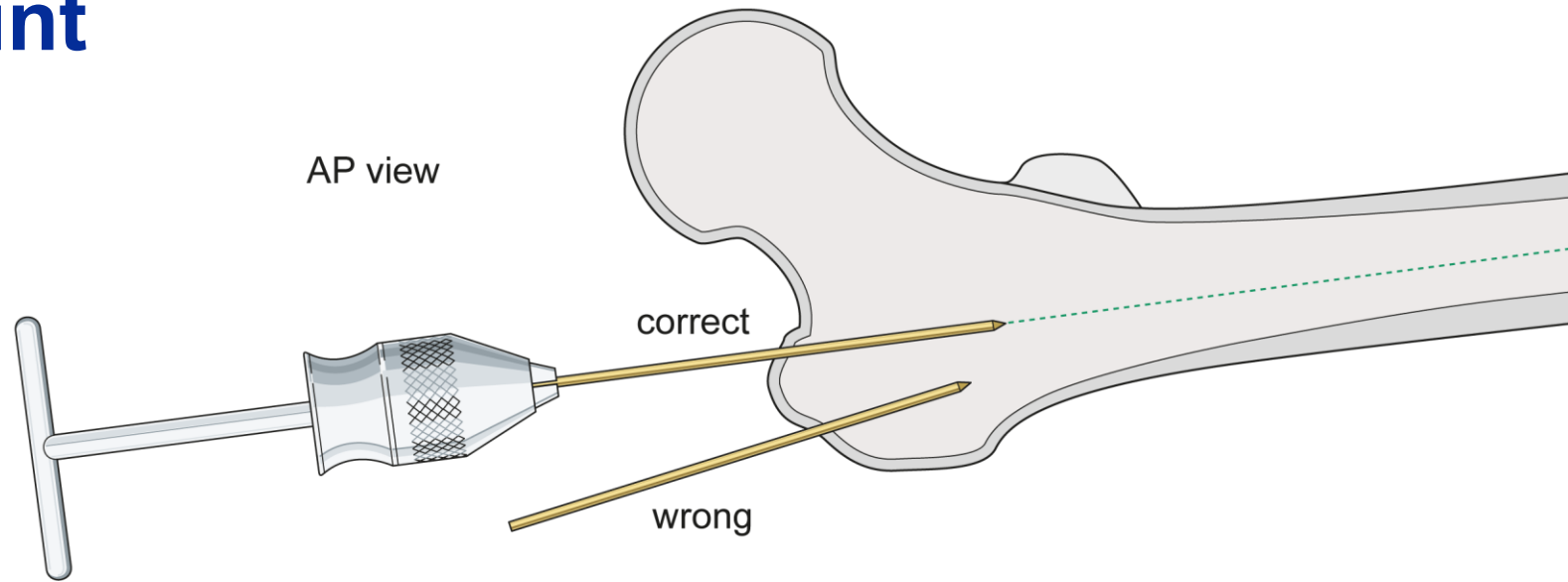
No Femoral Neck Fx







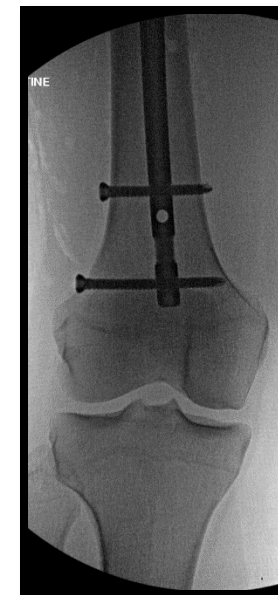
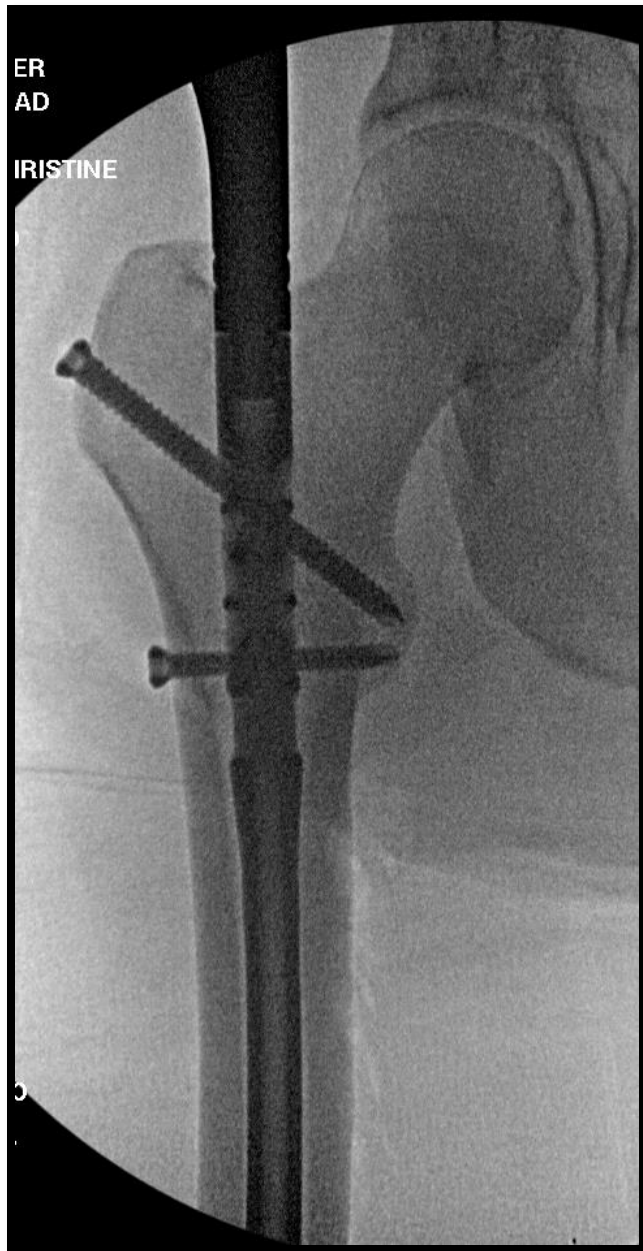
Entry point



Entry point

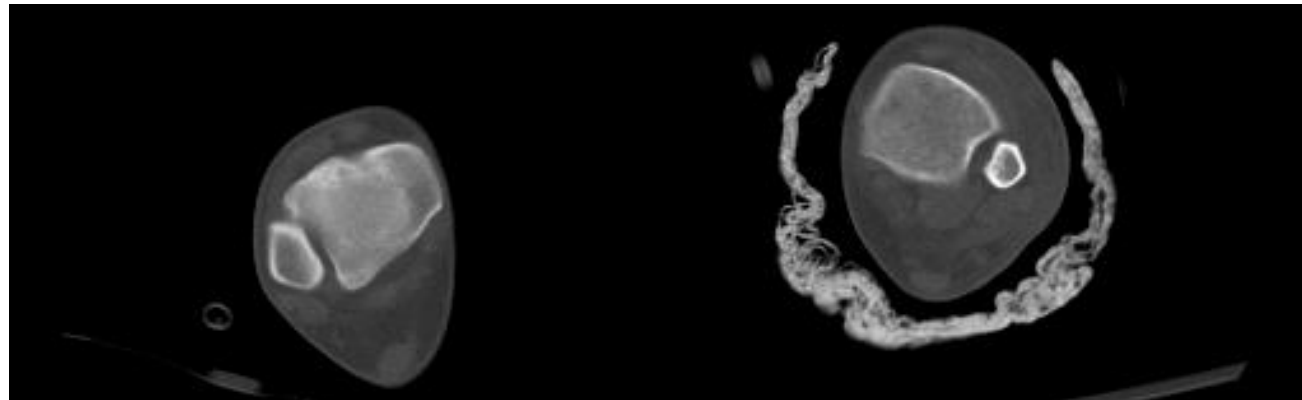
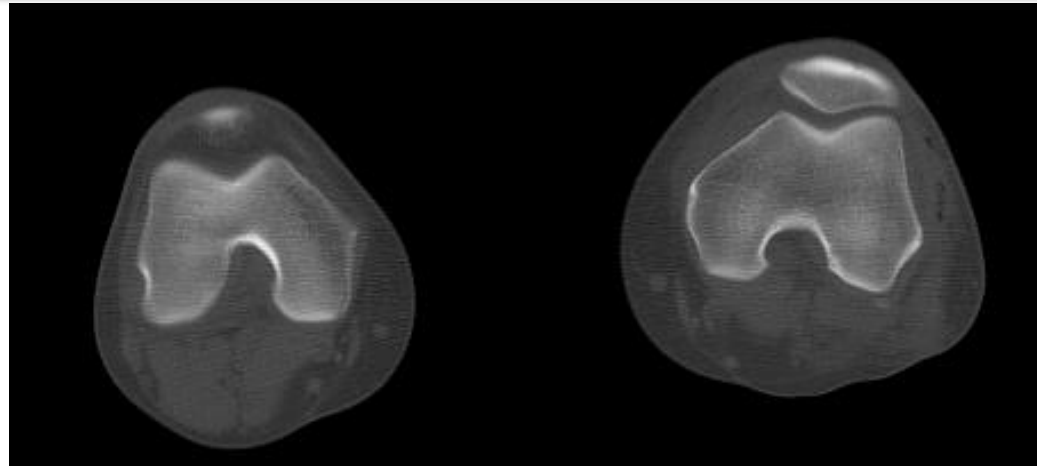
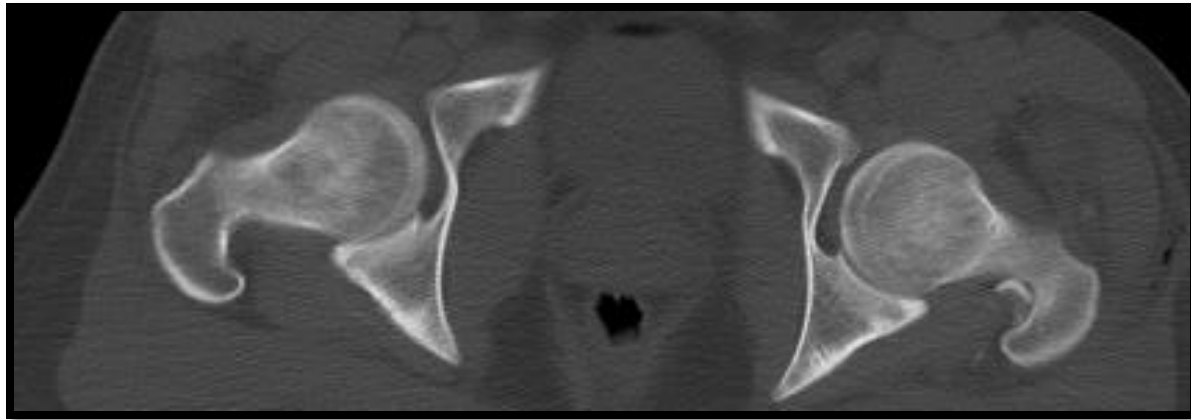
- Wrong entry point

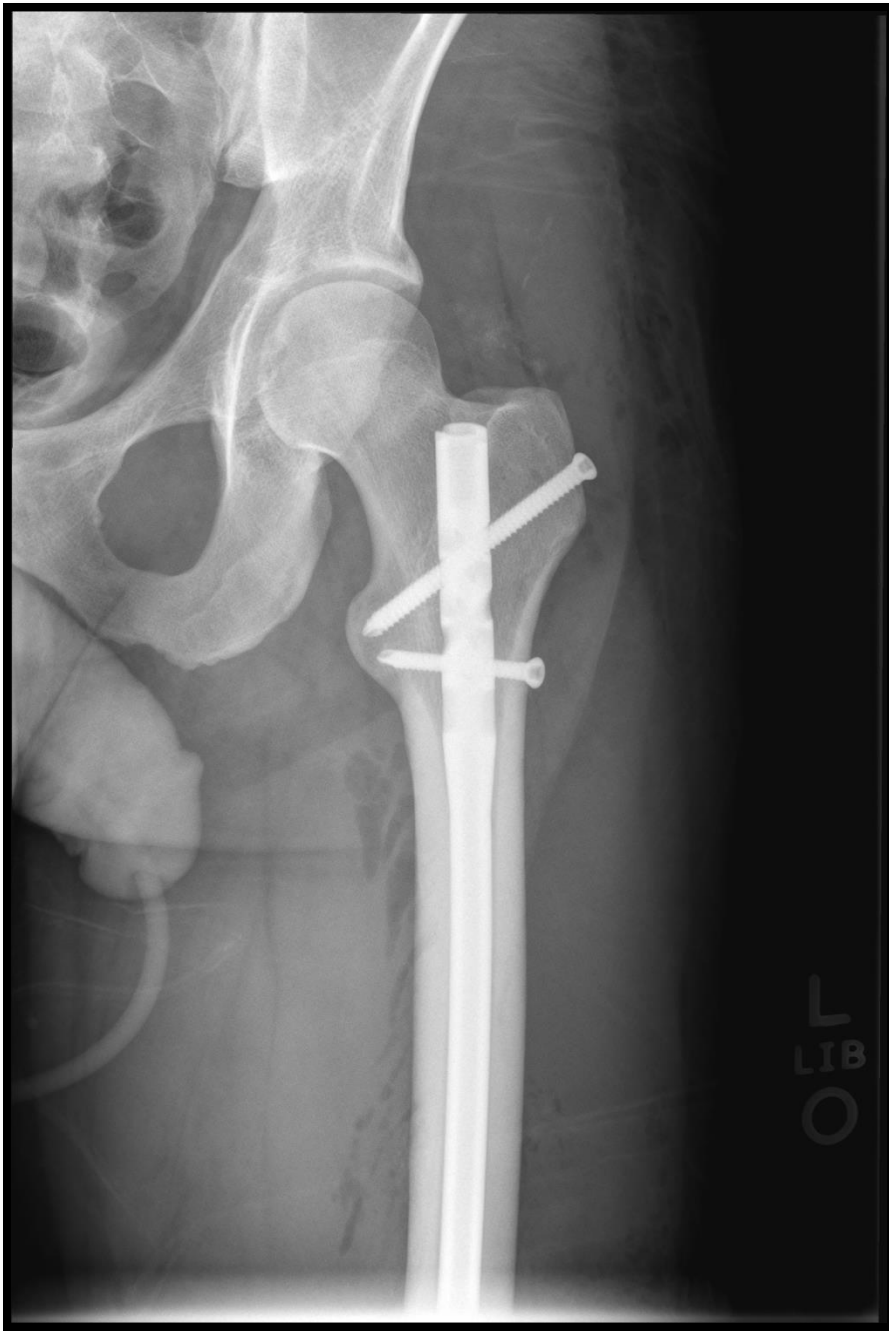




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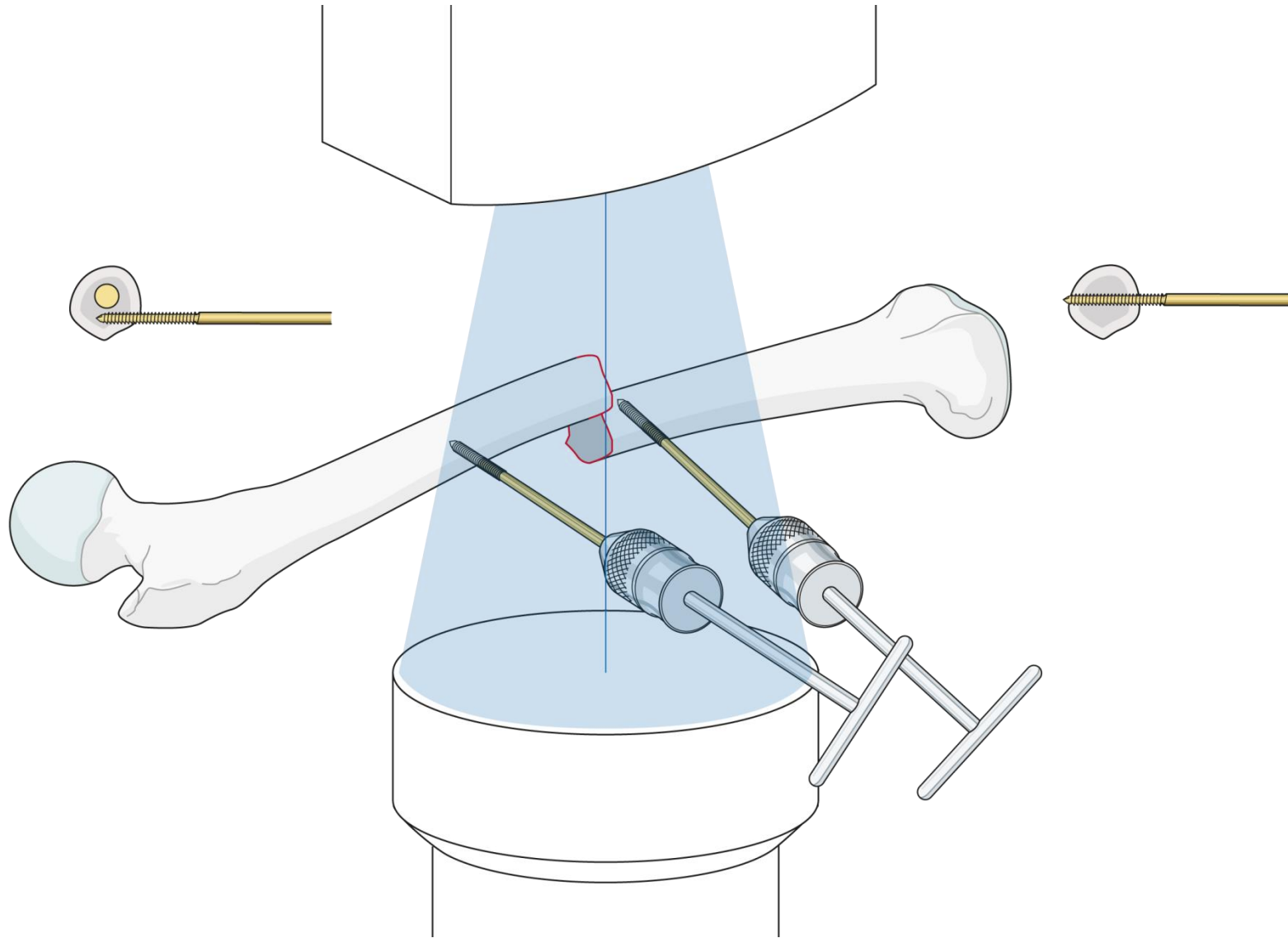








Tips and tricks—two Schanz screws

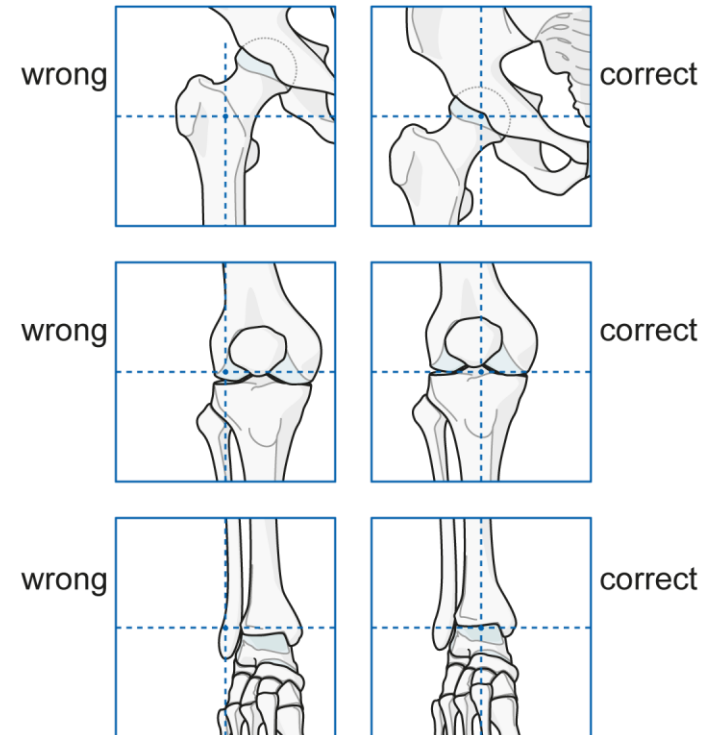
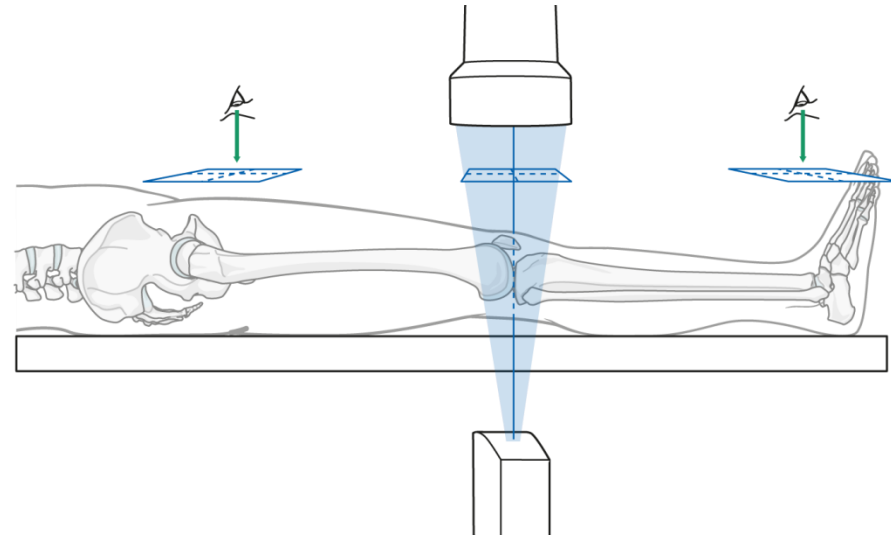
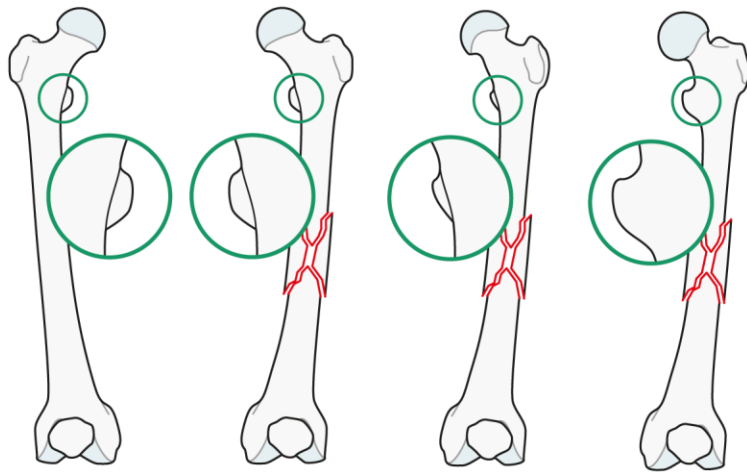
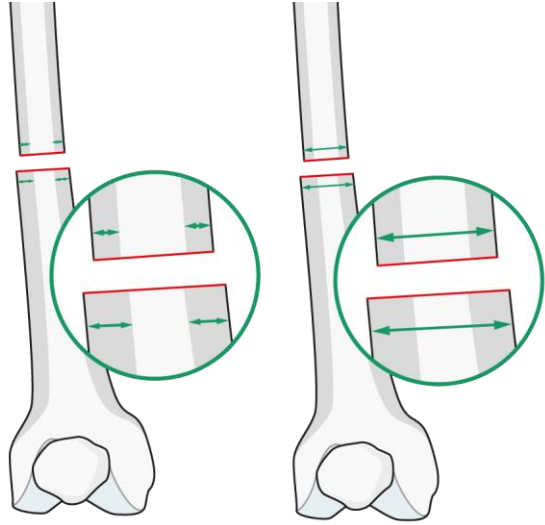


Complications of femoral nailing

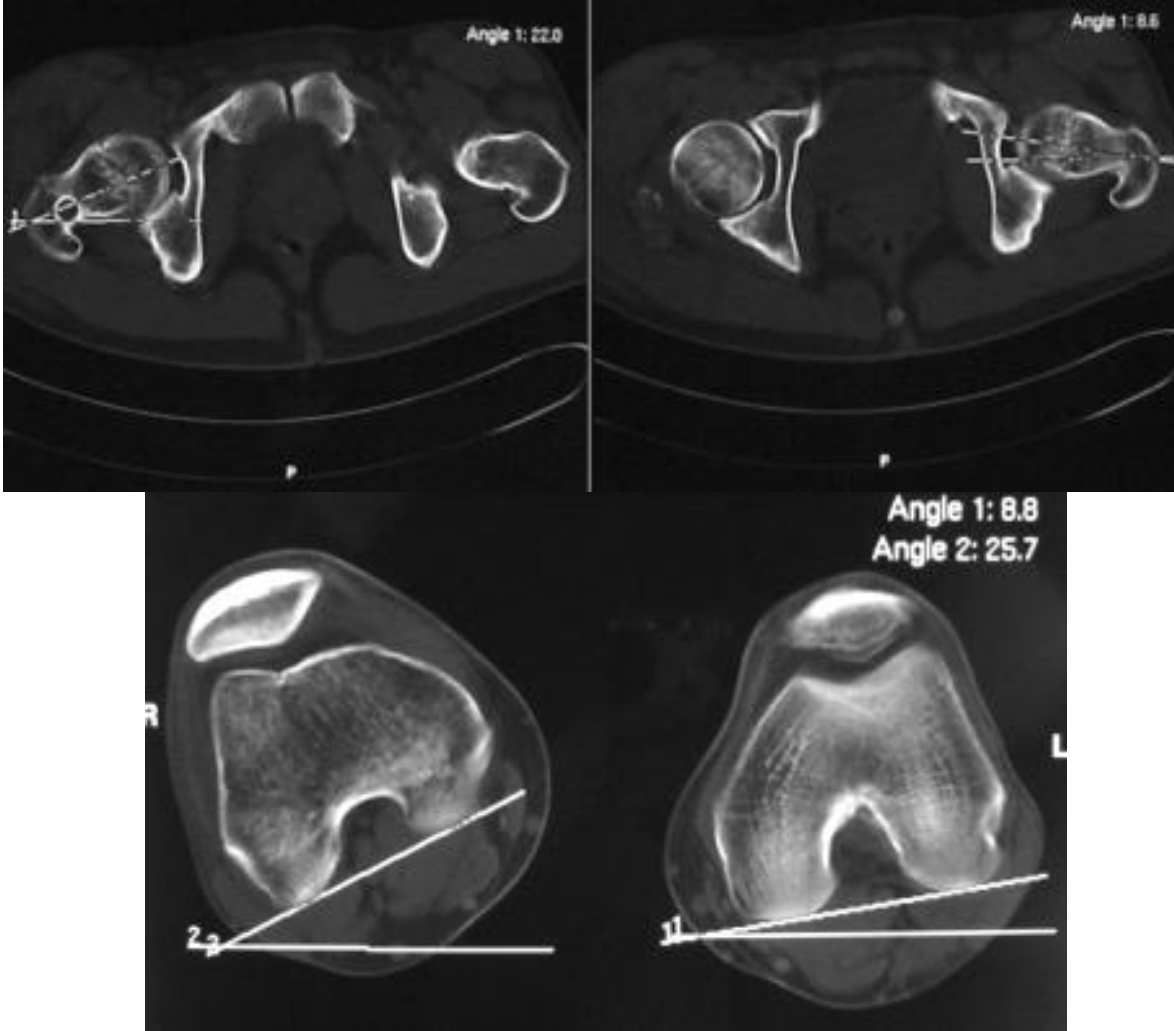
- Fat embolism
- Infection
- Malunion: rotation more than 15° and length
- Nonunion
- Heterotopic ossification



Rotation, alignment



Rotational malalignment



Take-home messages

- Reamed, locked IM nailing is gold standard
- Plating has a role when the medullary canal is not available
- Severe open fractures—external fixation is a viable option
- Check length, rotation and alignment
- Check for femoral neck fractures