

Subtrochanteric Femur Fractures

- IM Nailing Technical tips

- Case 1



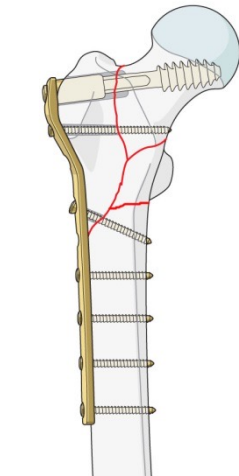
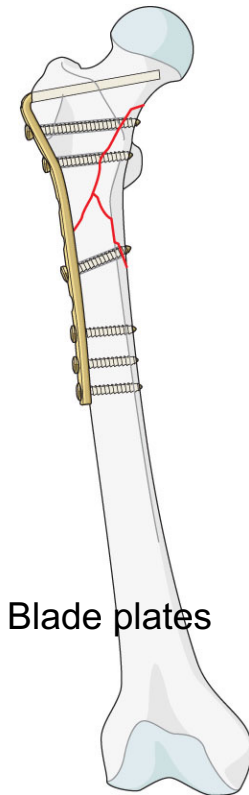
Which would you prefer to fix?

- Case 2



Choice of implants

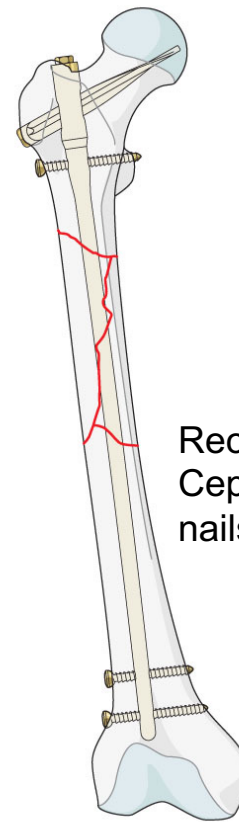
- extramedullary plates or intramedullary nails



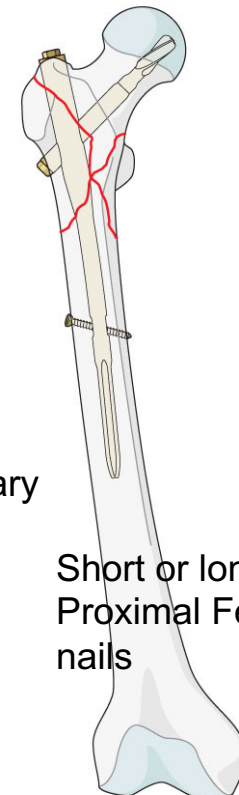
DCS plate



LCP Proximal
Femoral plate

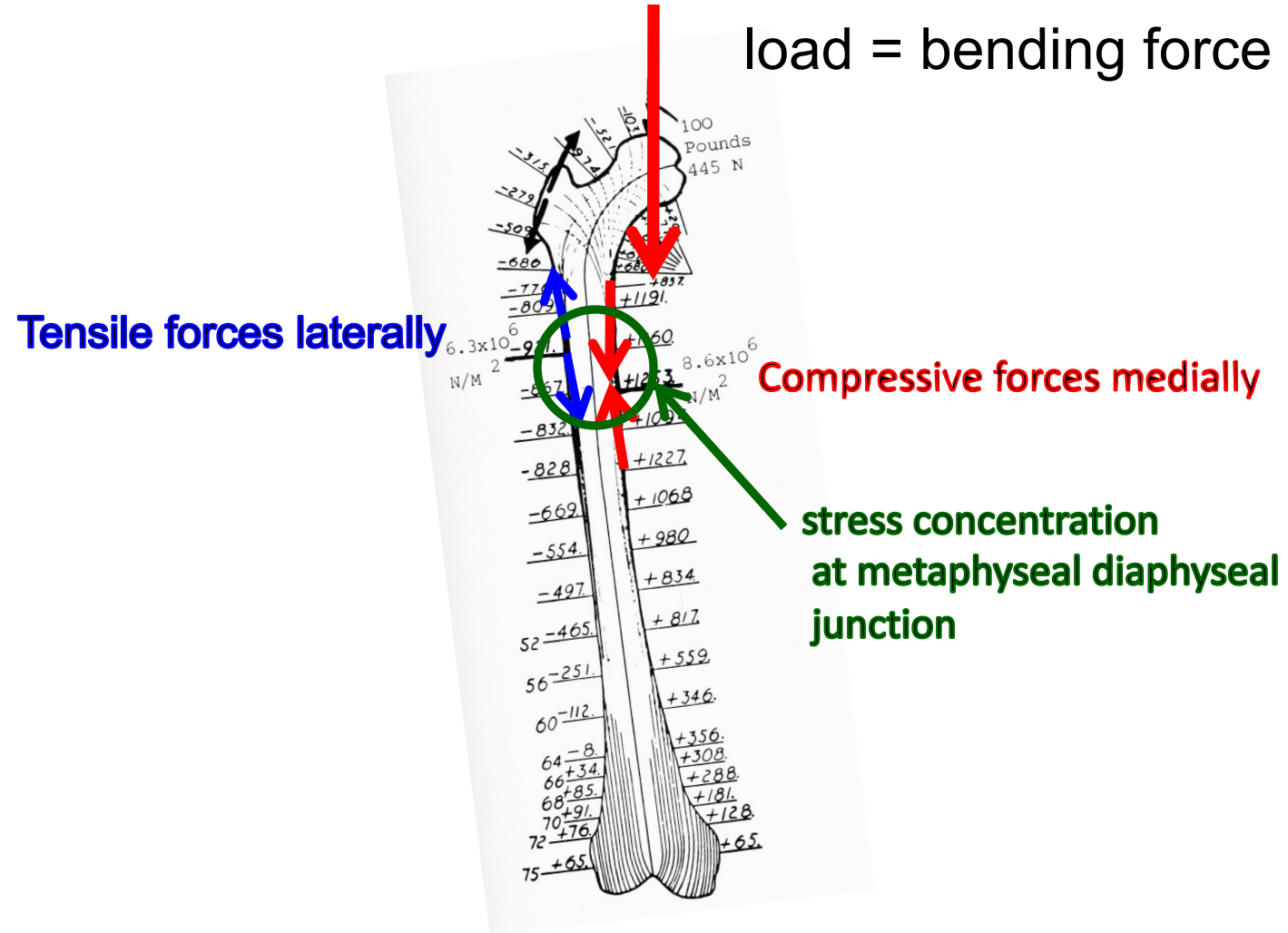


Recon or
Cephalomedullary
nails



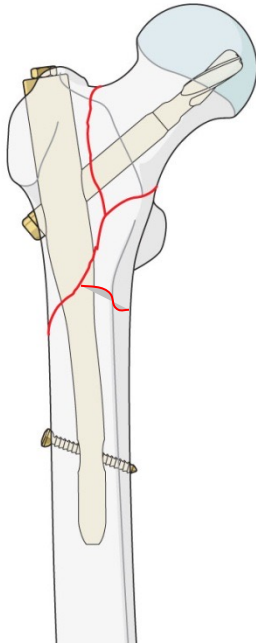
Short or long
Proximal Femoral
nails

Biomechanics



Outcome studies

- Meta-analysis – [Kuzyk PRT et al 2009 J Orthop Trauma](#)



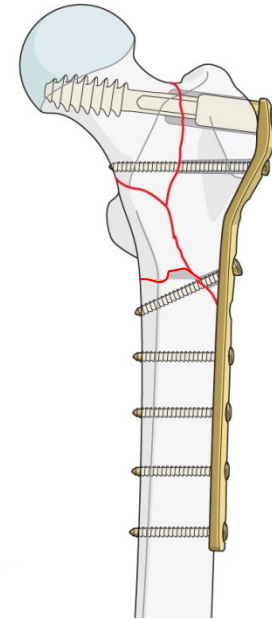
Intramedullary vs extramedullary

3 level I studies favour IM nail Rx

lower op time + blood transfusion

lower fixation failure

no difference in abductor muscle function at 1 yr
or walking function at 4 mth and 1 yr



- NICE Clinical Guideline 124 (2011) 'Hip fracture'
- 'Use an intramedullary nail to treat patients with a subtrochanteric fracture'
- ...in elderly patients
- ...but doesn't say what type.

- Case 1



- Case 2



Pre-op Plan

PROCEDURE	EQUIPMENT	POTENTIAL PROBLEMS

- Case 1



- Case 2



Pre-op Plan

PROCEDURE	EQUIPMENT	POTENTIAL PROBLEMS
<p>Antibiotics</p> <p>Patient position</p> <p>Pre-wash, prep + drape</p> <p>(Reduce)</p> <p>Mark skin</p> <p>Approaches</p> <p>(Reduce)</p> <p>Entry point</p> <p>Prepare proximal canal</p> <p>(Reduce)</p> <p>Pass guidewire</p> <p>Measure (length / diameter)</p> <p>Insert nail</p> <p>(Reduce)</p> <p>Insert hip screw</p> <p>Distal locking</p> <p>Wound closure</p>		

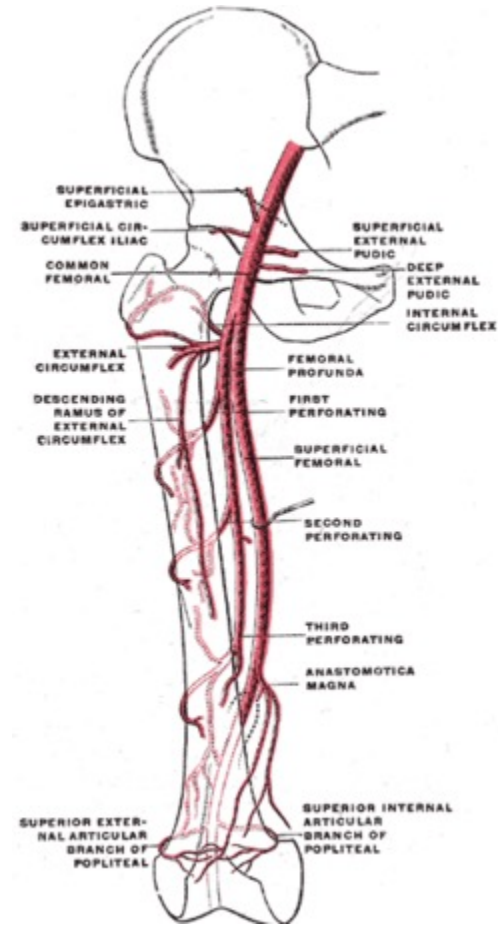
Pre-op Plan

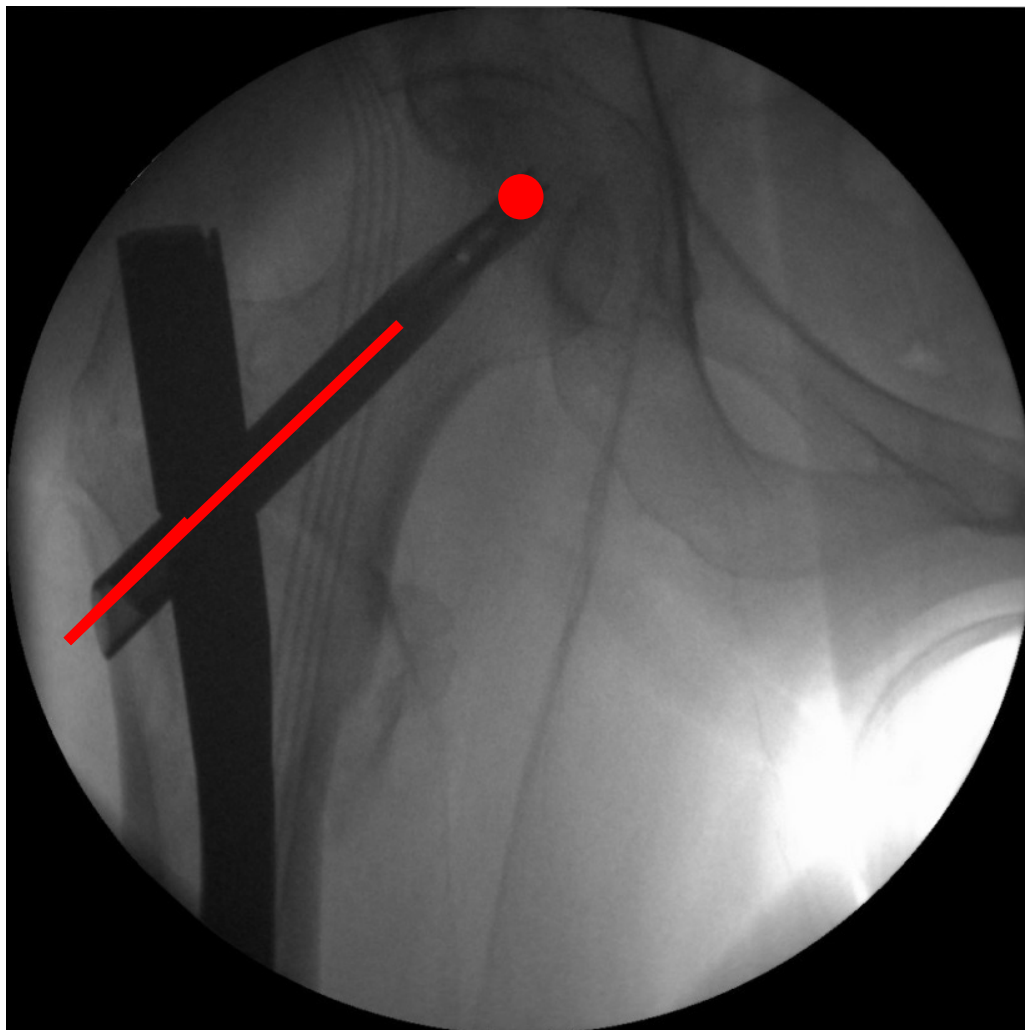
PROCEDURE	EQUIPMENT	POTENTIAL PROBLEMS
Antibiotics	Operating table	
Patient position	(Traction)	
Pre-wash, prep + drape	II (positioning ?)	
(Reduce)	Drapes	
Mark skin	Surgical adjuncts	
Approaches	Ortho basic	
(Reduce)	Cephalo-medullary nail	
Entry point	Skin closure	
Prepare proximal canal	Dressings	
(Reduce)		
Pass guidewire		
Measure (length / diameter)		
Insert nail		
(Reduce)		
Insert hip screw		
Distal locking		
Wound closure		

Pre-op Plan

PROCEDURE	EQUIPMENT	POTENTIAL PROBLEMS
Antibiotics	Operating table	Bleeding
Patient position	(Traction)	Neurologic damage
Pre-wash, prep + drape	II (positioning ?)	Vascular damage
(Reduce)	Drapes	Reduction
Mark skin	Surgical adjuncts	Access
Approaches	Ortho basic	Entry point
(Reduce)	Cephalo-medullary nail	Canal preparation
Entry point	Skin closure	Blow out prox femur
Prepare proximal canal	Dressings	Fracture
(Reduce)		Guidewire bending, nail backing out, weakening nail
Pass guidewire		Rotational malalignment
Measure (length / diameter)		Length
Insert nail		Implant failure
(Reduce)		Infection
Insert hip screw		DVT/PE
Distal locking		Symptomatic metalware
Wound closure		Delayed / Non union (Pathologic fracture)
	

Bleeding

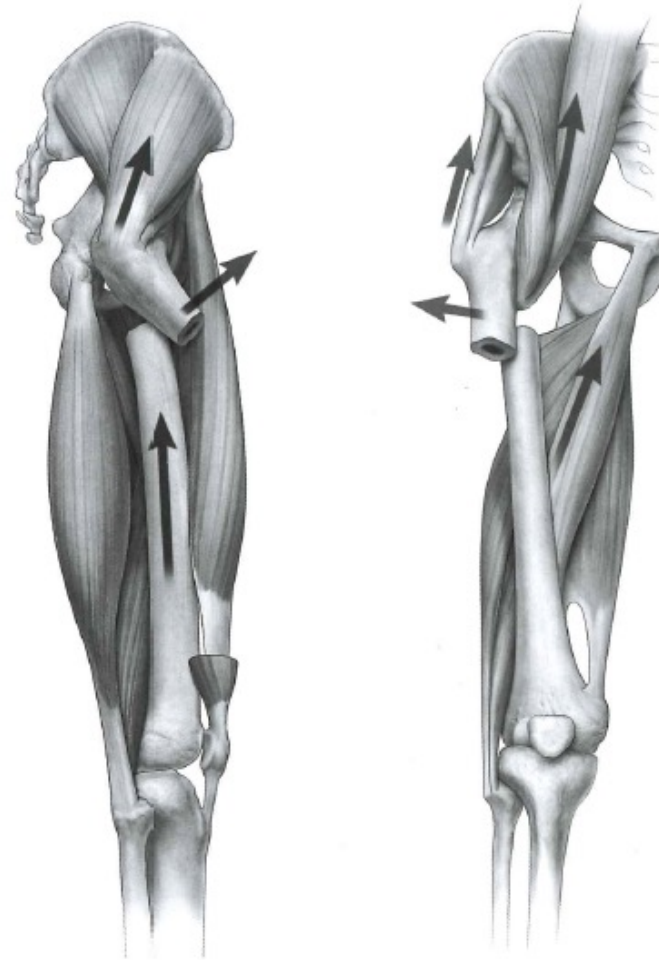




Reduction

- Proximal fragment
 - Varus
 - Flexion
 - Abduction
 - Ext rotation
- Distal fragment
 - Anywhere you want

- Patient positioning
- Surgical adjuncts



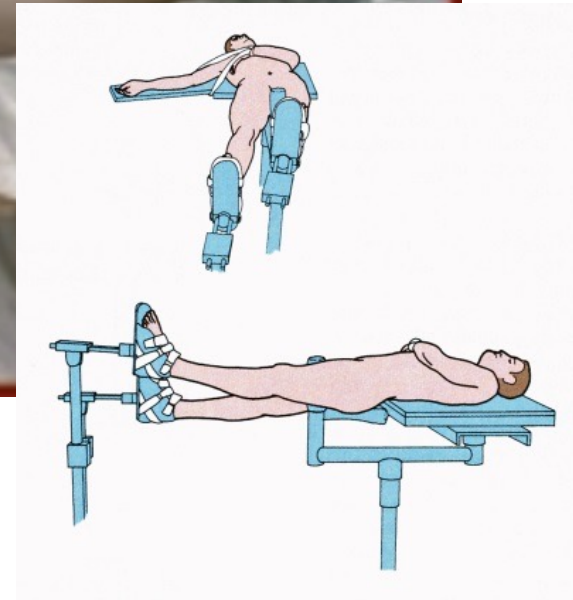
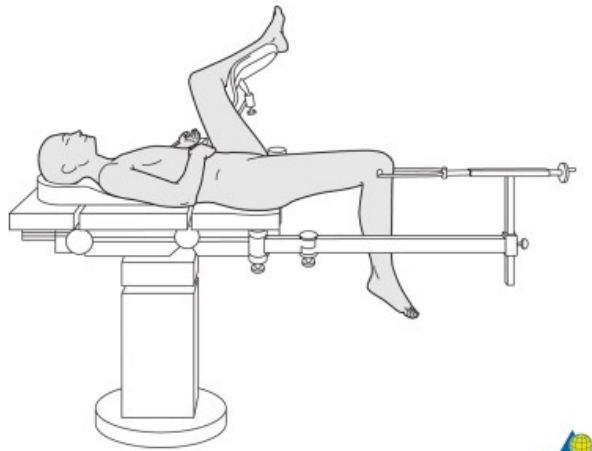
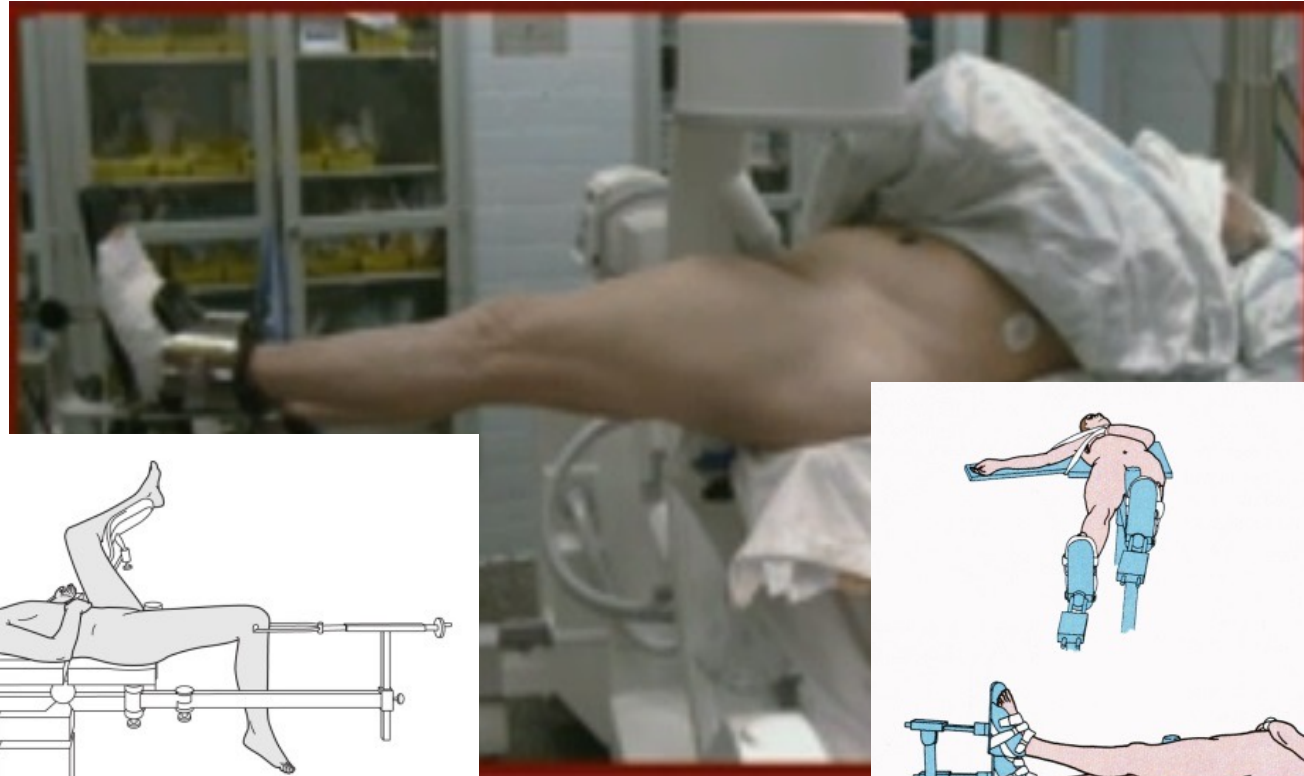
Patient Positioning - options

- Supine traction
 - Stirrup
 - Scissored
 - Hip flexed
- Supine free
- Semi free
- Lateral traction
- Lateral free

Ideal
=
Adduction
+
Flexion
+
Valgus

COMPROMISE


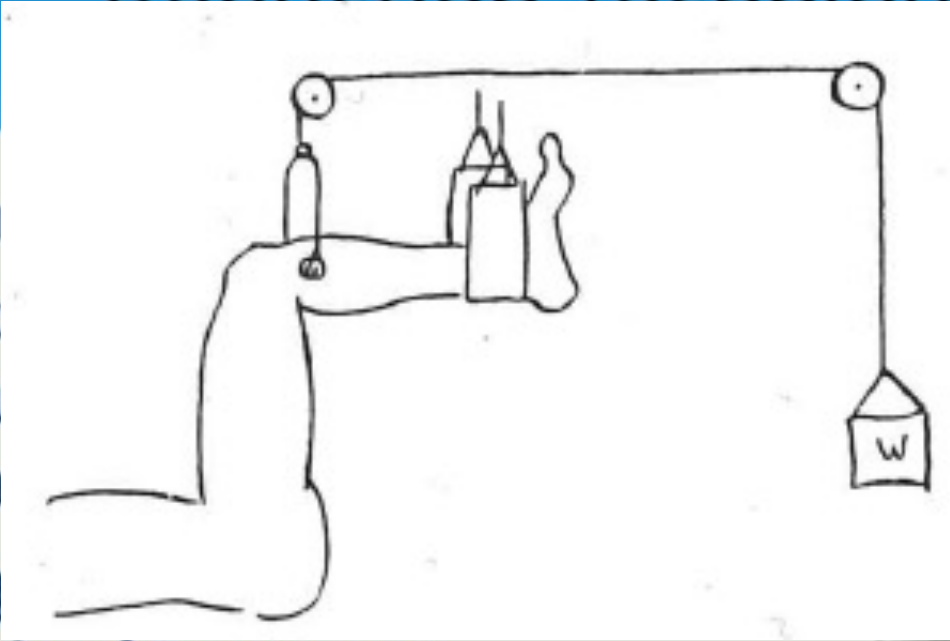
Supine Straight Traction



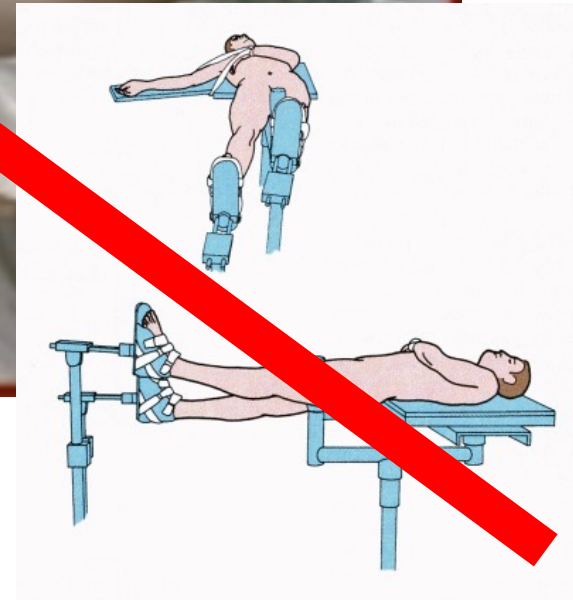
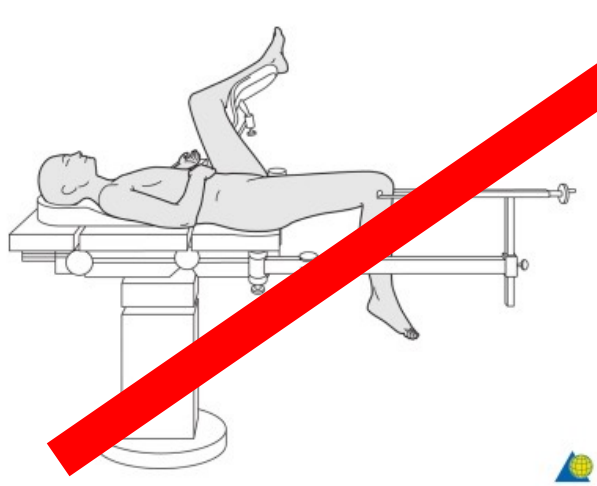
Closed Management of Sub Trochanteric Fractures

Reduction Technique

- * Hibbs: 1
- * Prox
- Abdu
- Rotat
- * Bring
- Proximal Fragment



~~Supine Straight Traction~~



Supine Flexed Traction



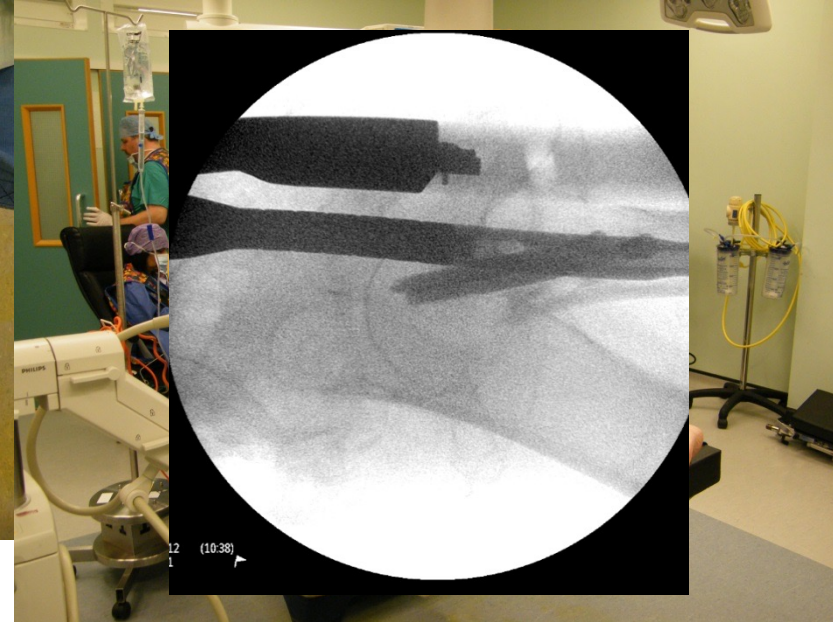
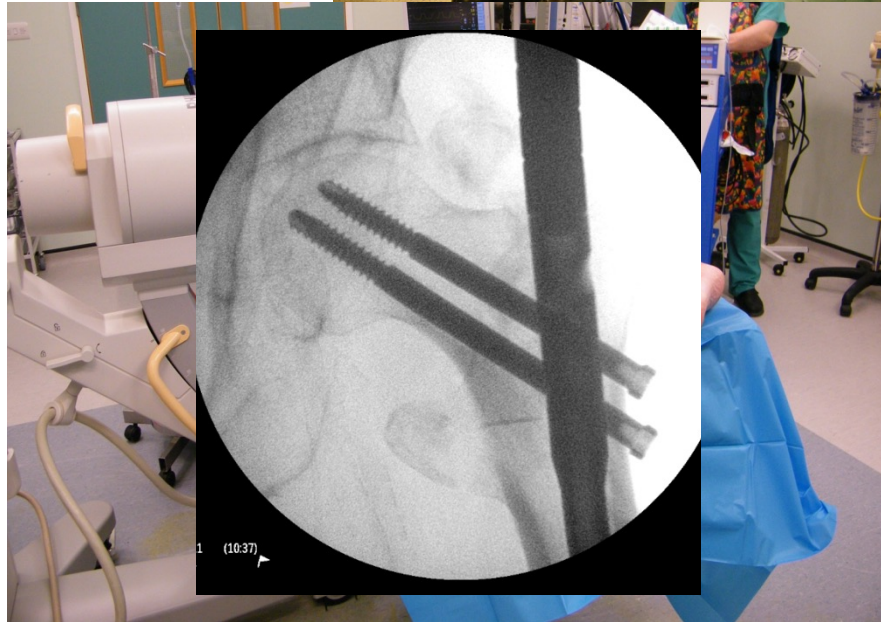
Supine Free



Lateral Traction



Lateral Free

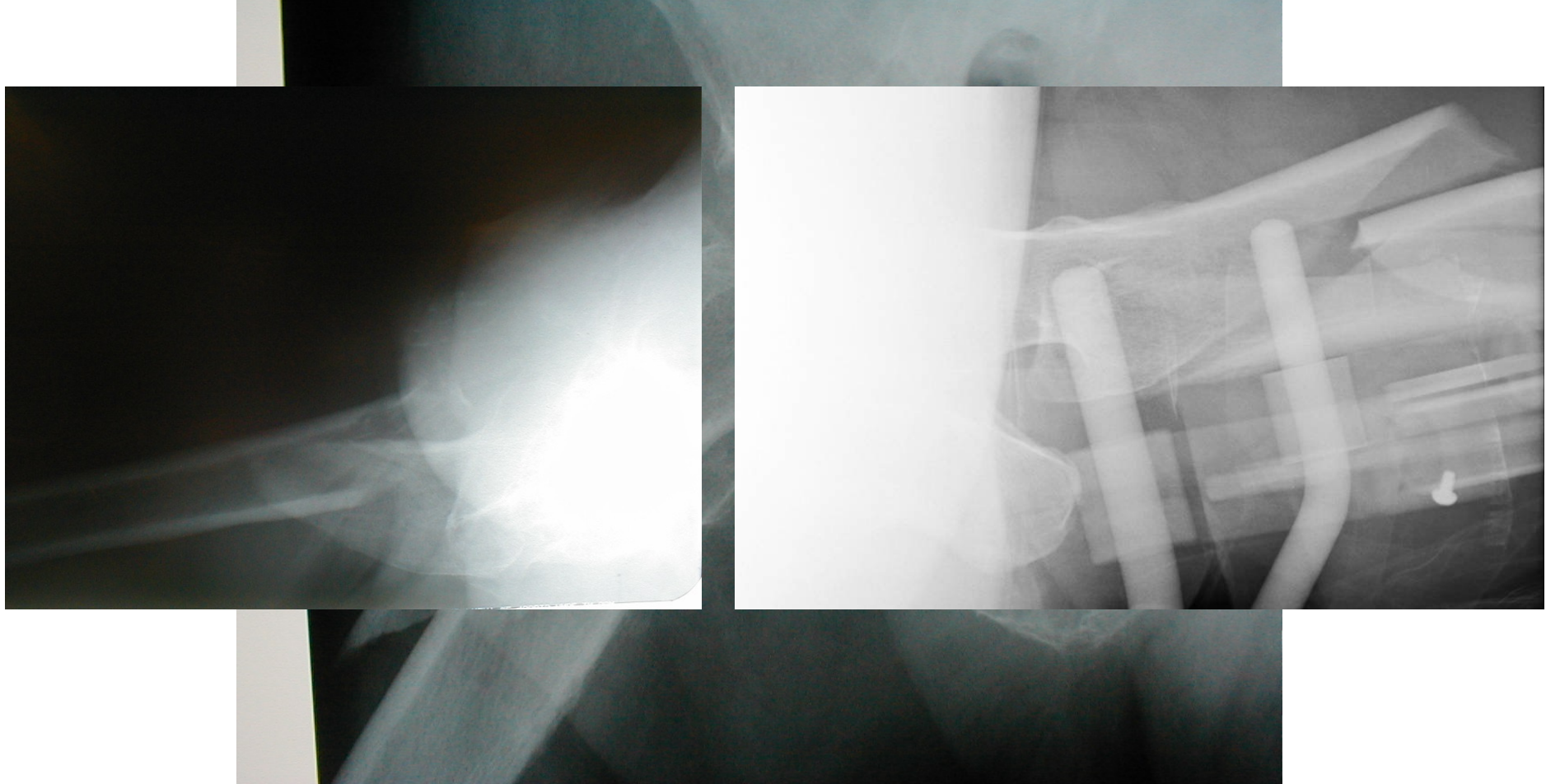


Patient Positioning - decision making


- Displacement on lateral x-ray (lesser troch)
- Other injuries
- Body habitus
- Fracture pattern
- Assistance
- Approach

COMPROMISE





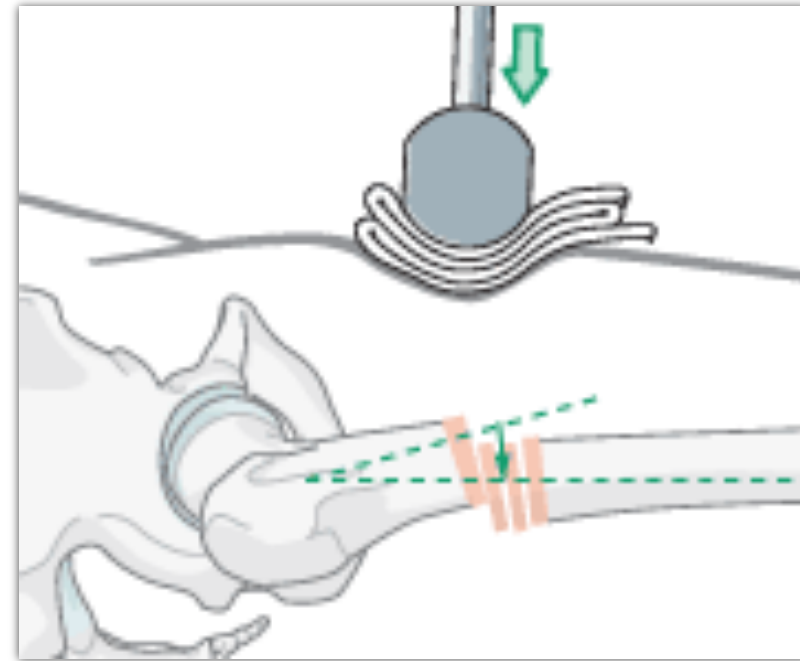
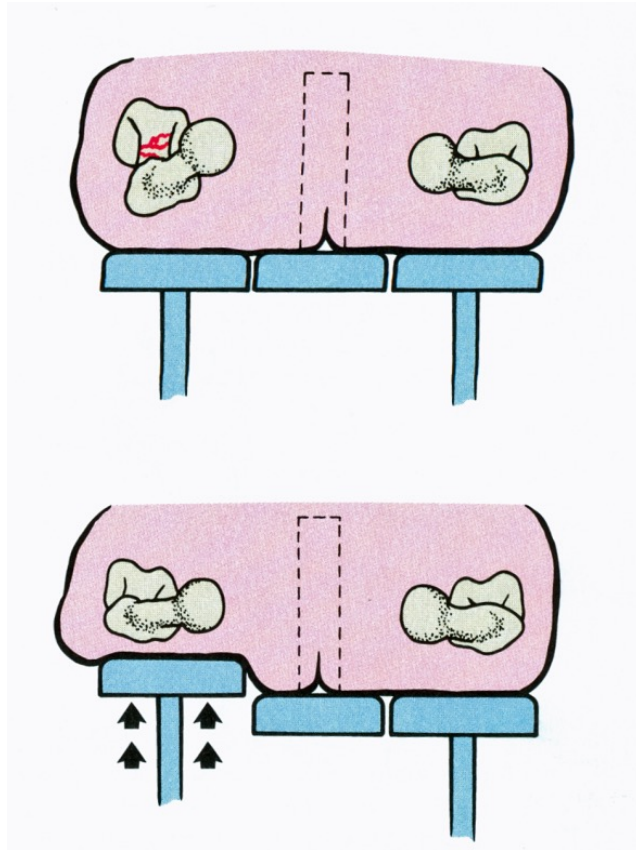
Surgical Adjuncts

- 
- Bumps
 - (F tool)
 - Traction skin
 - Ball spike pusher
 - Bone hook
 - Shanz pins
 - Traction regional
 - MIPO reduction tools
 - Cerclage
 - Cable
 - Wire
 - Unicortical plate
 - (Reduction clamps)

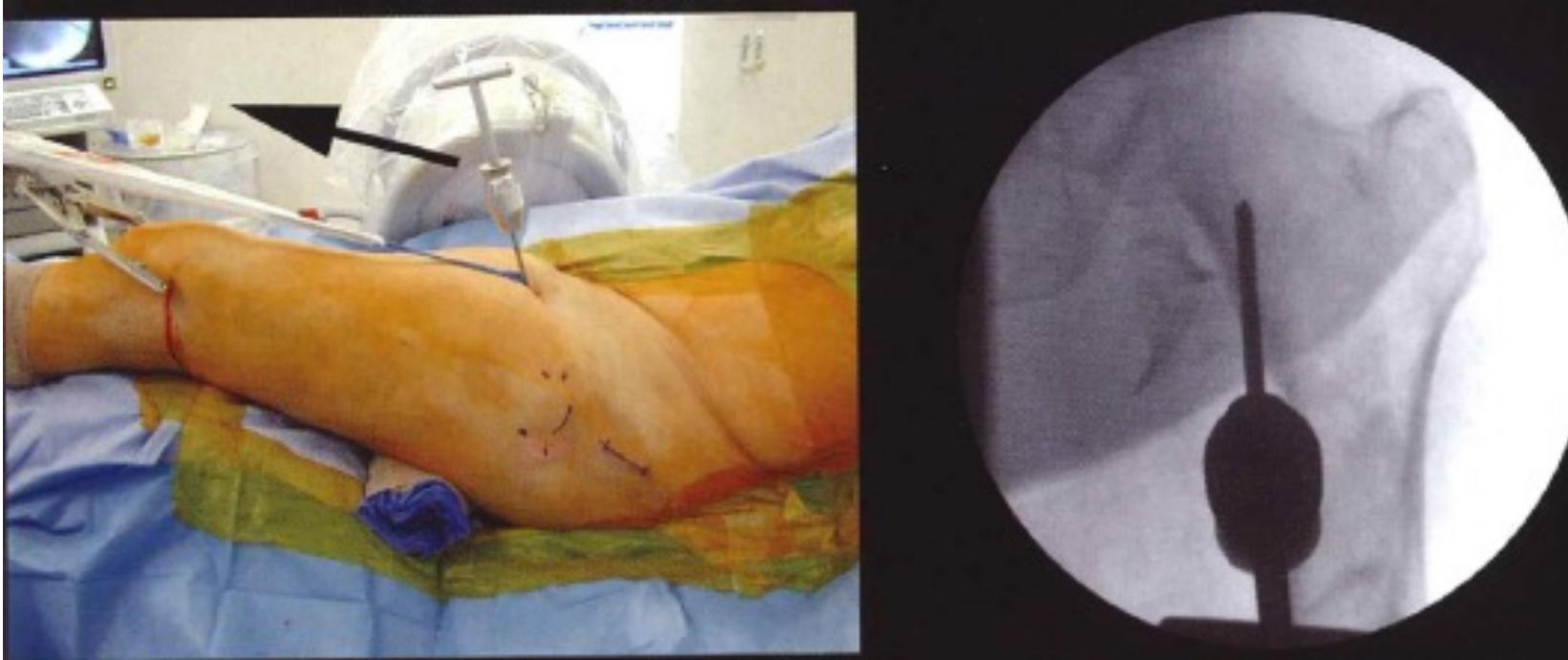
 - Using nail
 - (blocking screws)

Escalating Levels of
Violence

Bumps



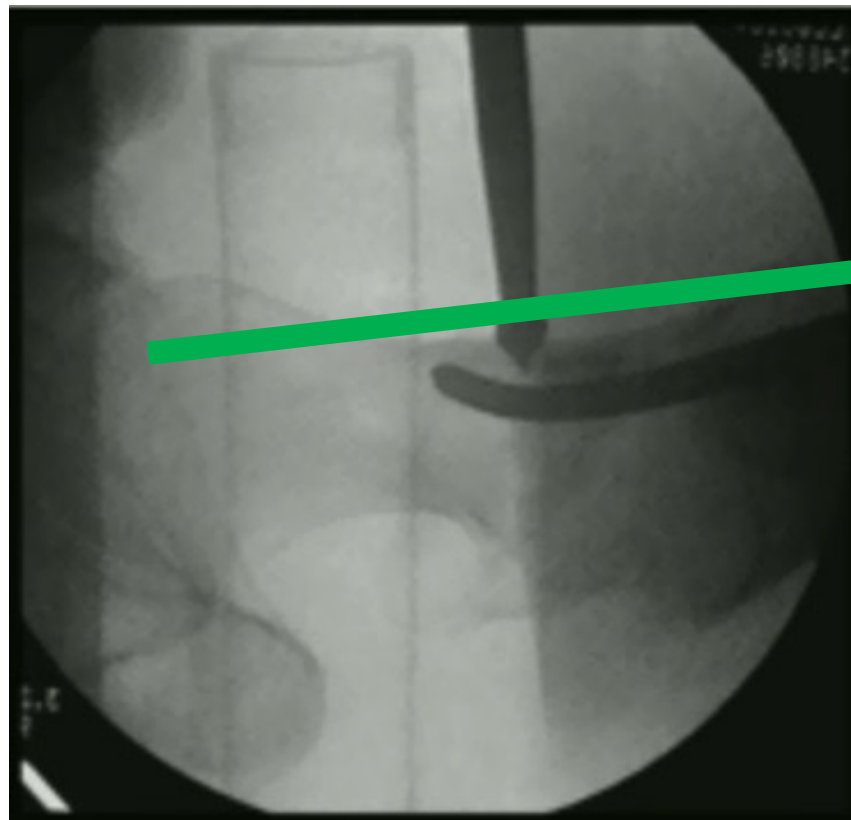
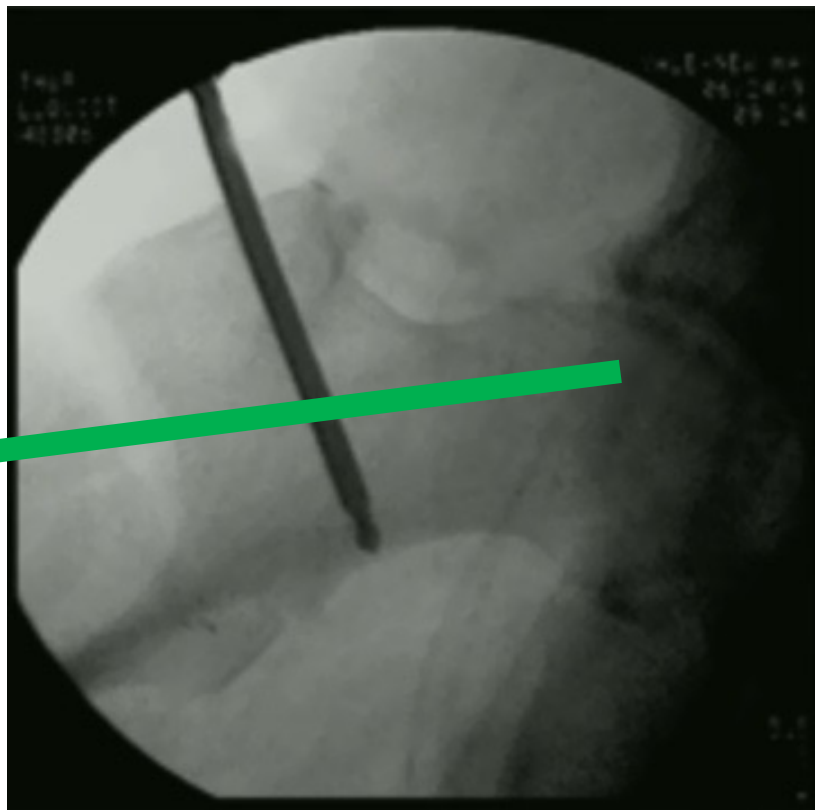
Correcting Proximal Displacement



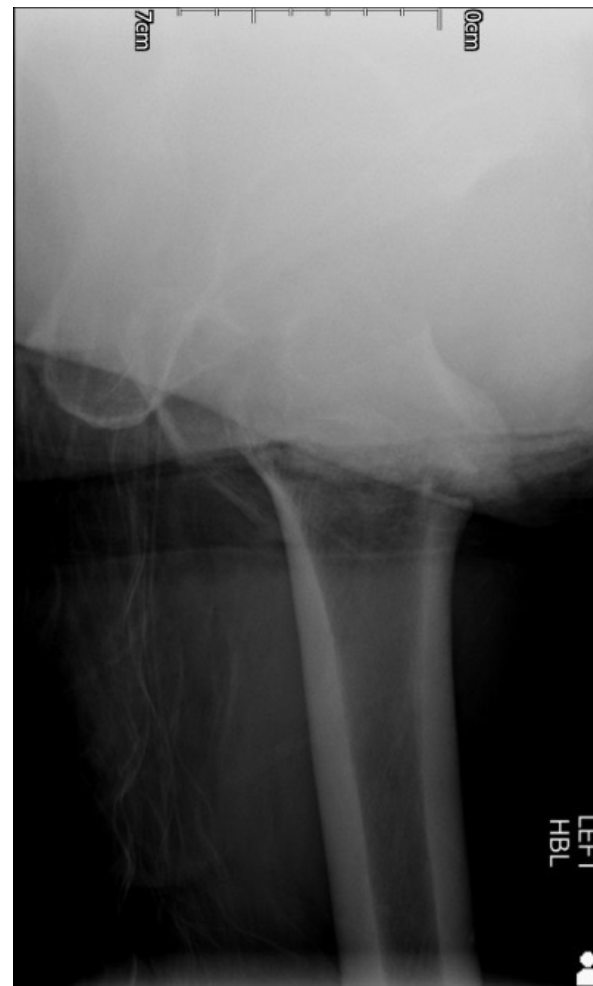
Antero-lateral Schanz Pin



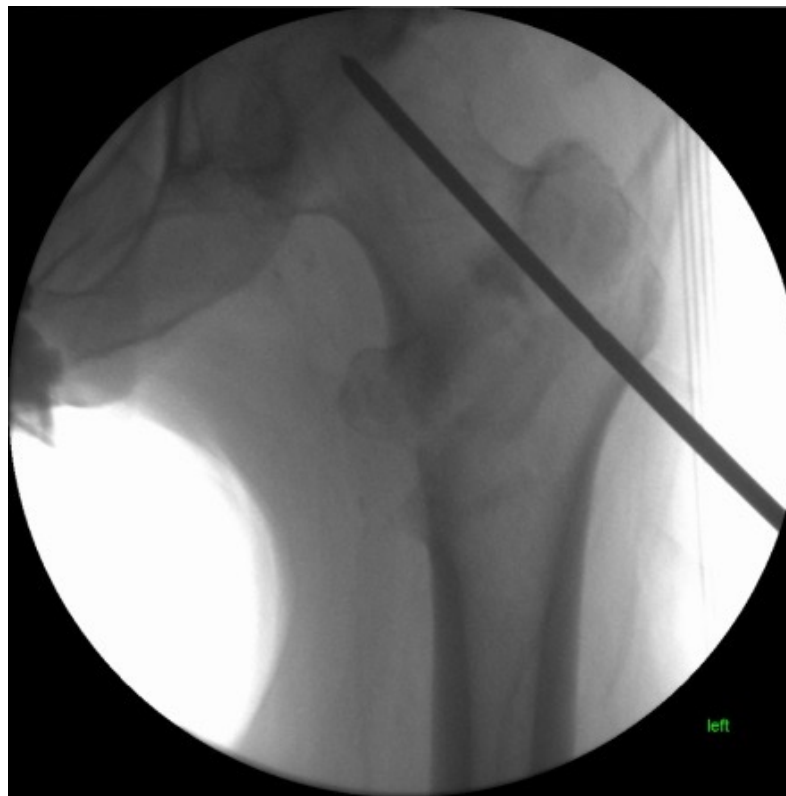
Pins + Pushers



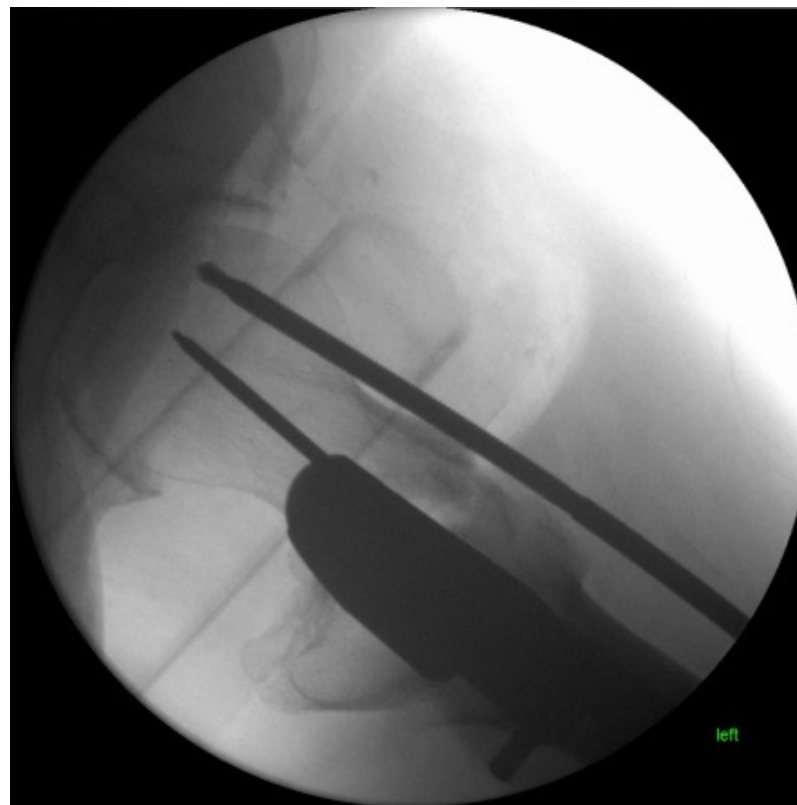
Pins + Pushers



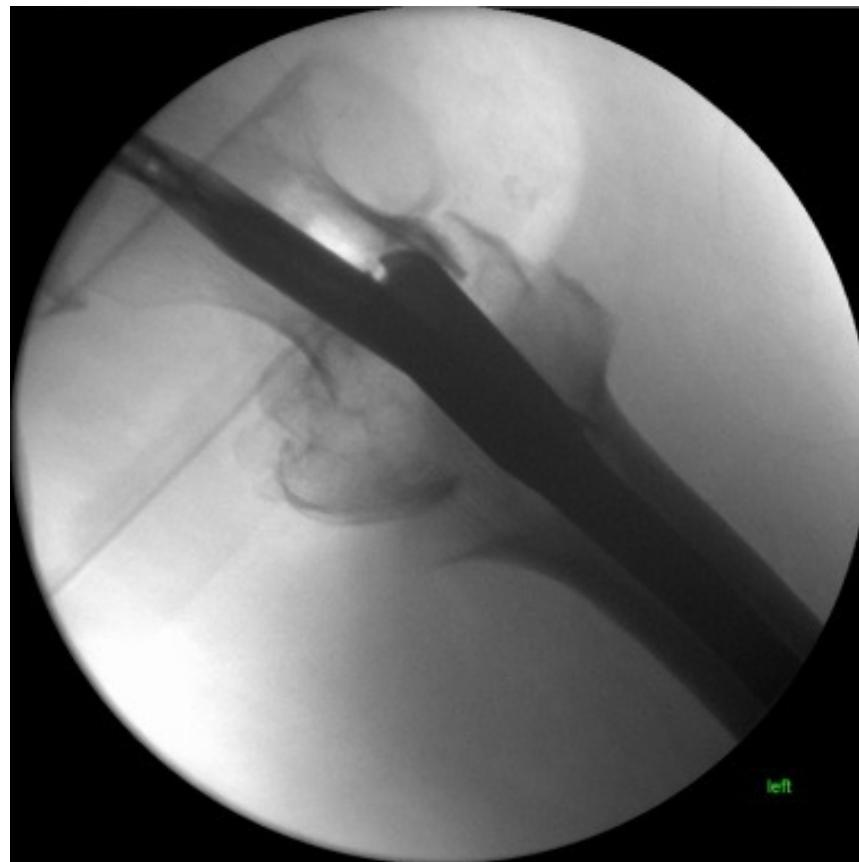
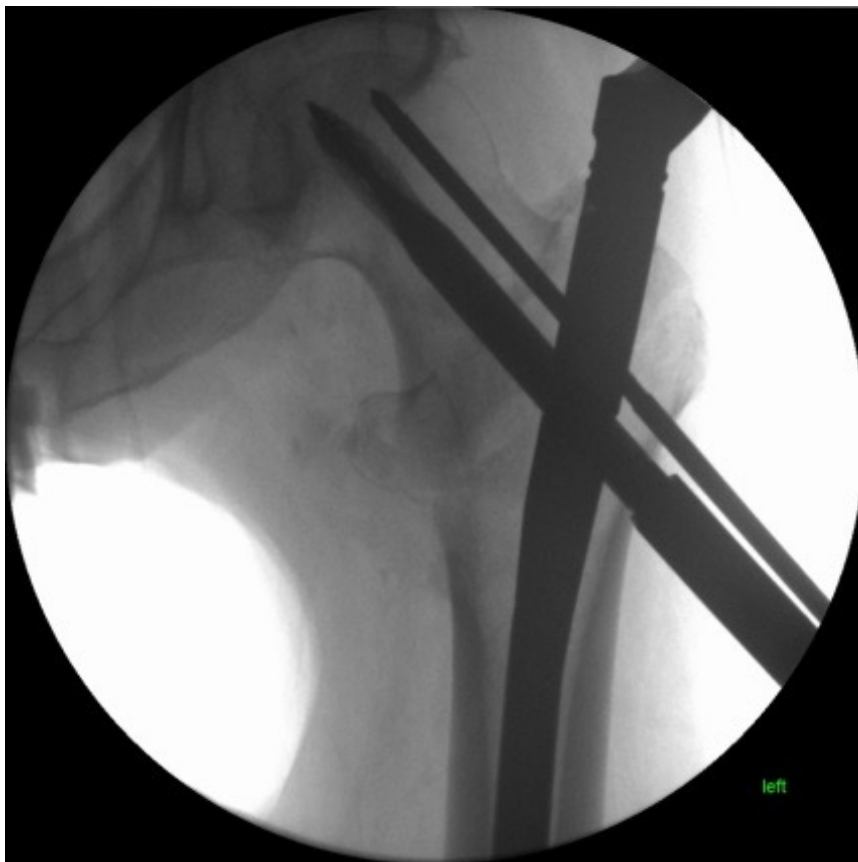
Pins + Pushers



Pins + Pushers



Pins + Pushers



Cerclage Wire

Shukla S et al 2007 Injury
Cephalomedullary nailing

Open reduction techniques

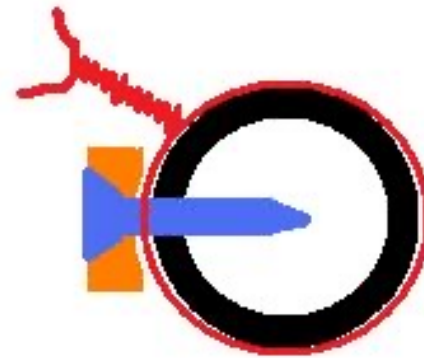
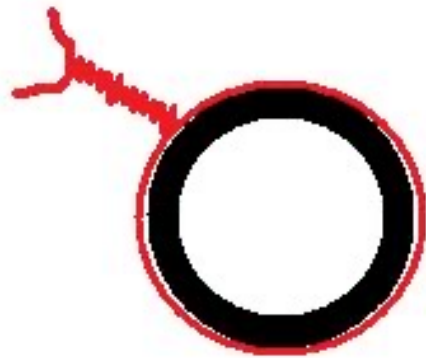
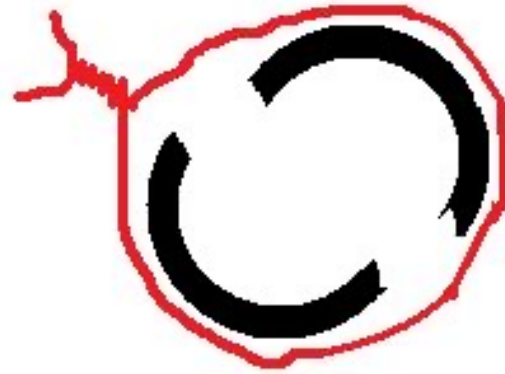
Union rate = 95%

No worse than in closed reduction

No increase in infection rate



Cerclage Wiring

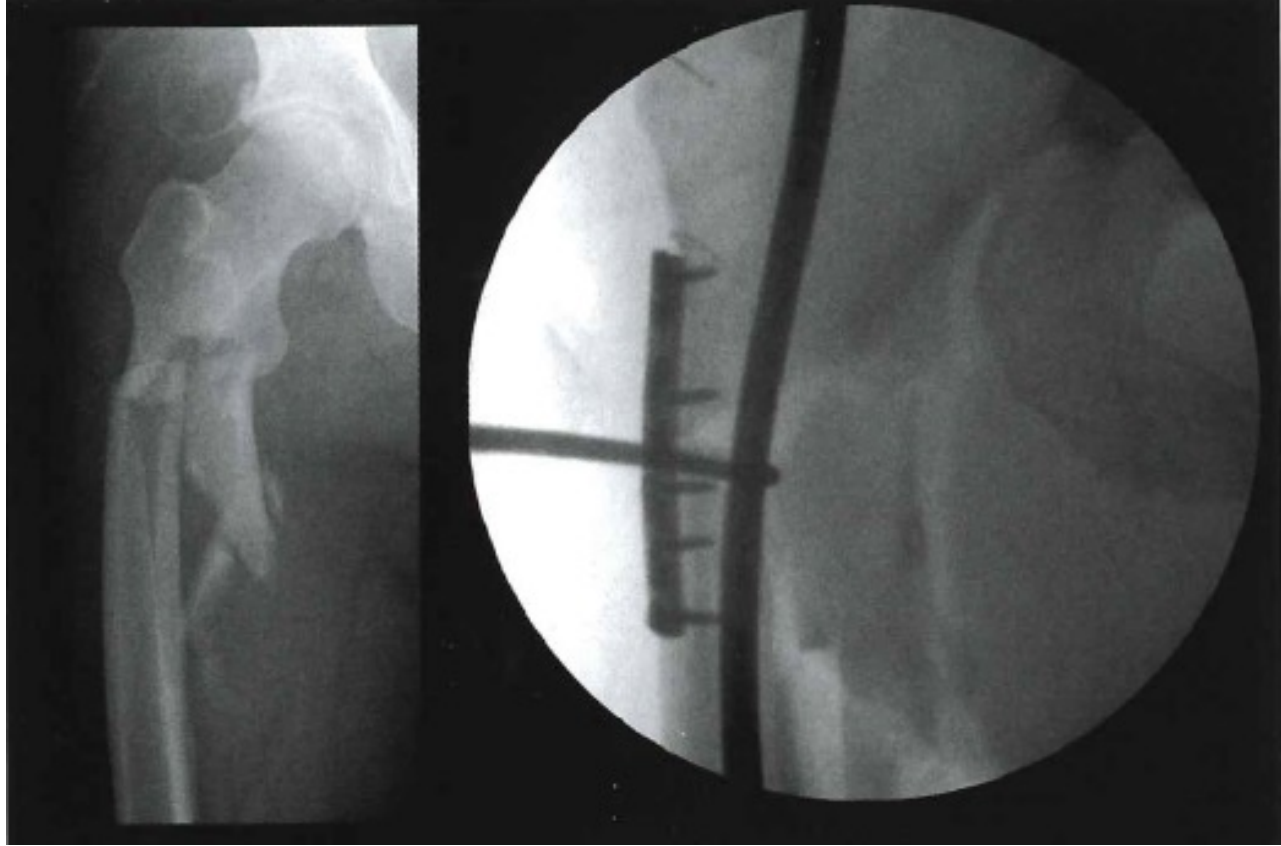




Minimise Soft Tissue Stripping

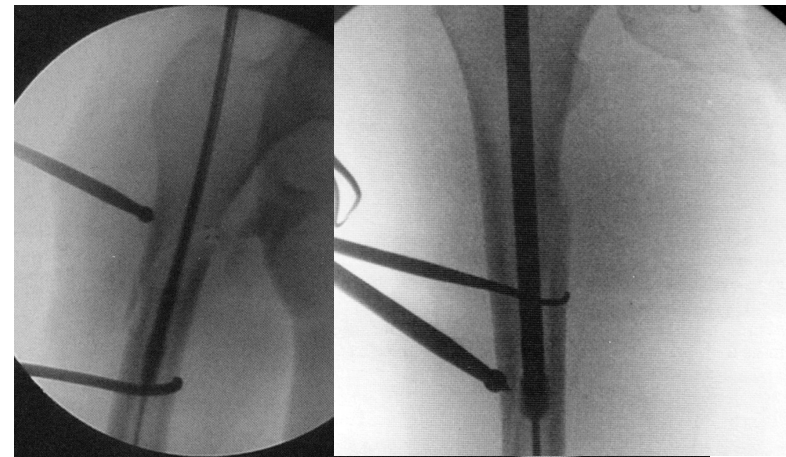
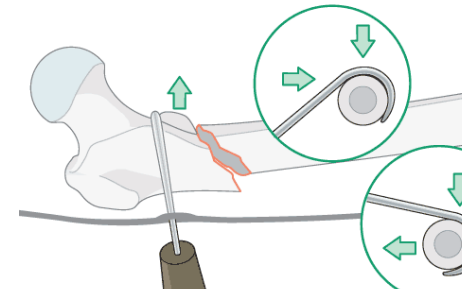


Wire or
Cable ?



Bone hook

- percutaneous
- use the lateral incision to insert hooks or spikes

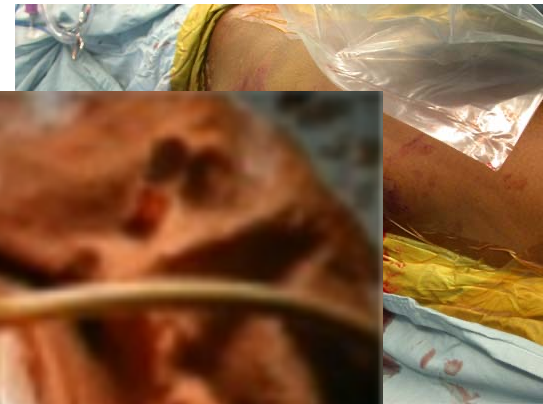


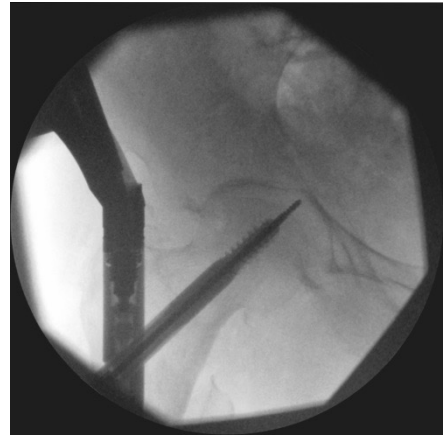
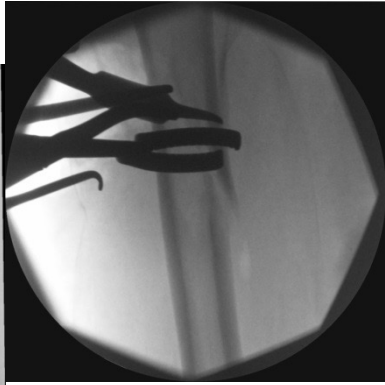
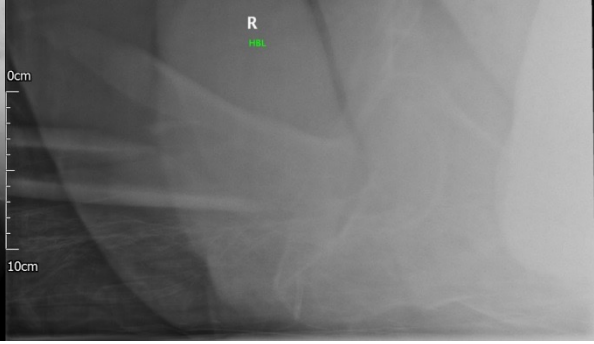
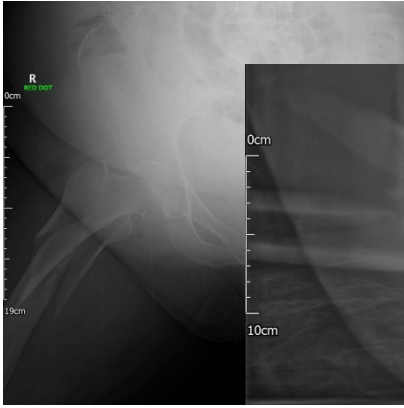
Reduction Clamps

- limb

Afsari A
Clamp-a

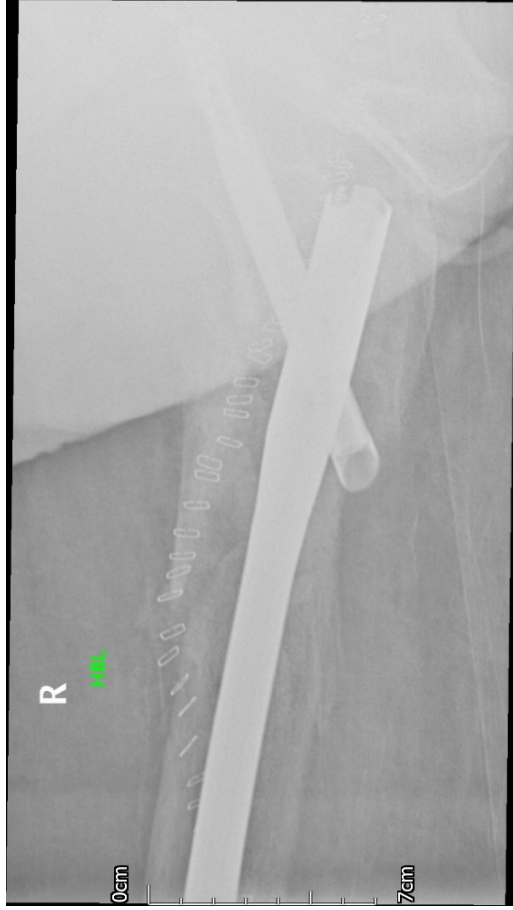
98% u
86% a
14% 2





25 days

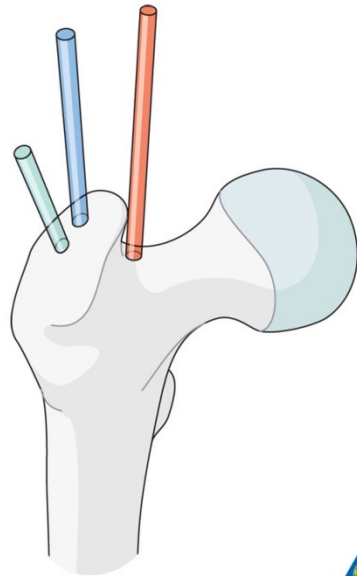
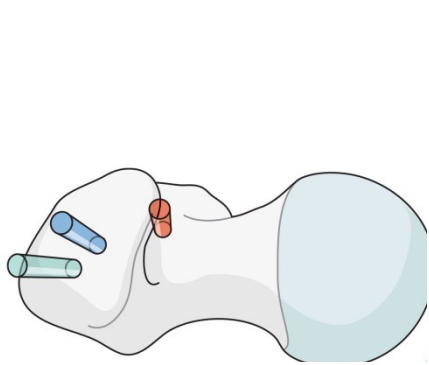




6 weeks post revision – oozy wound required washout –
E-coli – within 2 weeks of revision



Entry Point



- UFN
- PFNA
- R/AFN



Canal preparation

- Anticipate trajectory
- Creating space for the nail
- Maintain nail within optimum trajectory
 - Deny space

NB Easier with In line instrumentation

Anticipate Trajectory

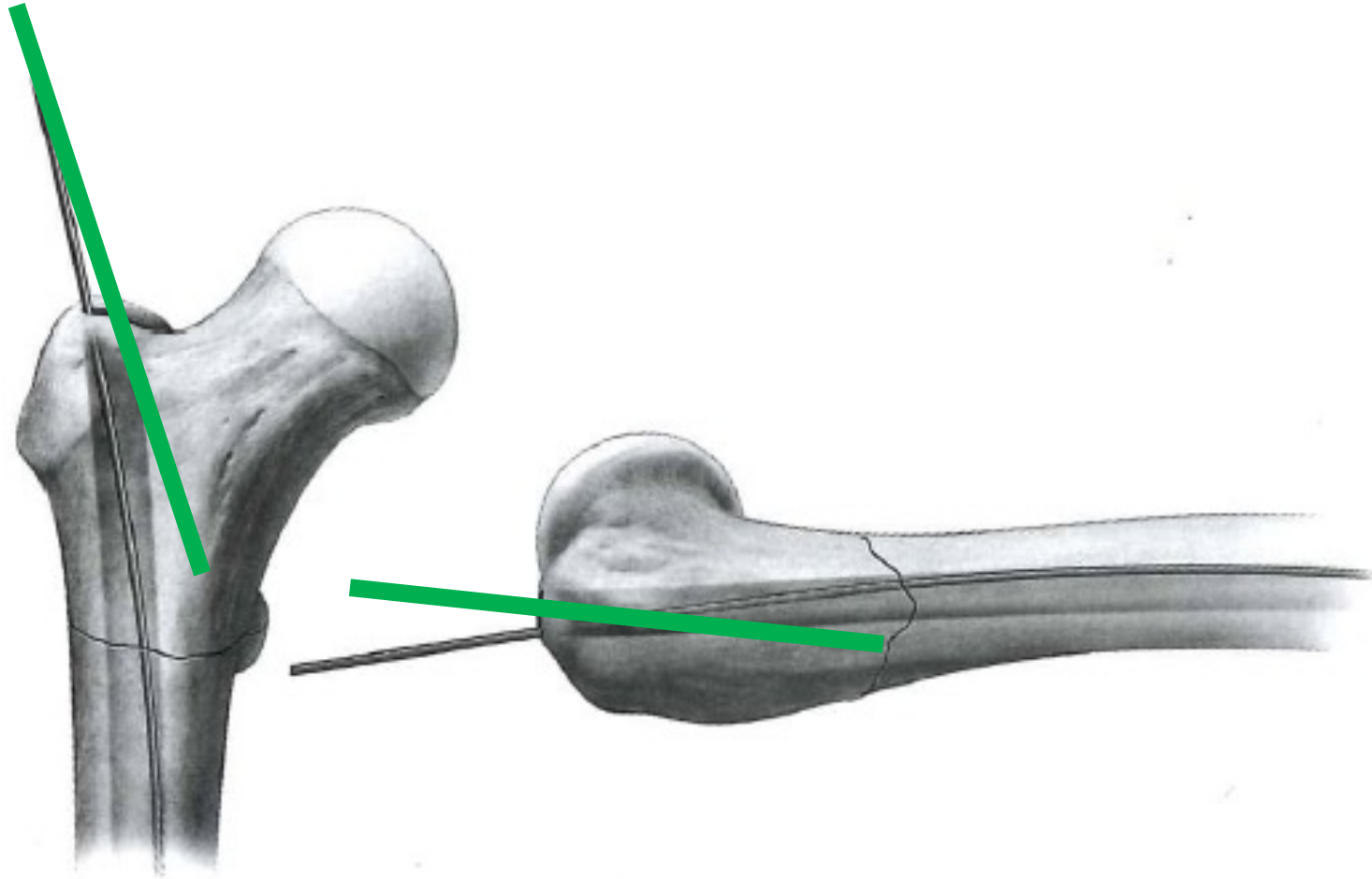


Anticipate Trajectory

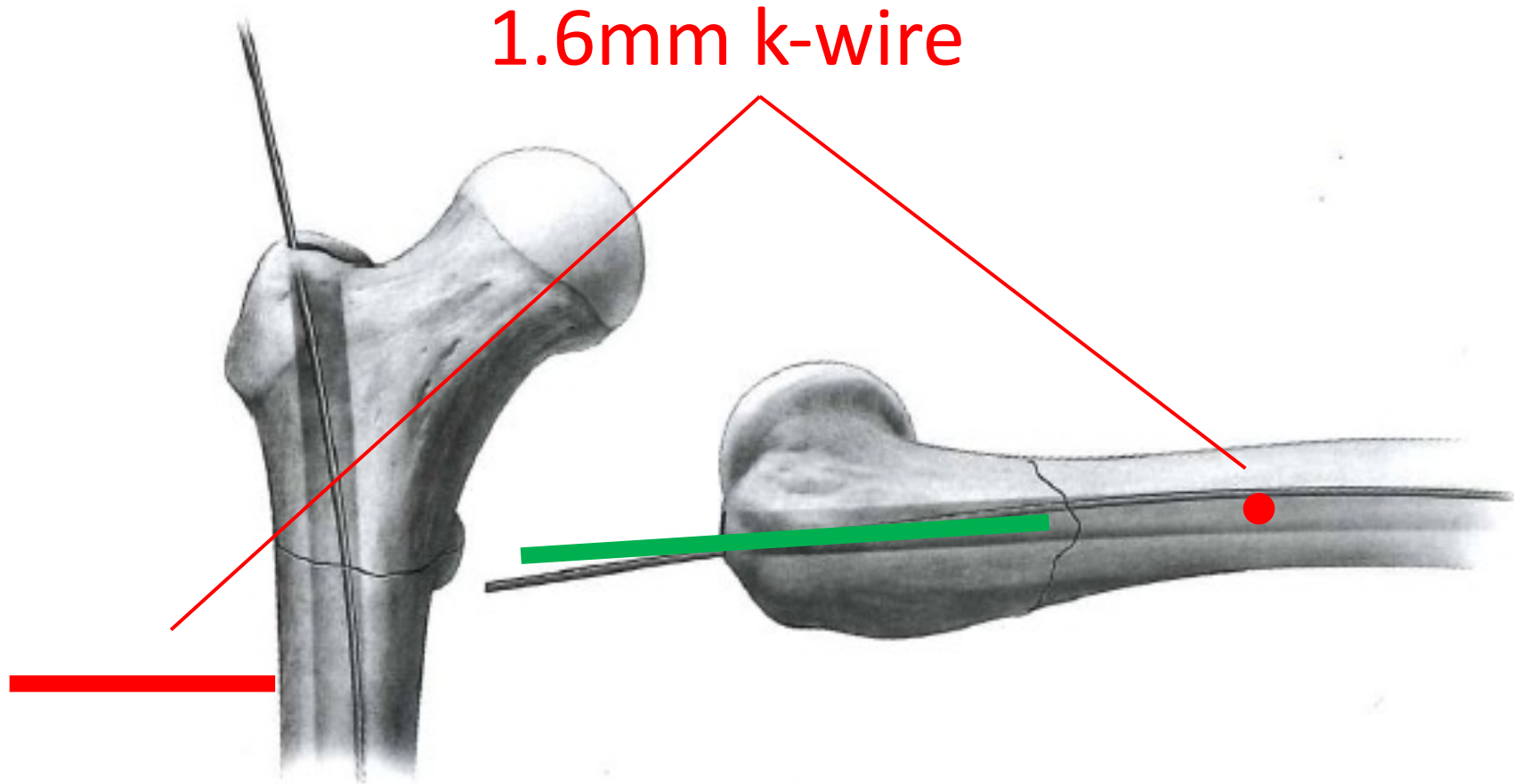
If this bone is not removed, the nail will displace the fracture

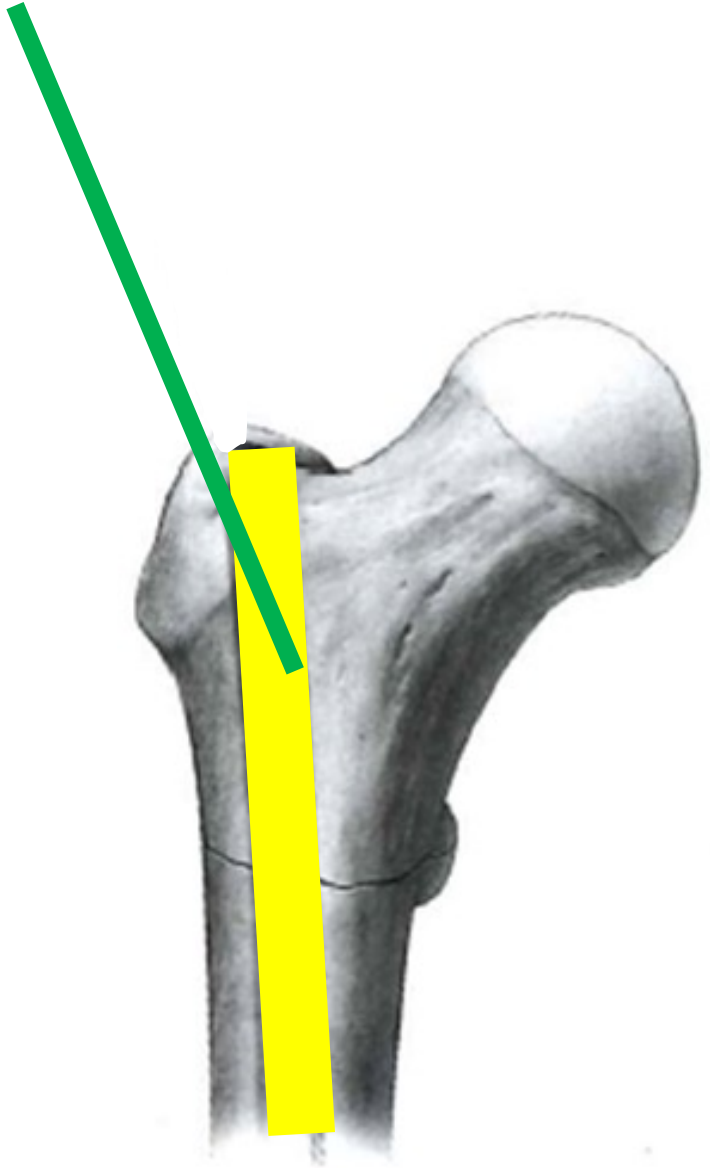


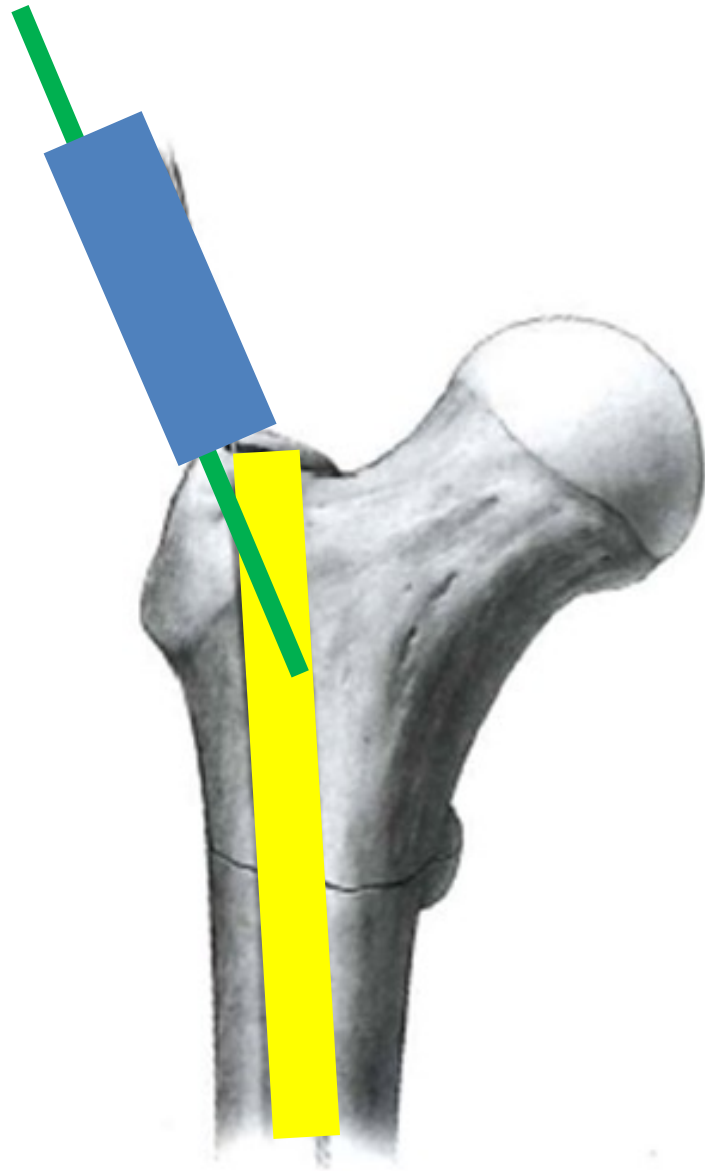
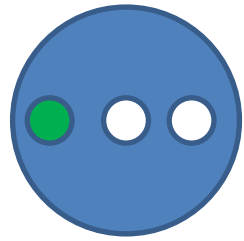
Common Alignment Errors

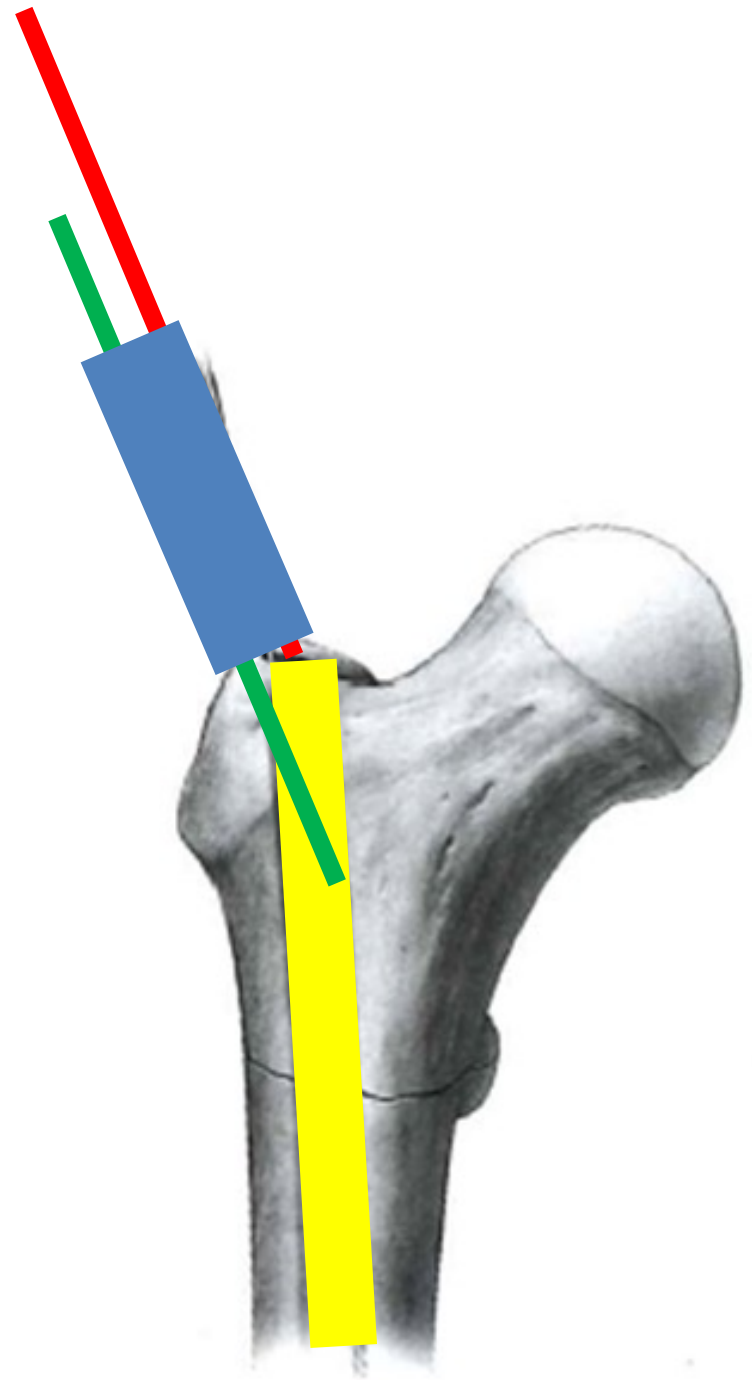
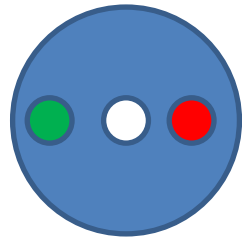


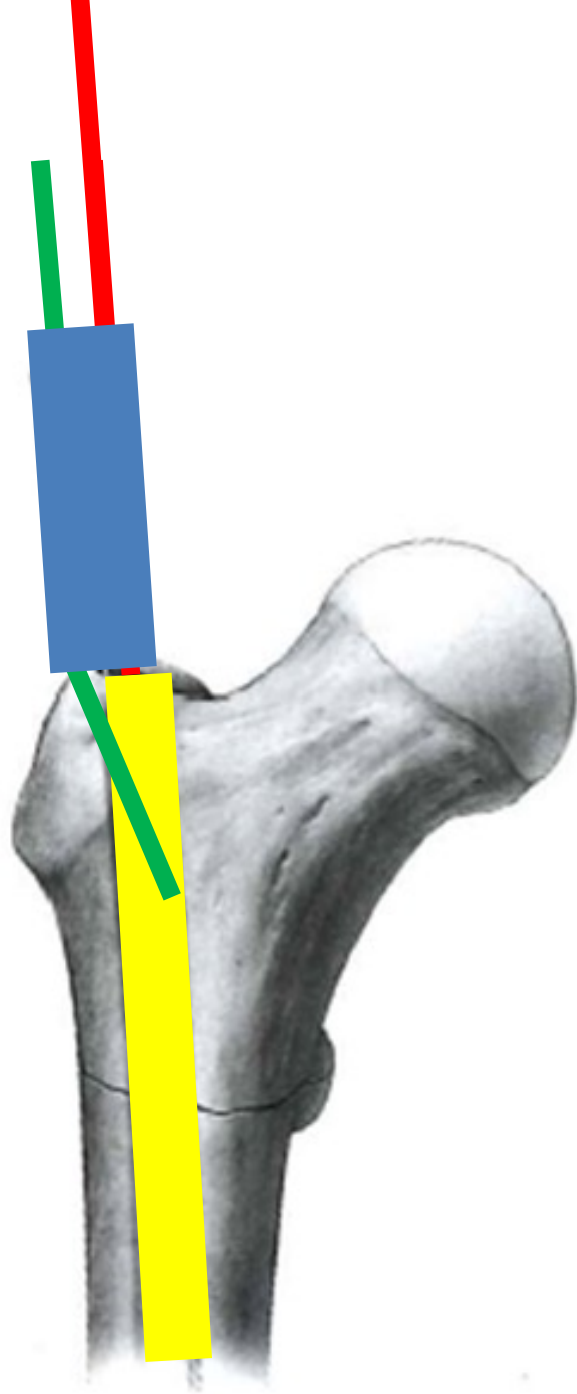
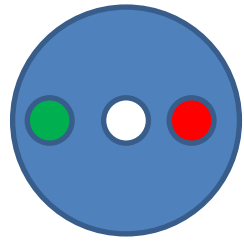
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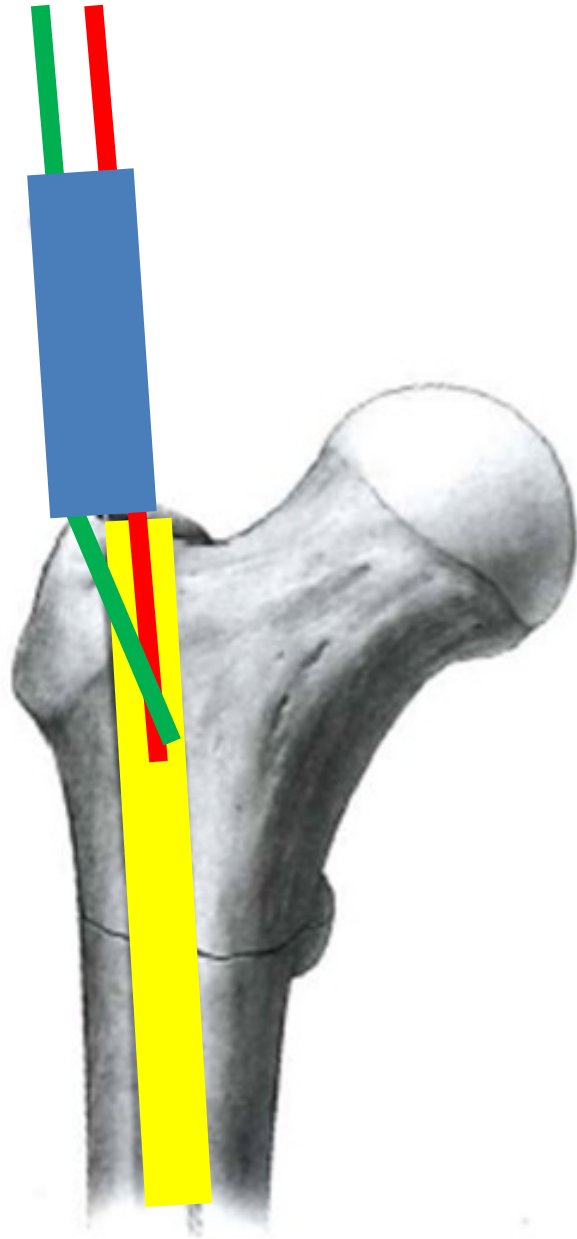
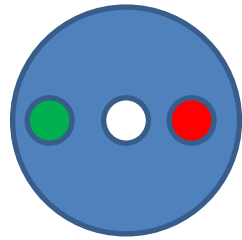




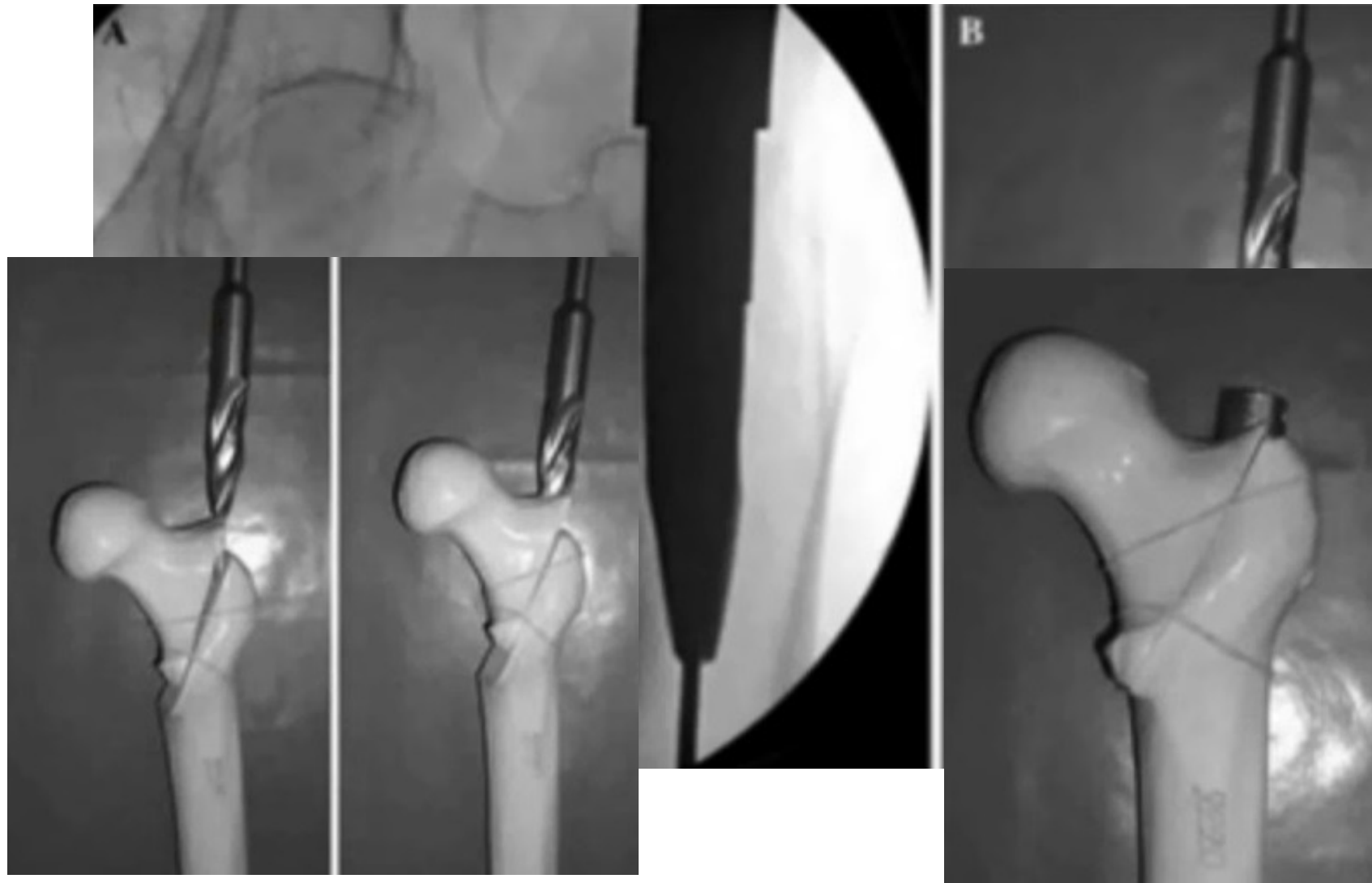








Proximal Femur Blow Out



Passing Guidewire



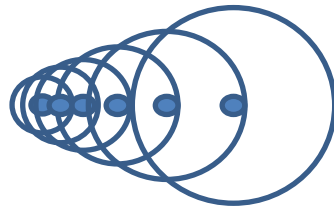
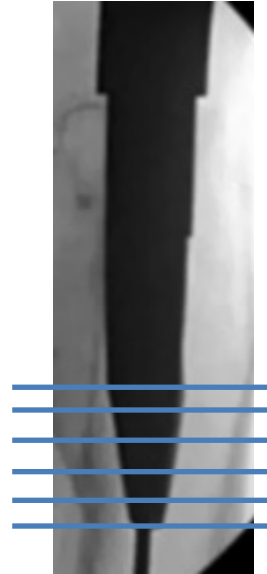
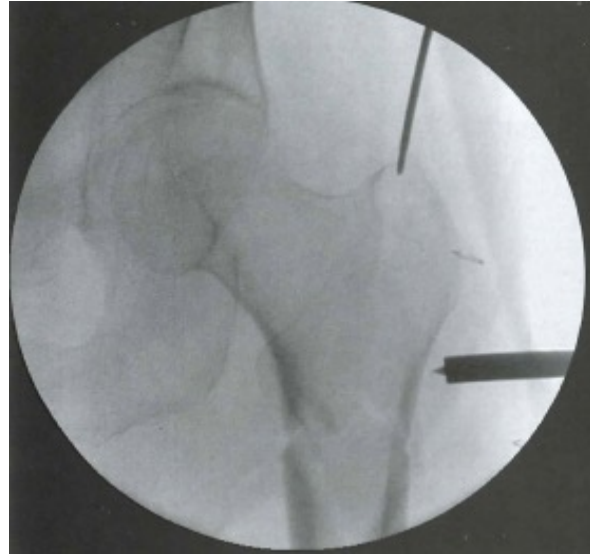
Nail Displaces Fracture

- Entry reamer migration
- Inadequate preparation for nail trajectory
- Nail does not follow prepared trajectory

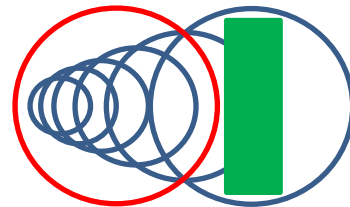
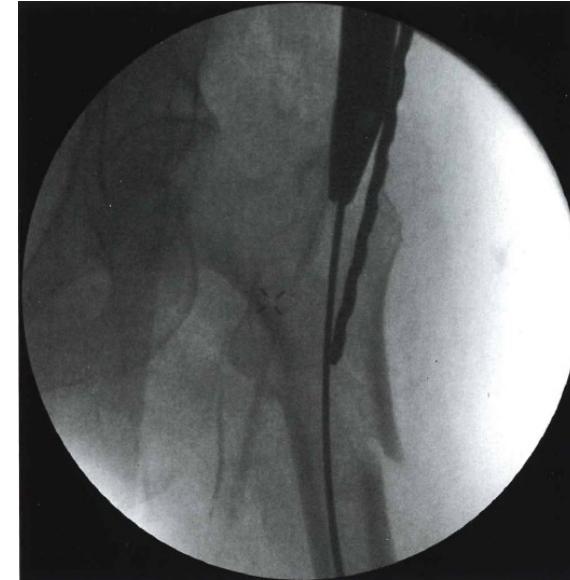
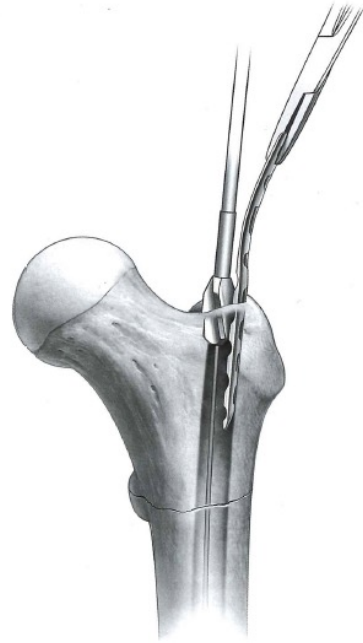
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Entry Reamer Migration



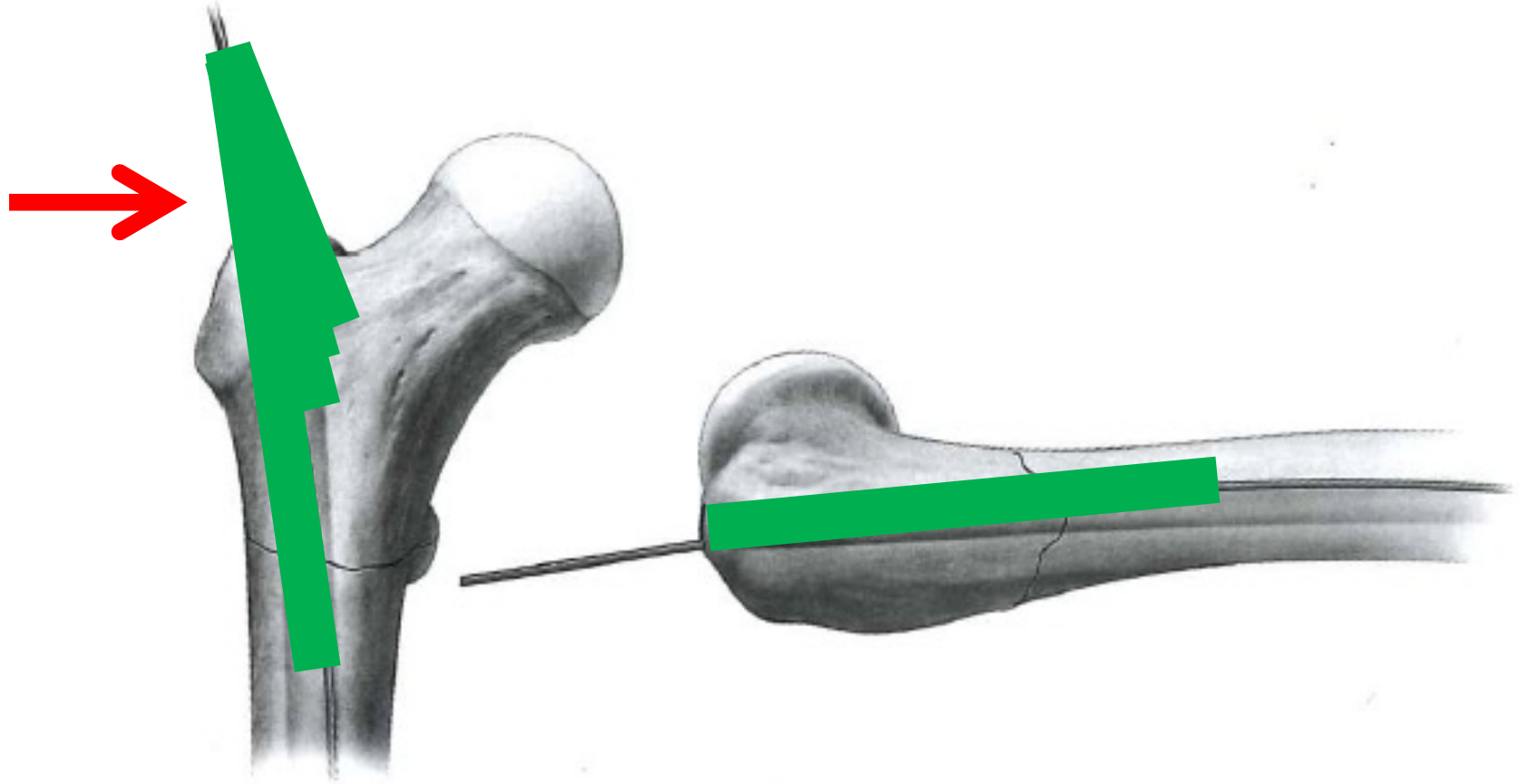
Entry Reamer Migration

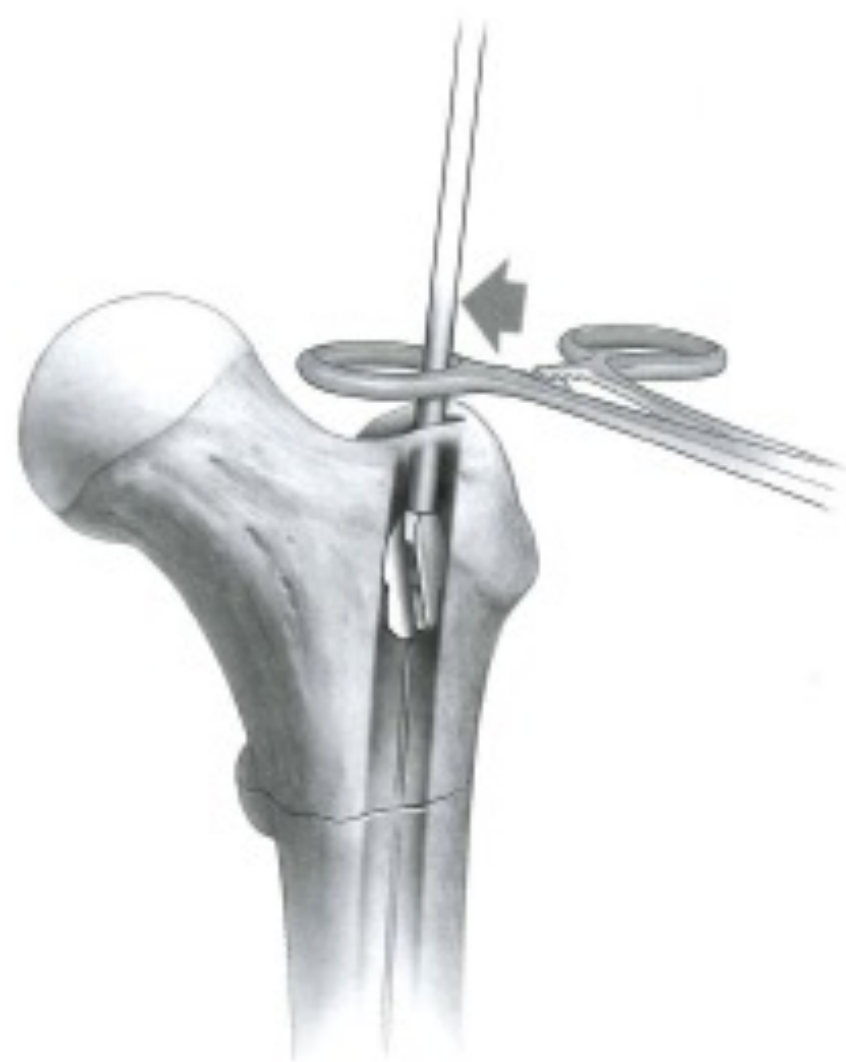


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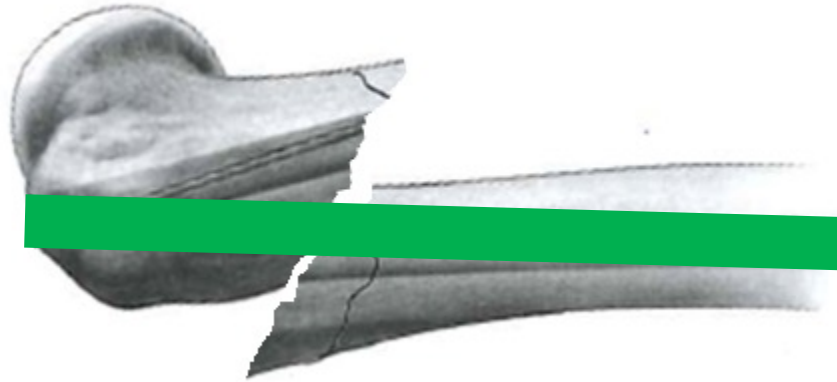




Nail Displaces Fracture

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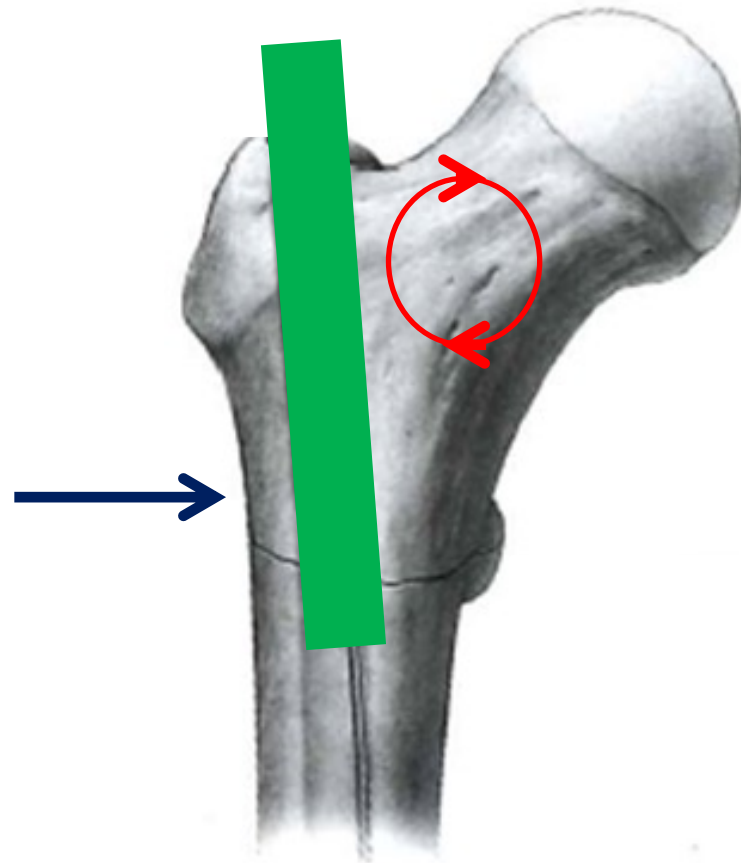
“Nails (reamers) are like teenagers



.....they like to go out early and stay out late”

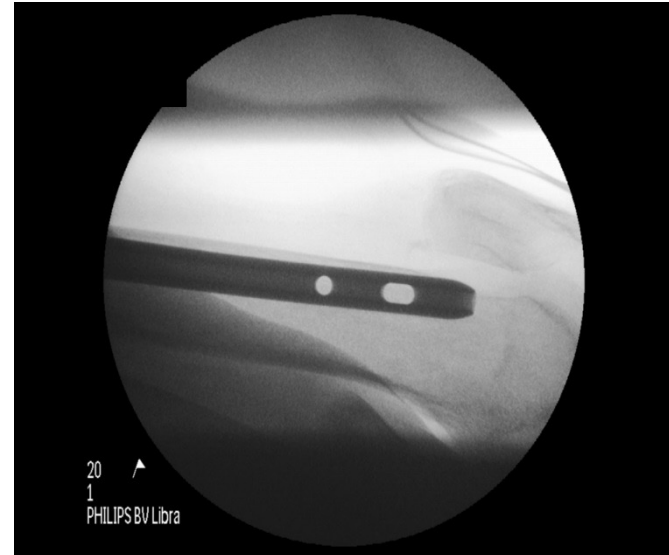
Toney Russell

Maintain Reduction During Nail Insertion (+ reaming)



Fracture (iatrogenic)

- Osteoporotic bone
- Prox medial femoral shaft
- Distal anterior perforation
 - Reamer (pull back guidewire)
 - Nail
- Cerclage cable
- Late periprosthetic (early / late)



Rotational Malalignment + Length

- Pre-op assessment
 - Clinical
 - II
- Cortical width
- Direct intra op measurement
- II + cautery wire

Implant Failure

- Implant specific
 - TAD
 - Perforation
 - Is it strong enough
- Weight bearing

Infection

Soft tissues / soft tissues / soft tissues



Other

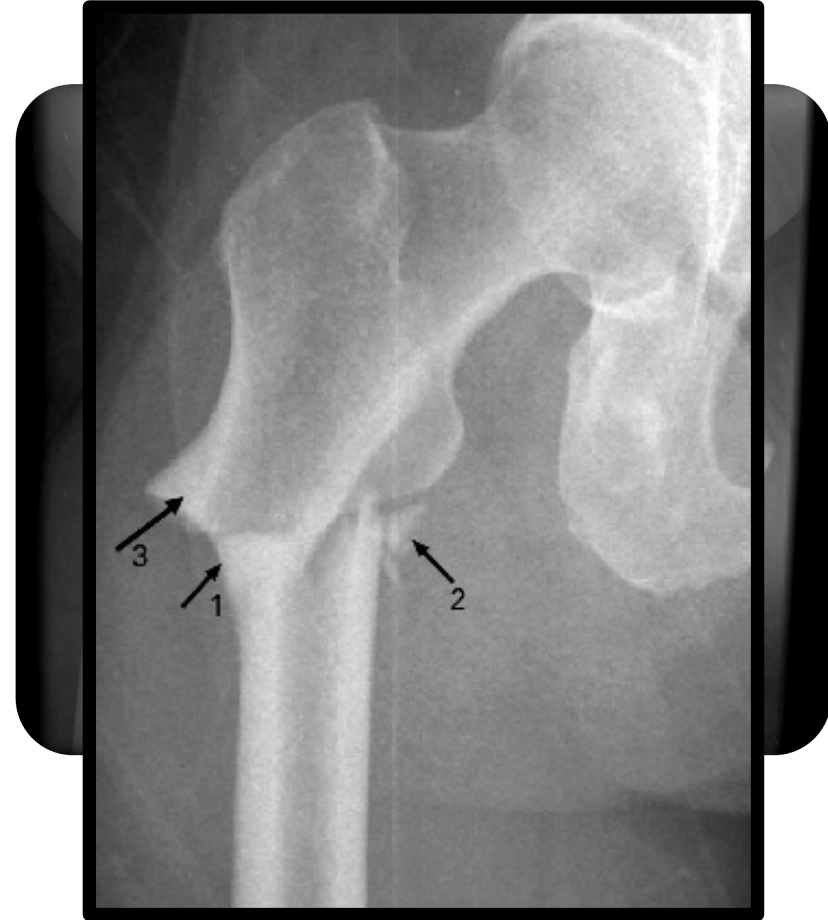
- DVT / PE
- Symptomatic metal-ware

Delayed / Non Union

- AO principles
- Optimise host
- Pathologic fractures

Pathologic Fracture

- Mets
- Atypical
- Bowing
- Pre-op work up
- Histology
- Restoration of mechanical alignment
- Fracture healing
- Fracture prevention



Zombie Apocalypse



Additional Considerations

- Ensuring hip screw is correct length using different systems
- Gamma 3 point fix
- Tendency for guidewire to walk
- Losing guidewire, weight of jig