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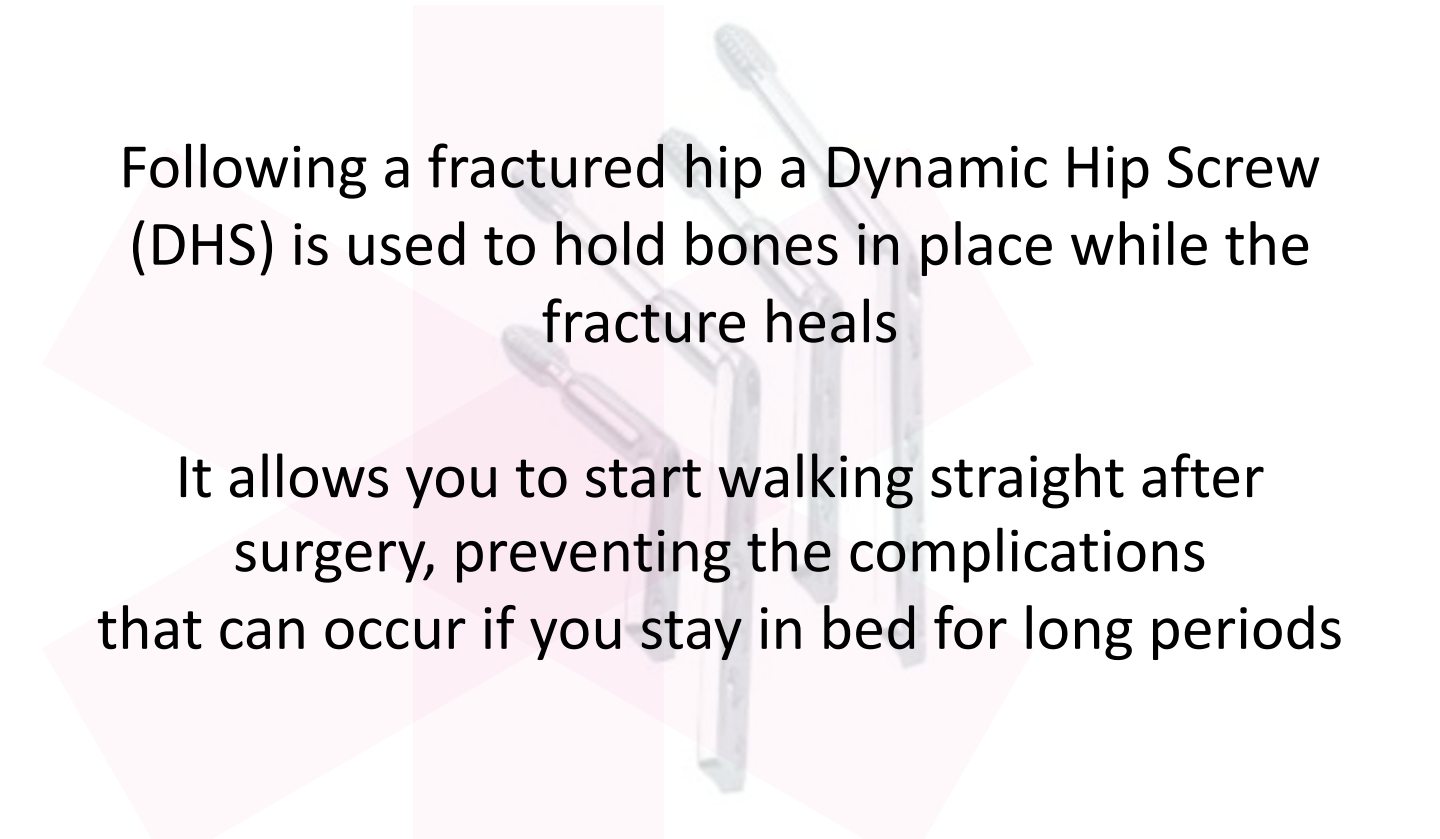
Supporting Healthcare in Low Resource Environments

Dynamic Hip Screw (DHS)

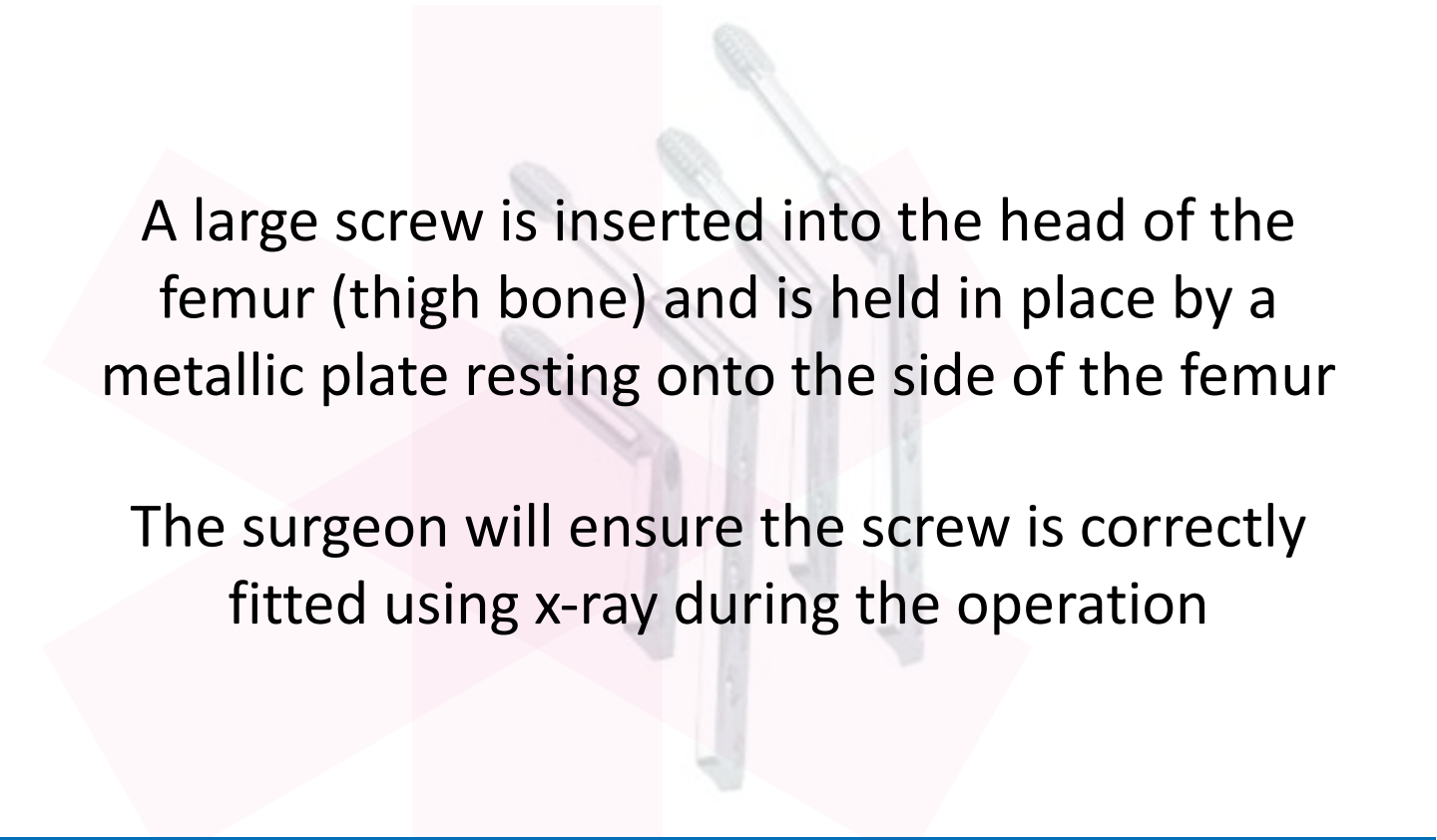
What is a DHS Plate?



Following a fractured hip a Dynamic Hip Screw (DHS) is used to hold bones in place while the fracture heals

It allows you to start walking straight after surgery, preventing the complications that can occur if you stay in bed for long periods

What is a DHS Plate?



A large screw is inserted into the head of the femur (thigh bone) and is held in place by a metallic plate resting onto the side of the femur

The surgeon will ensure the screw is correctly fitted using x-ray during the operation

The femur

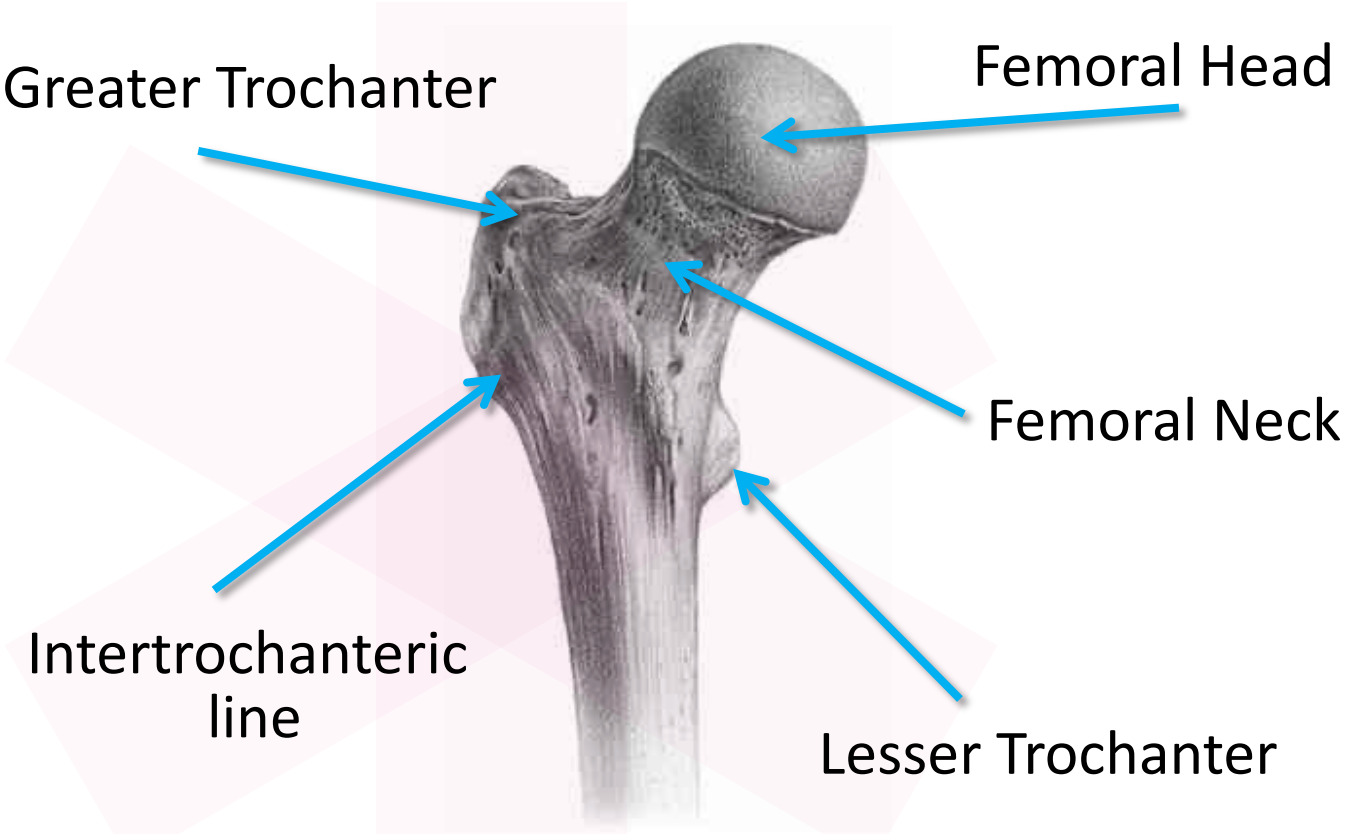
Longest, heaviest and strongest bone

Articulates proximally with the acetabulum in the pelvis

Articulates distally with the patella and tibia

The head projects superiorly and medially for articulation with the acetabulum

Landmarks


Greater Trochanter
Femoral Head
Femoral Neck
Intertrochanteric line
Lesser Trochanter

Regions

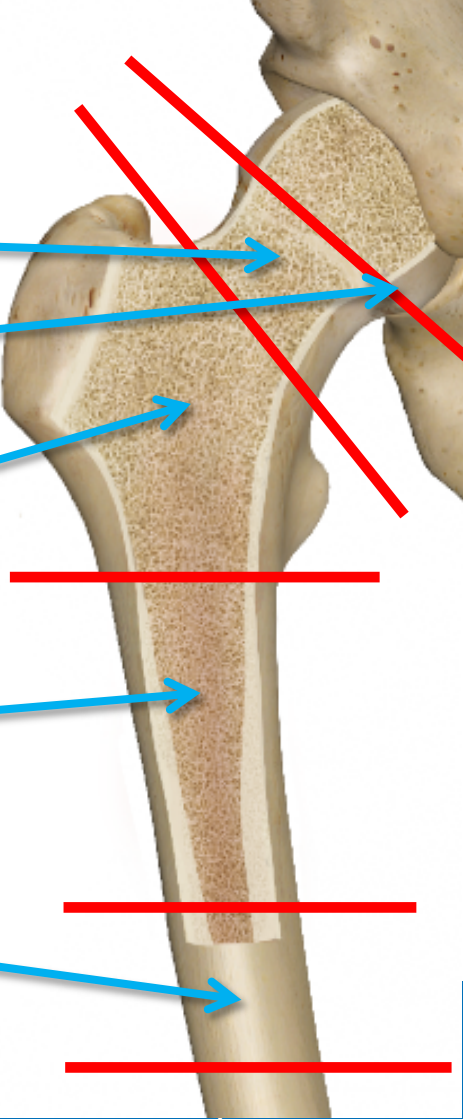
Head (Capital)

Neck (Sub Capital)

Trochanteric

Sub Trochanteric

Isthmus



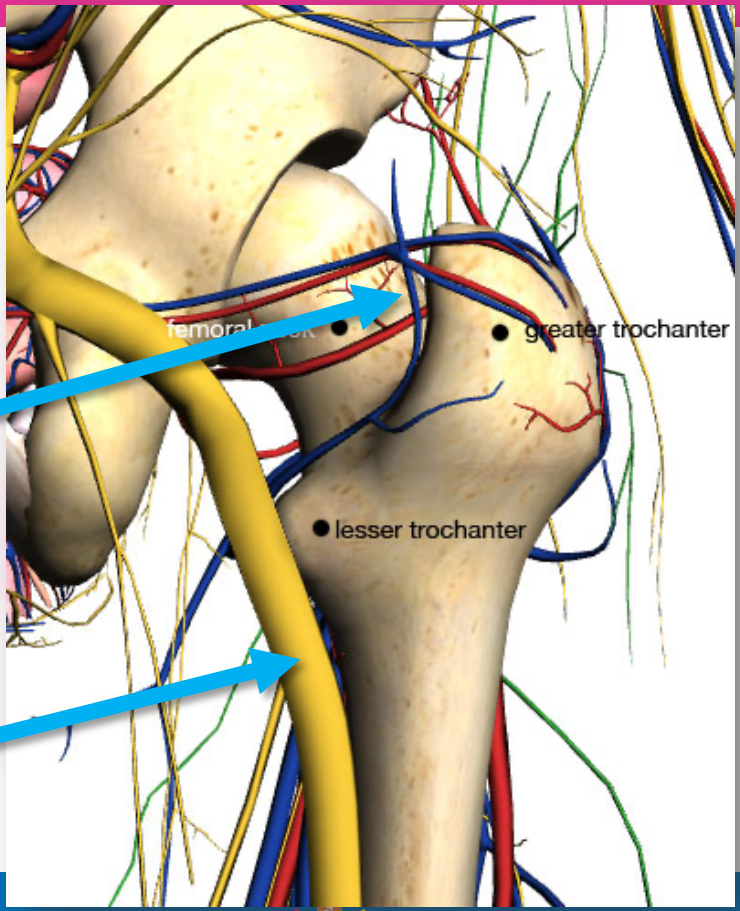
Vascular system

The proximal femur has two main sources of blood supply

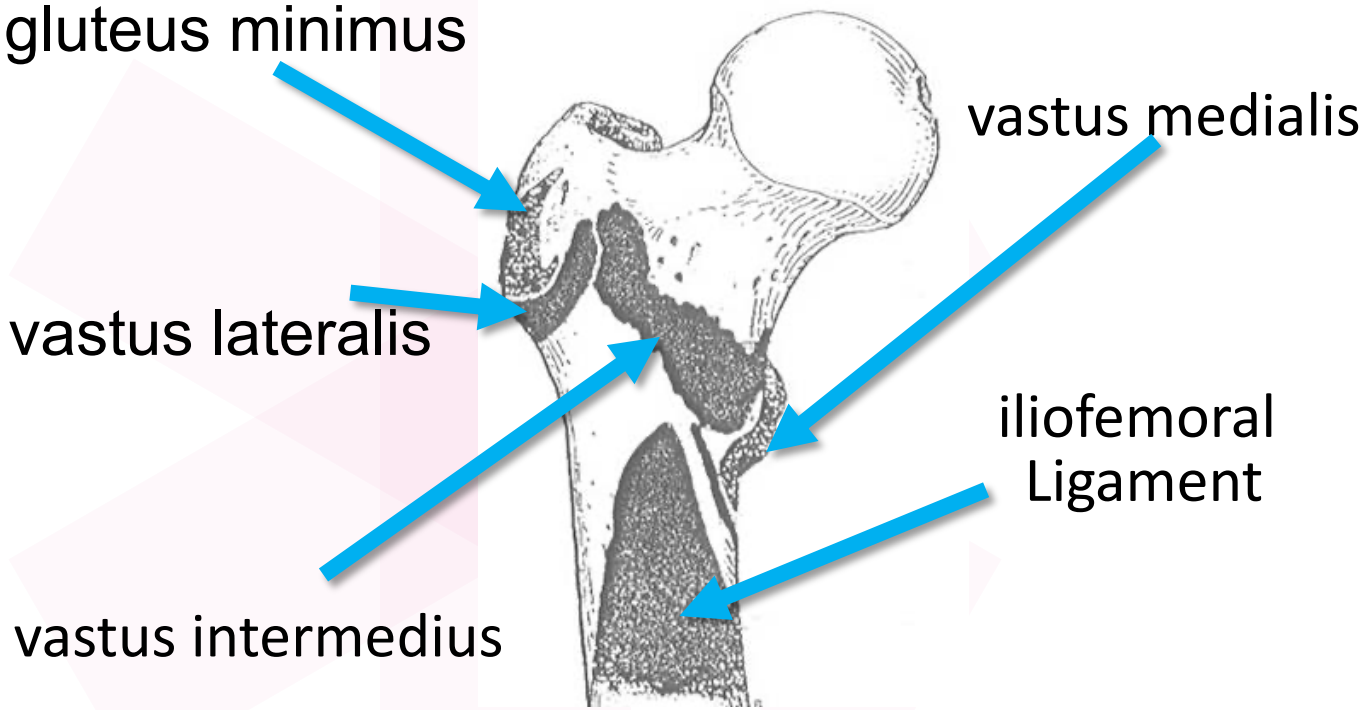
Circumflex Arteries

Medial
Lateral

Both arise from the femoral artery

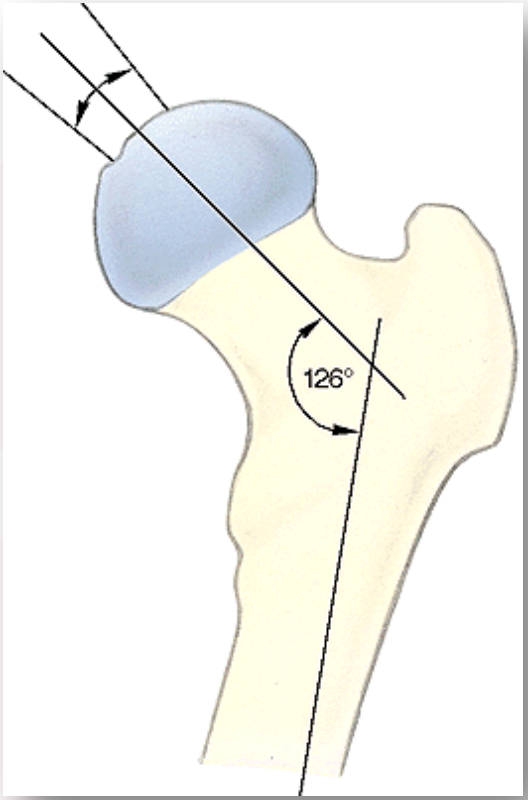


Muscular attachments

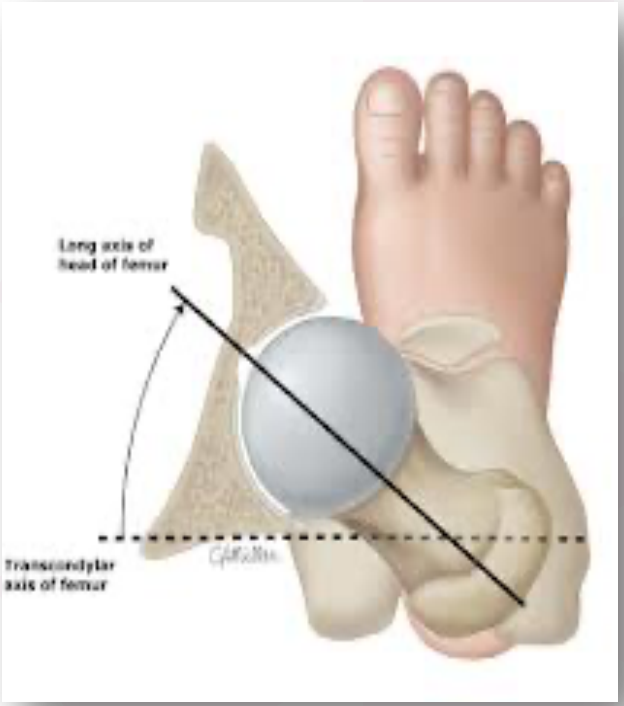


CCD angle

The angle between the longitudinal axes of the femoral neck and shaft, called the caput-collum-diaphyseal angle or CCD angle, normally measures approximately 150° in newborn and 128° in adults. Can be as low as 120º in the elderly



Anteversion



Anterior rotation of the neck in relation to the two condyles distally

Average = c14º

Possible span = c10-30º

Principles of reduction

- ✓ Anatomical alignment in all three planes
- ✓ Fracture apposition - all displacements corrected
- ✓ Preserve vascularity

Principles of reduction

- ✓ Atraumatic - not producing more trauma
- ✓ Absolute reduction essential in ephyseal (articular) fractures

Aims of hip fracture management

Restore

Length
Axial rotation
Angular alignment

Obtain union

Anatomical reduction of each fracture surface not essential!

Mechanism of injury

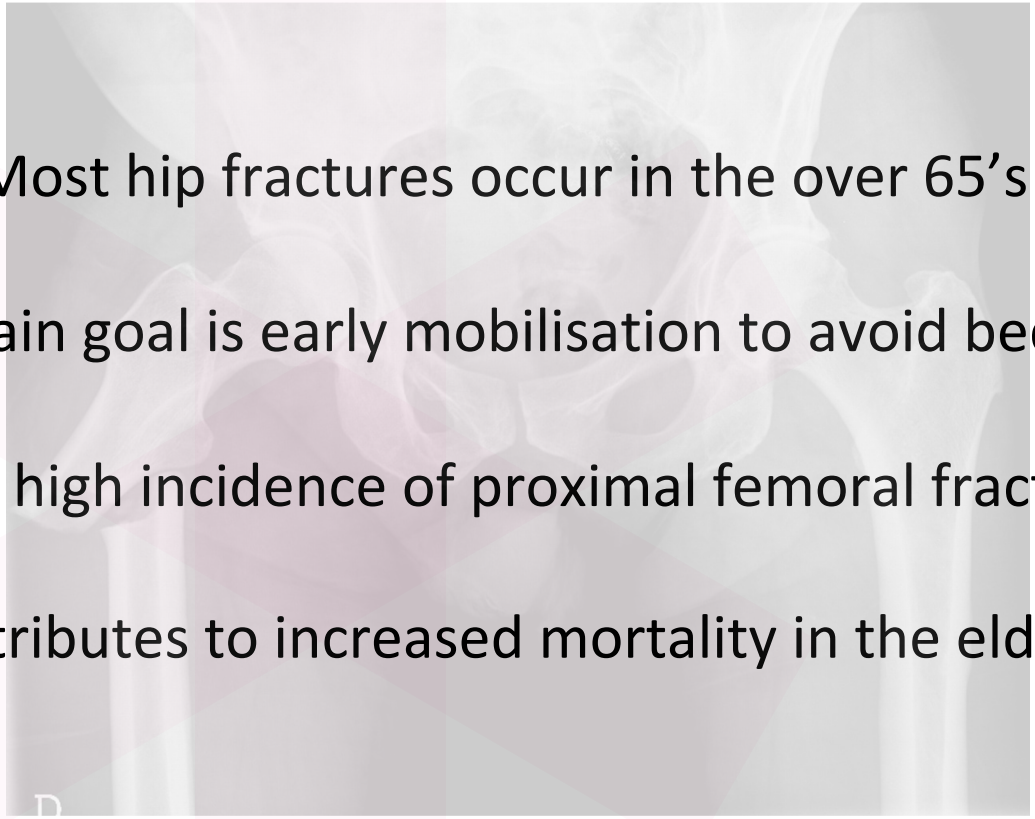
Elderly - low energy

Poly trauma

Pathological lesions

Young - high energy

Mechanism of injury



Most hip fractures occur in the over 65's

The main goal is early mobilisation to avoid bed rest

Very high incidence of proximal femoral fracture

Contributes to increased mortality in the elderly

Bone quality

The typical patient with a hip fracture?

Elderly Female Osteoporotic

Bone quality

A brief history of DHS

Operative treatment of hip is over 100 years old

Very crude with high complication

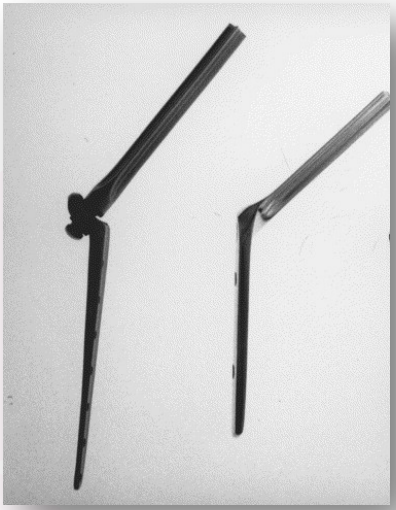
Patients kept in bed for long periods in traction

Mortality rate very high

1931 Smith Peterson

Tri flanged pin introduced

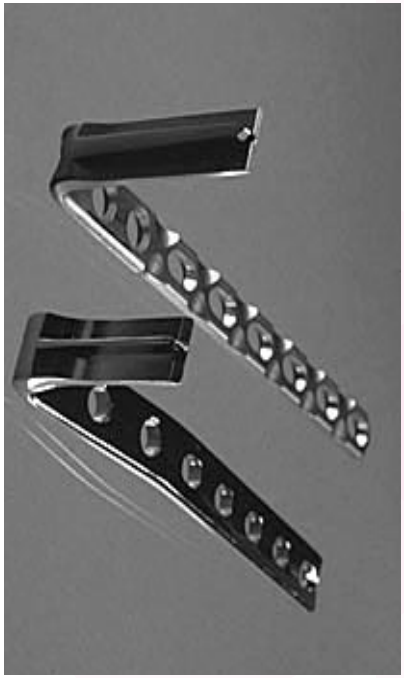
1940's Jewitt McLaughlin



Next major development involved adding a plate to the side of a tri flanged pin

Complications of early fixation

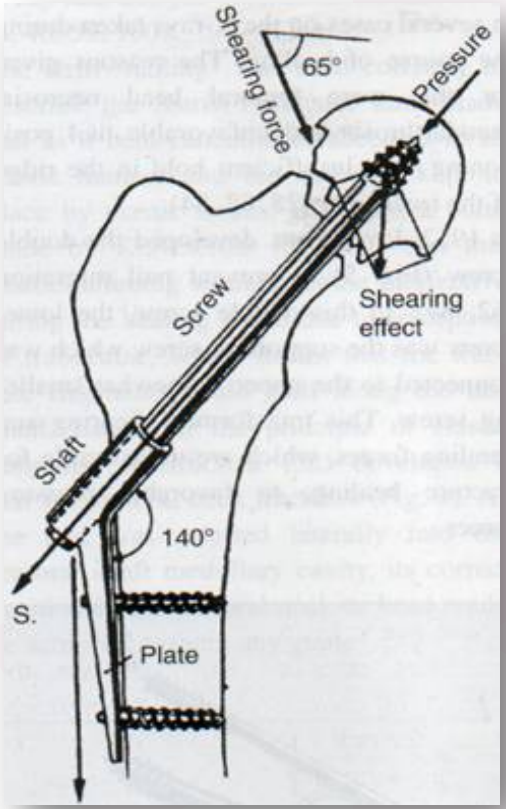
Solution



This led to the development of one piece systems

AO Angled blade plate introduced

1951 Pohl



Developed the first non fixed connection between plate and screw

Allowed for dynamic compression. This reduced some earlier complications

1970's Knowles

Hip Pin system

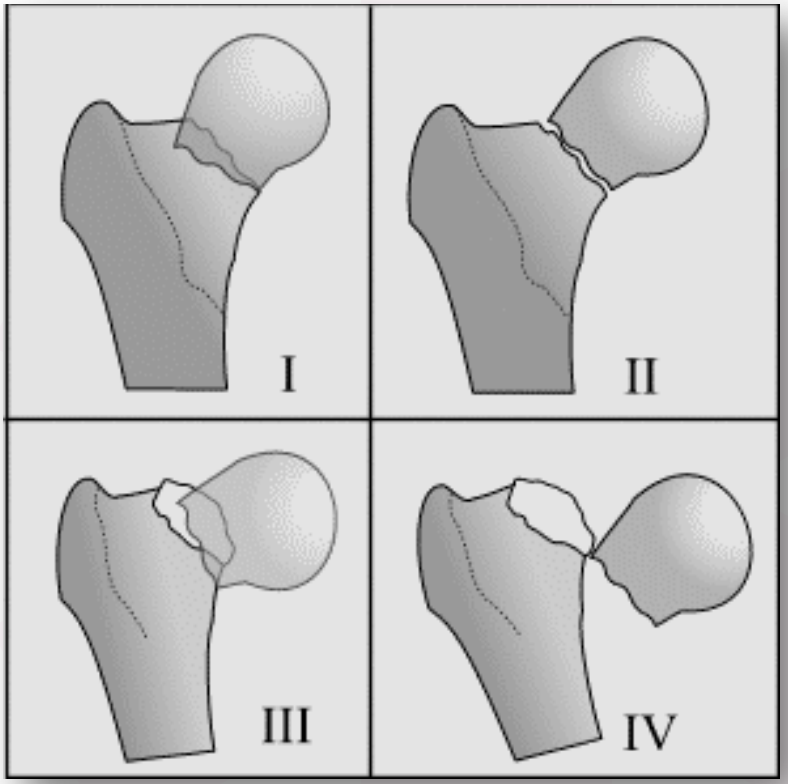
Finally….

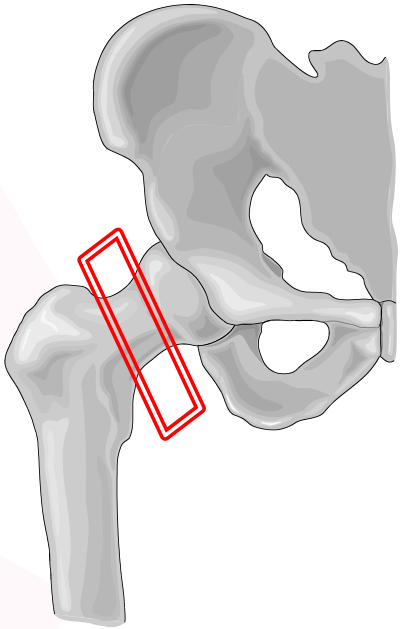
1971 Richards Compression Hip Screw introduced

1980 AO introduced current DHS plates and screws

Classification and data

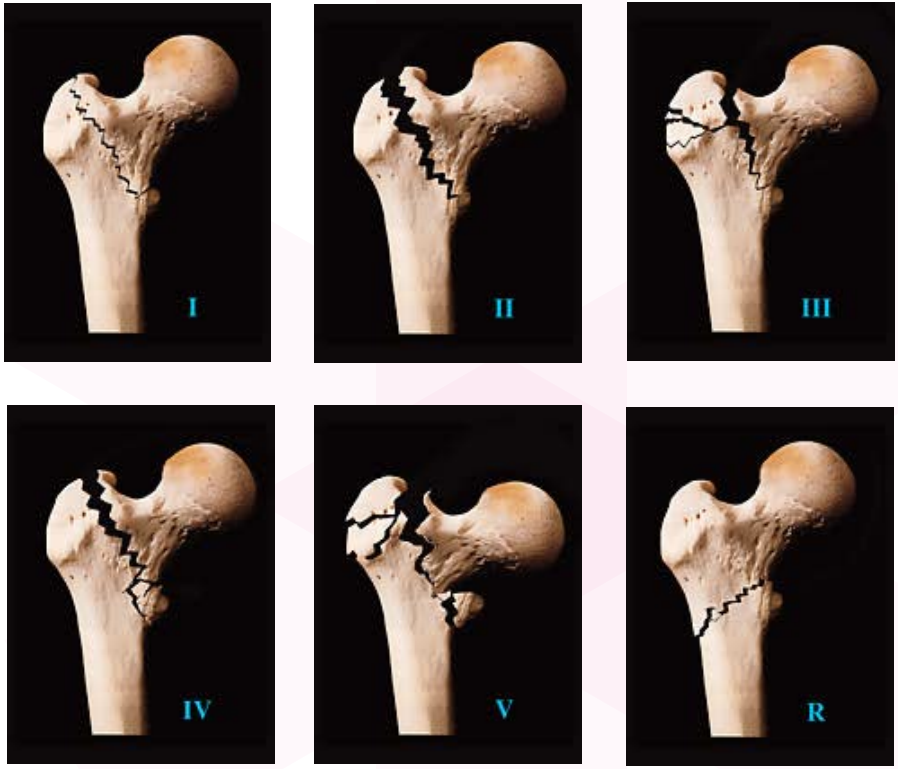
Garden's fracture classification

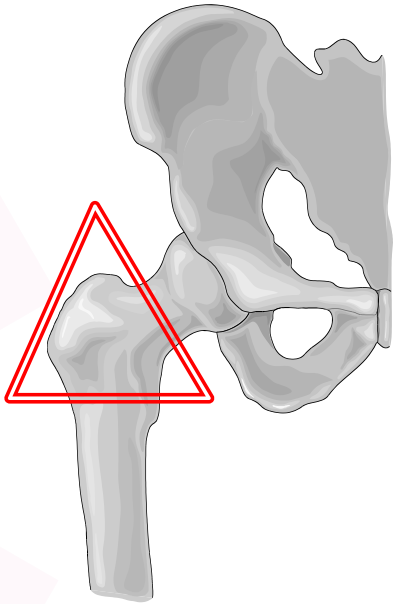




Sub Capital Fractures

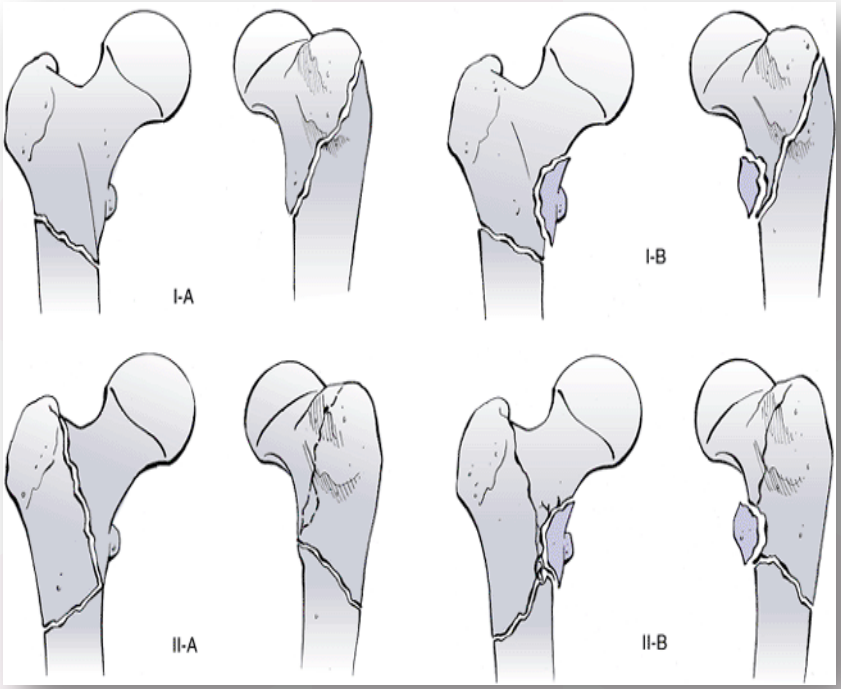
Evan's Fracture Classification

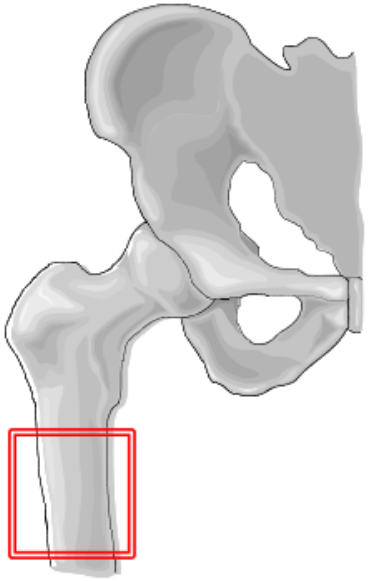




Inter-trochanteric fractures

Russell Taylor classification





Sub-trochanteric fractures

Aims of treatment

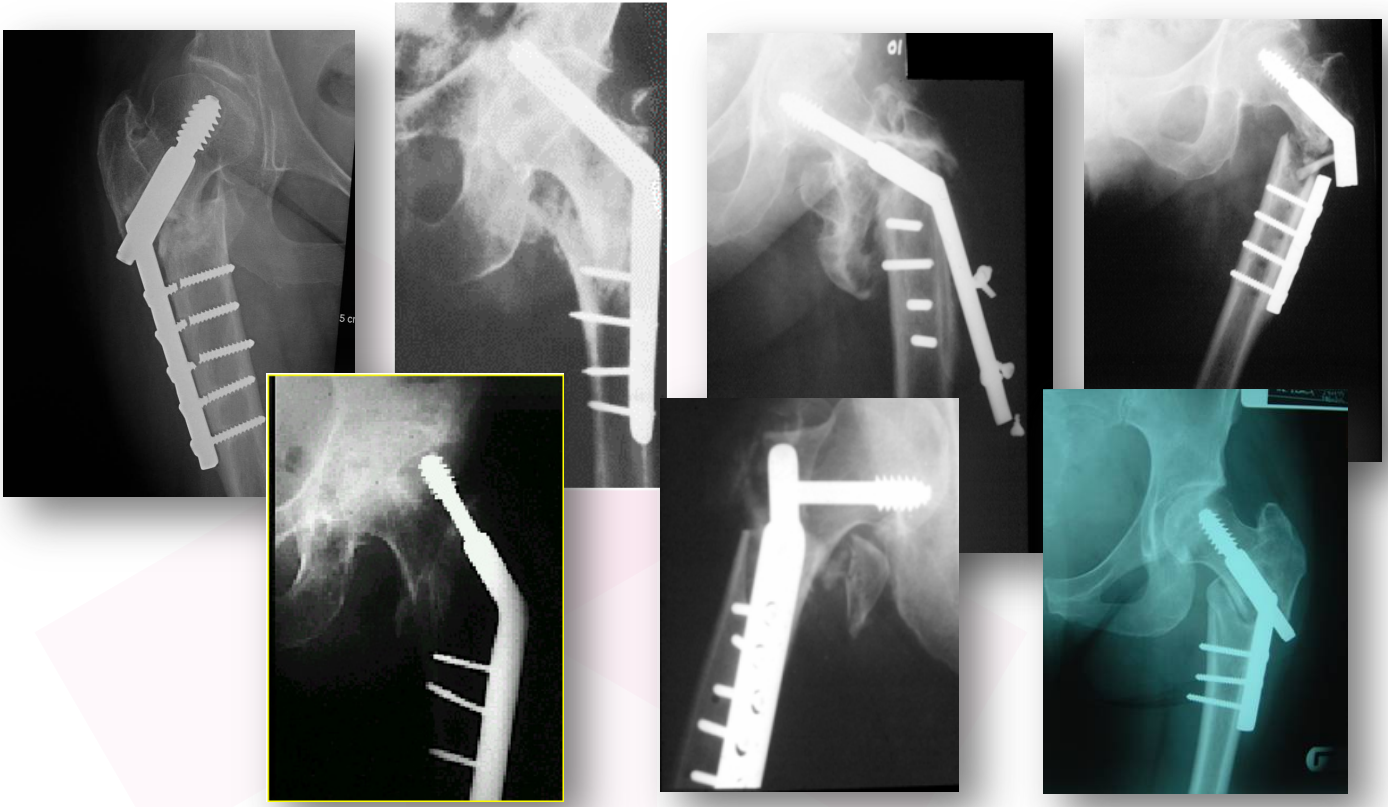
Restoration of
pre-operative mobility

= independence

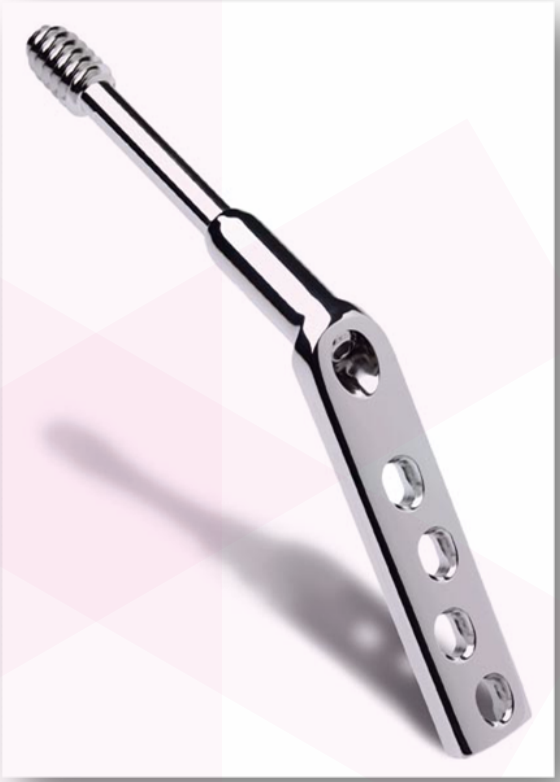
Weight bearing

A stable implant can allow immediate full weight bearing, which is an advantage

Mechanism of failure

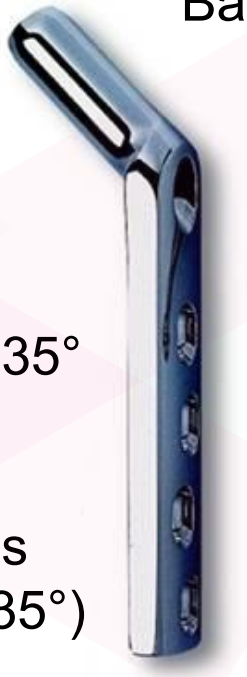


DHS implants



DHS system anatomy

Hip Screw lengths
50 – 145mm

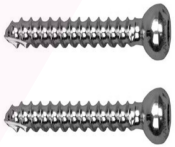


Barrel length 38mm

Compression Screw

Plate angles 130°, 135°
140°, 145°, 150°

Plate lengths
2 – 18 hole (135°)



4.5mm Cortical Screws

Surgical technique overview

Patient positioning

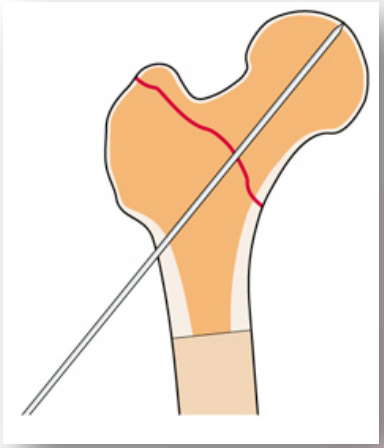
Implant positioning

preoperative

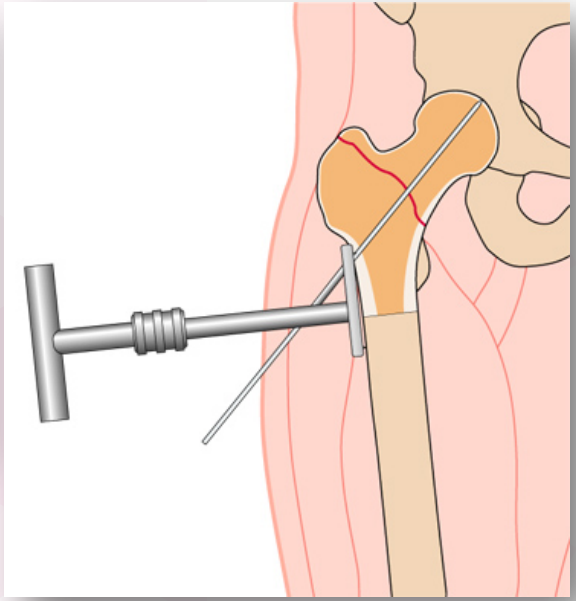
postoperative
anterior-posterior view of the implant

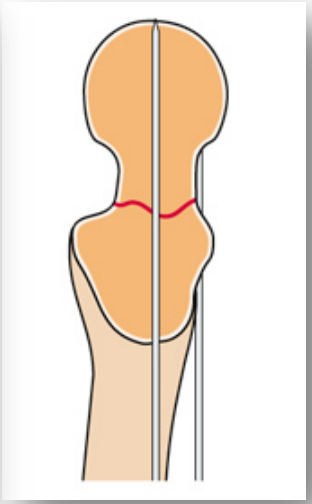
postoperative
lateral view of the implant

Guide Pin placement



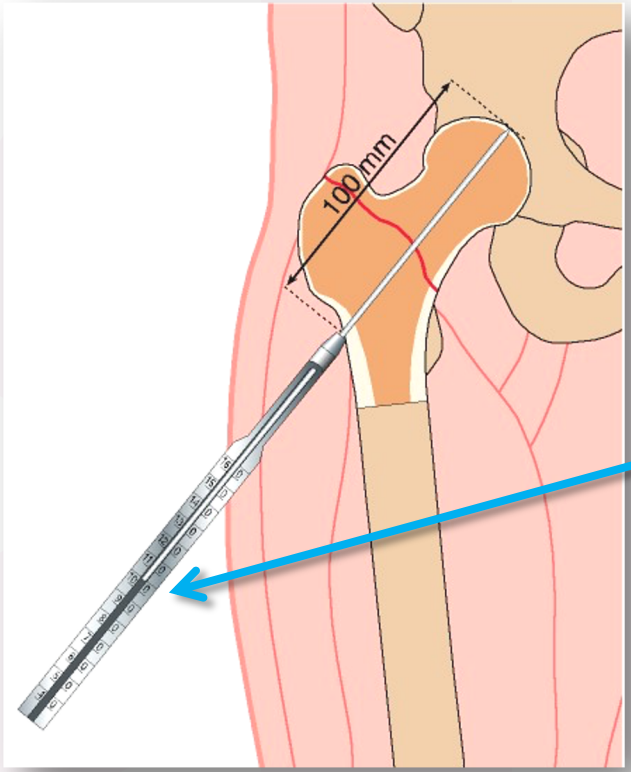
A/P





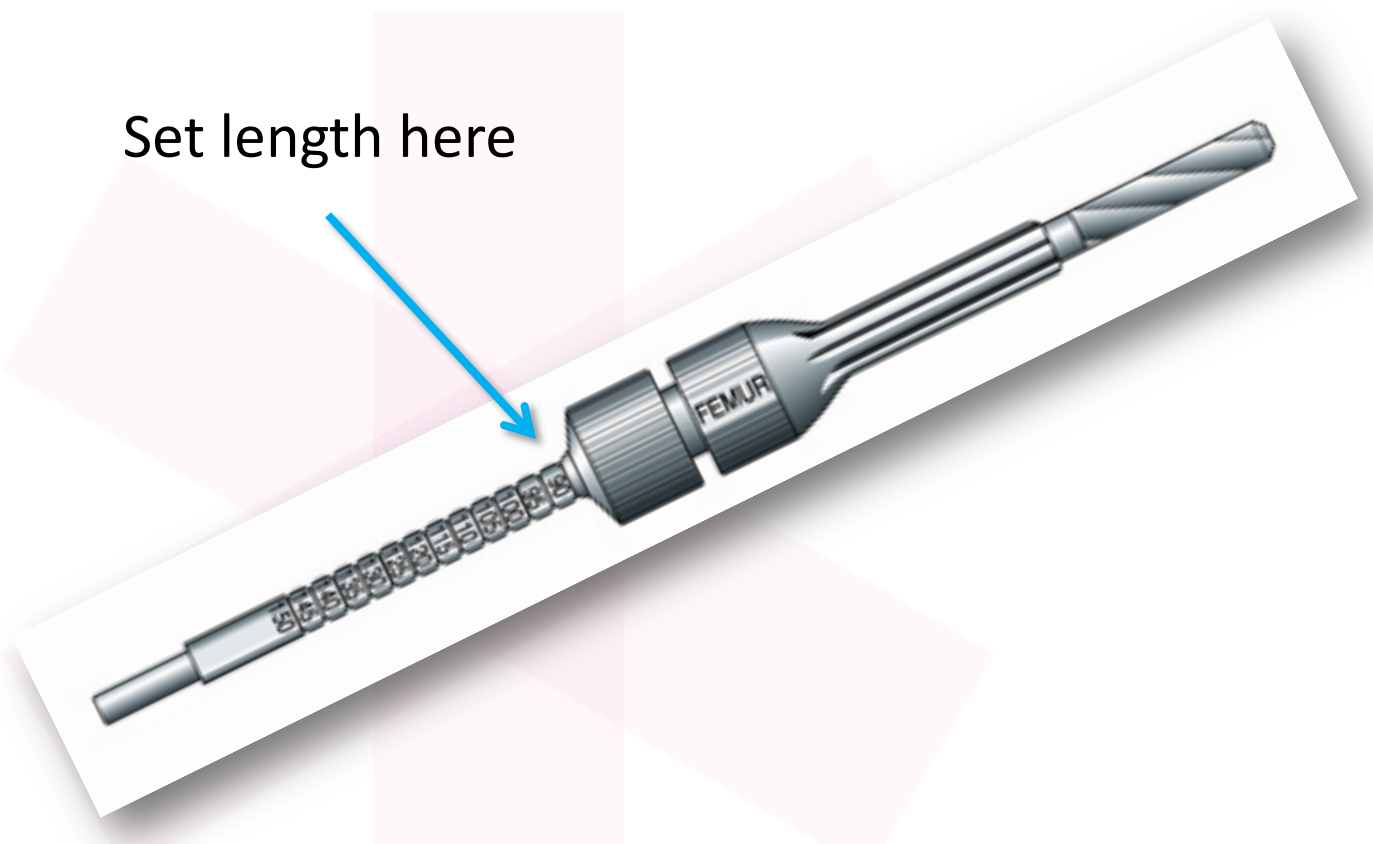
Superior

Measure for Lag Screw length

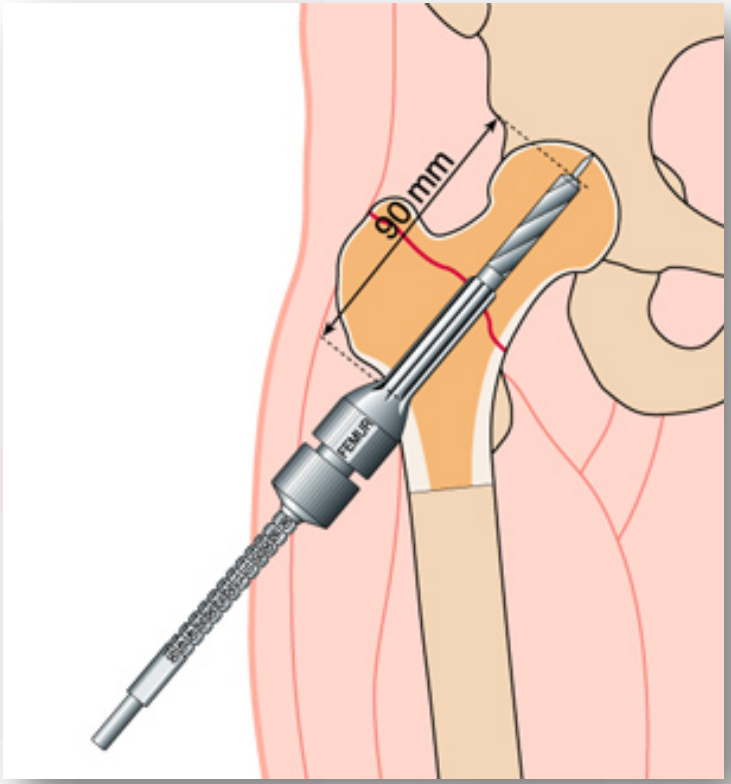


Deduct 10mm

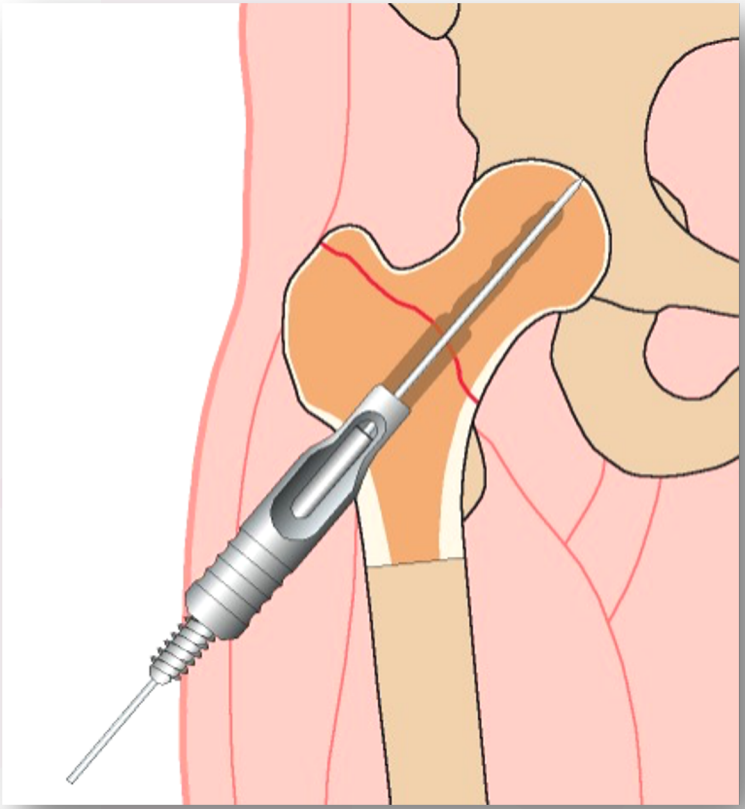
Set Triple Reamer



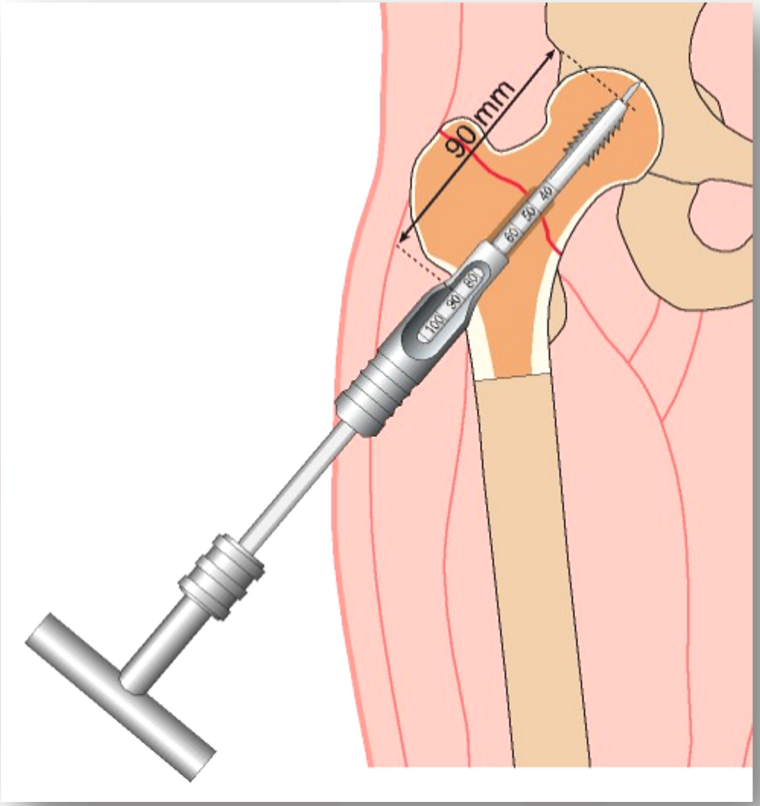
Ream



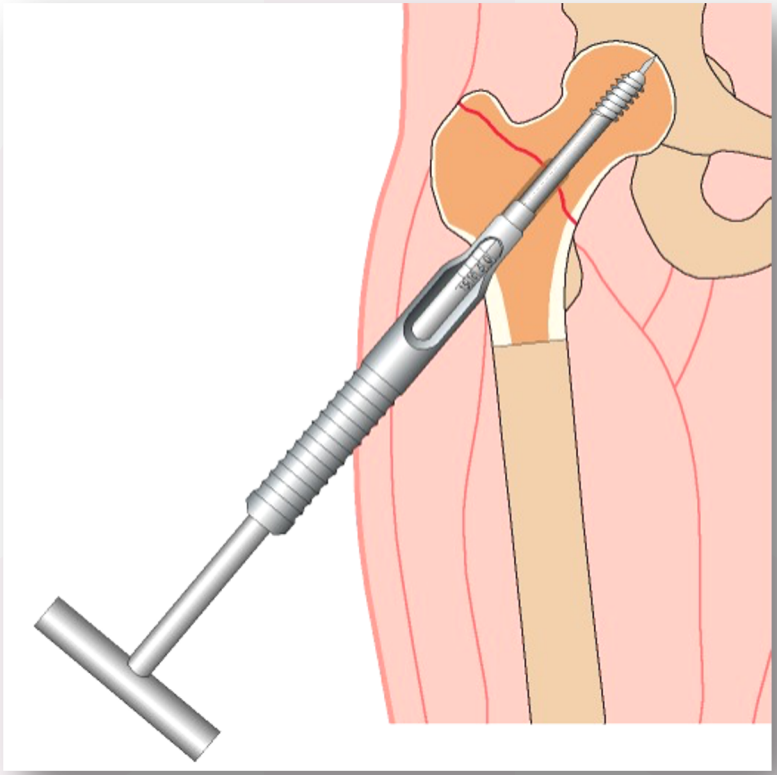
Re-insert Guide Wire

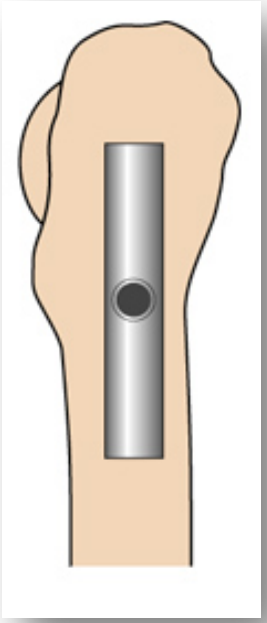


Tap



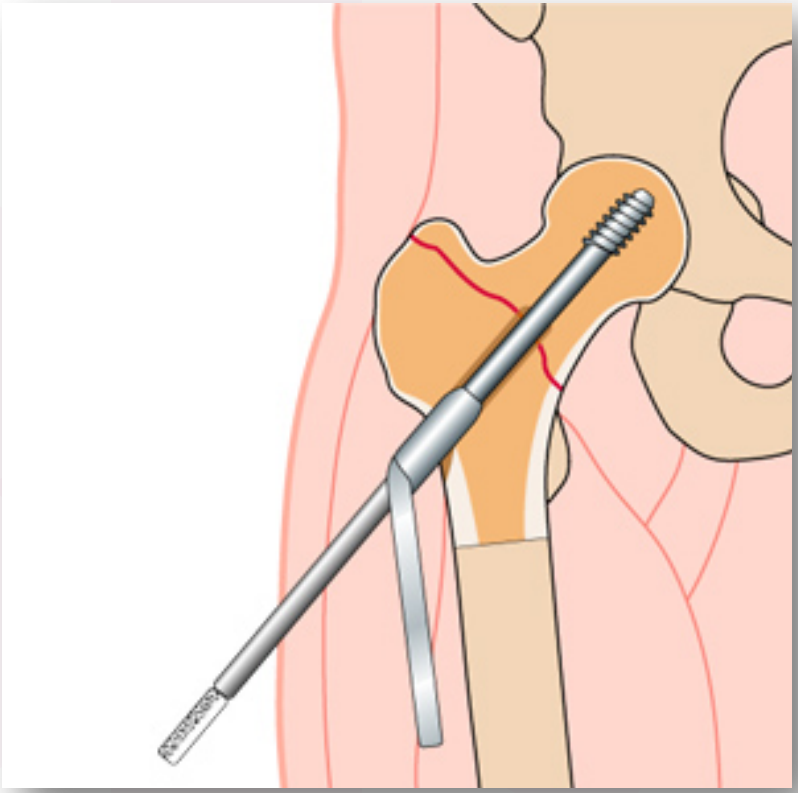
Hip Screw insertion



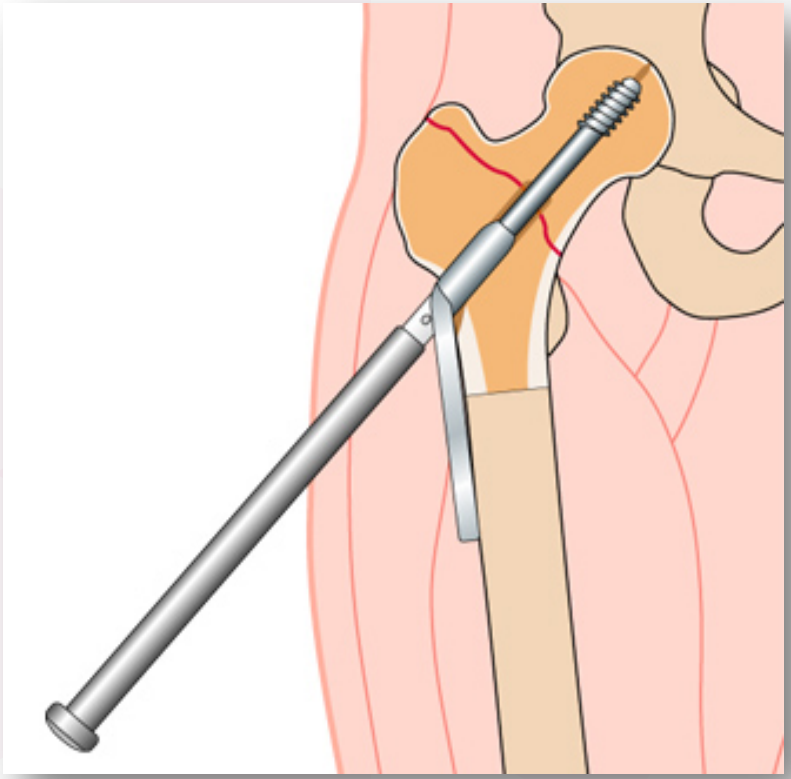


T-Handle final position

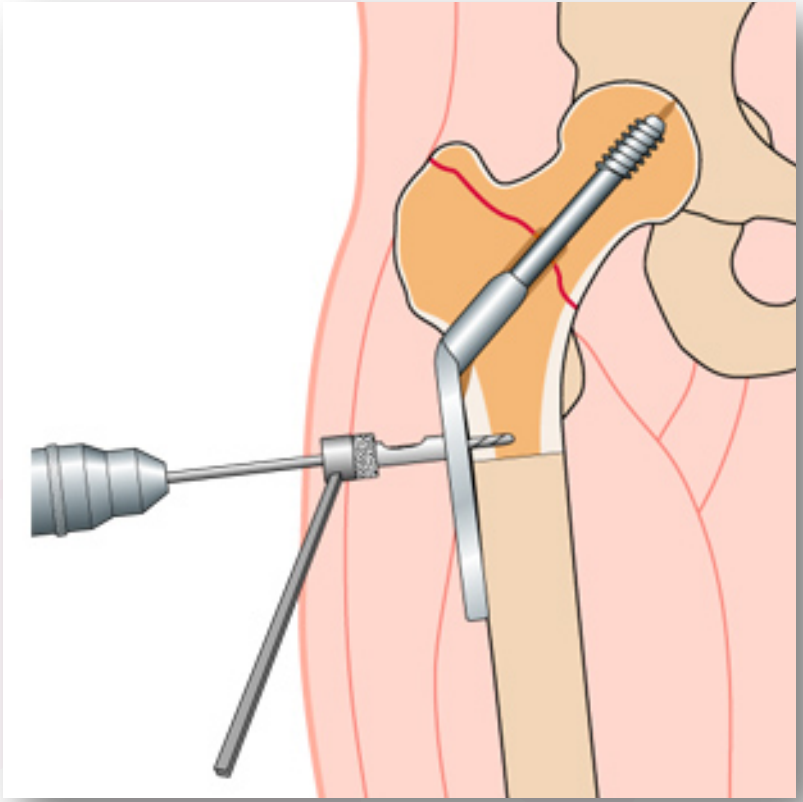
Screw and Plate insertion



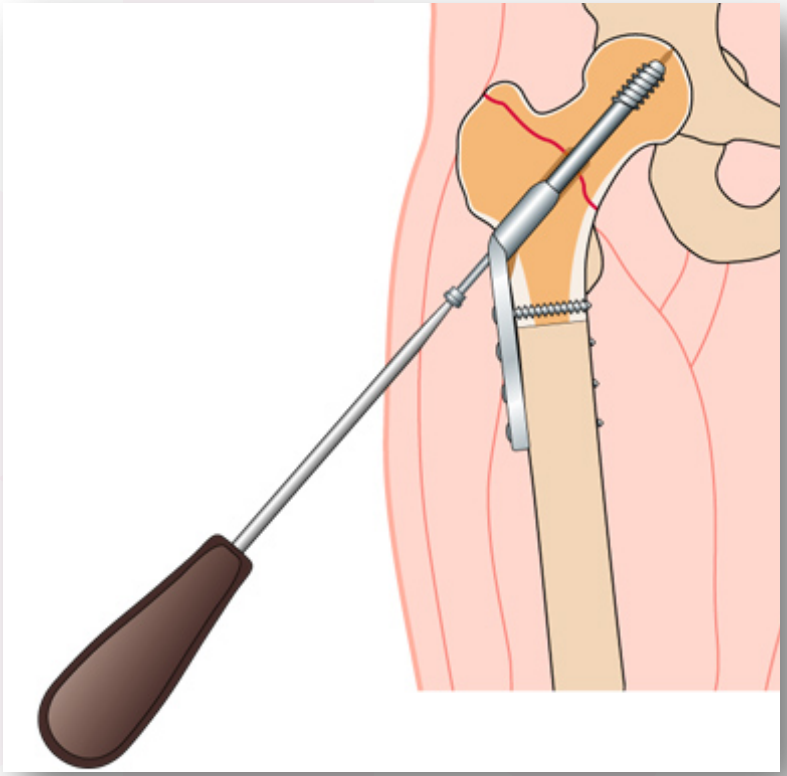
Impact



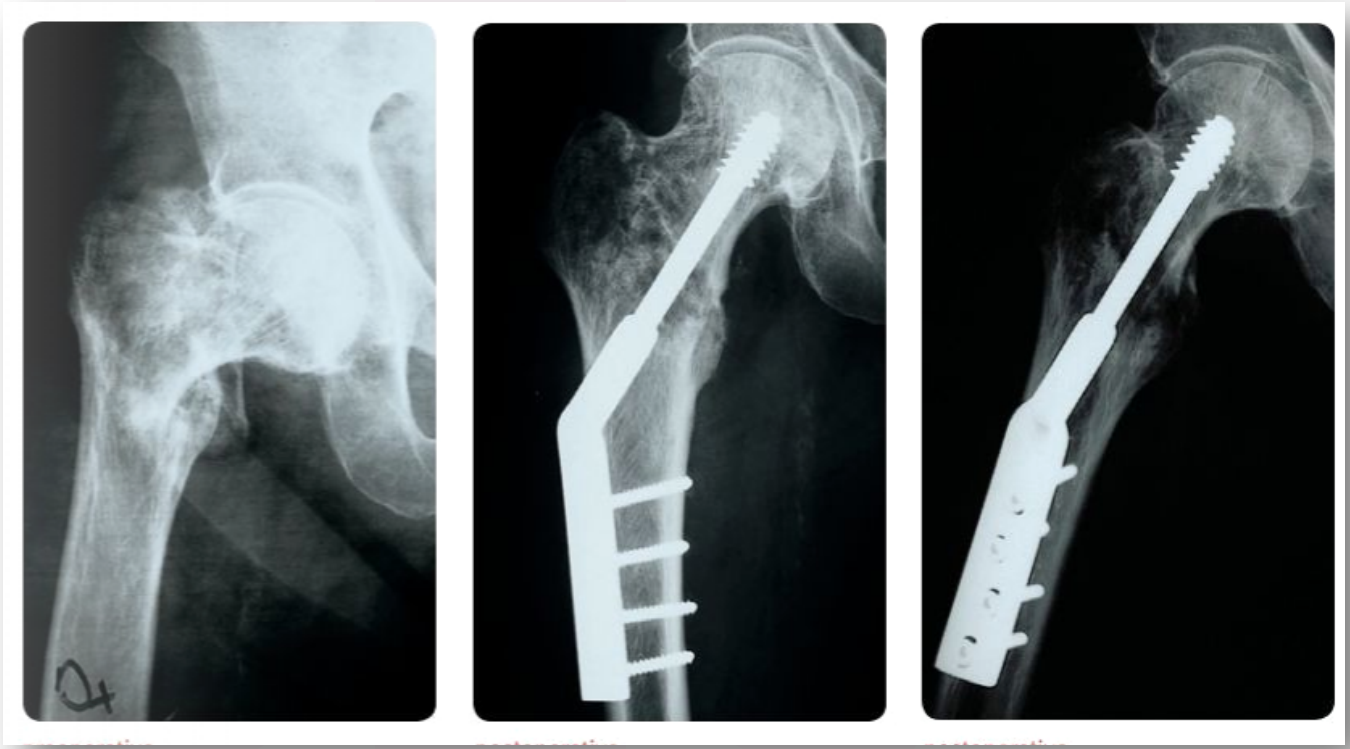
Insert 4.5mm Cortical Screws



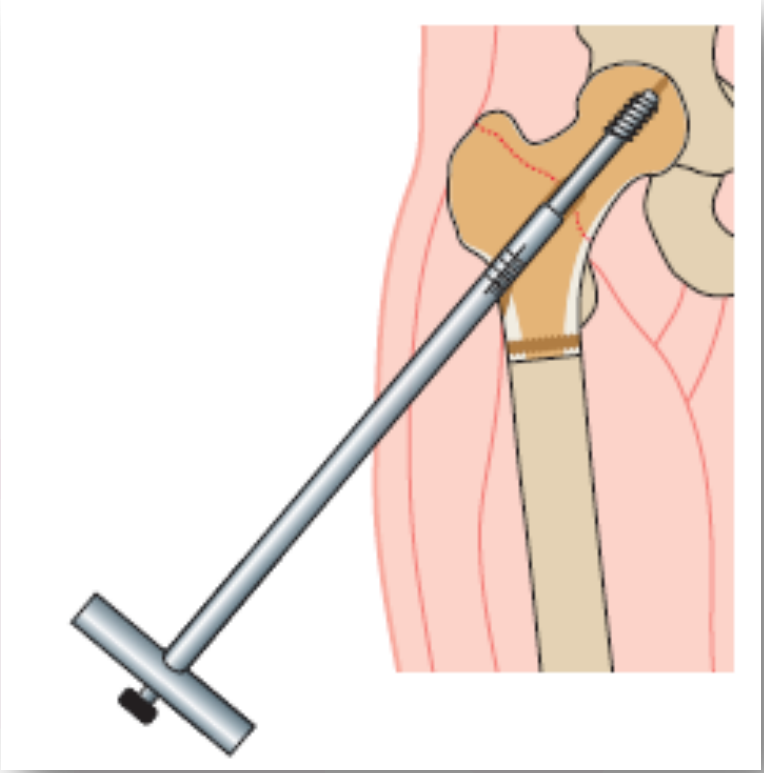
Insert Compression Screw



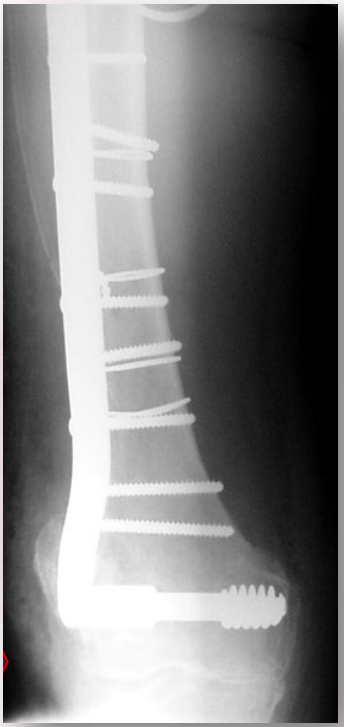
DHS procedure complete

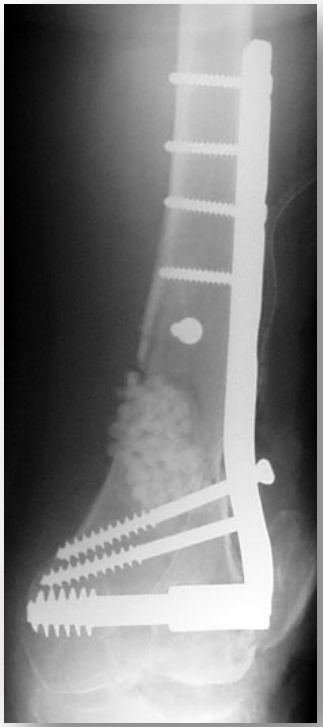


DHS extraction

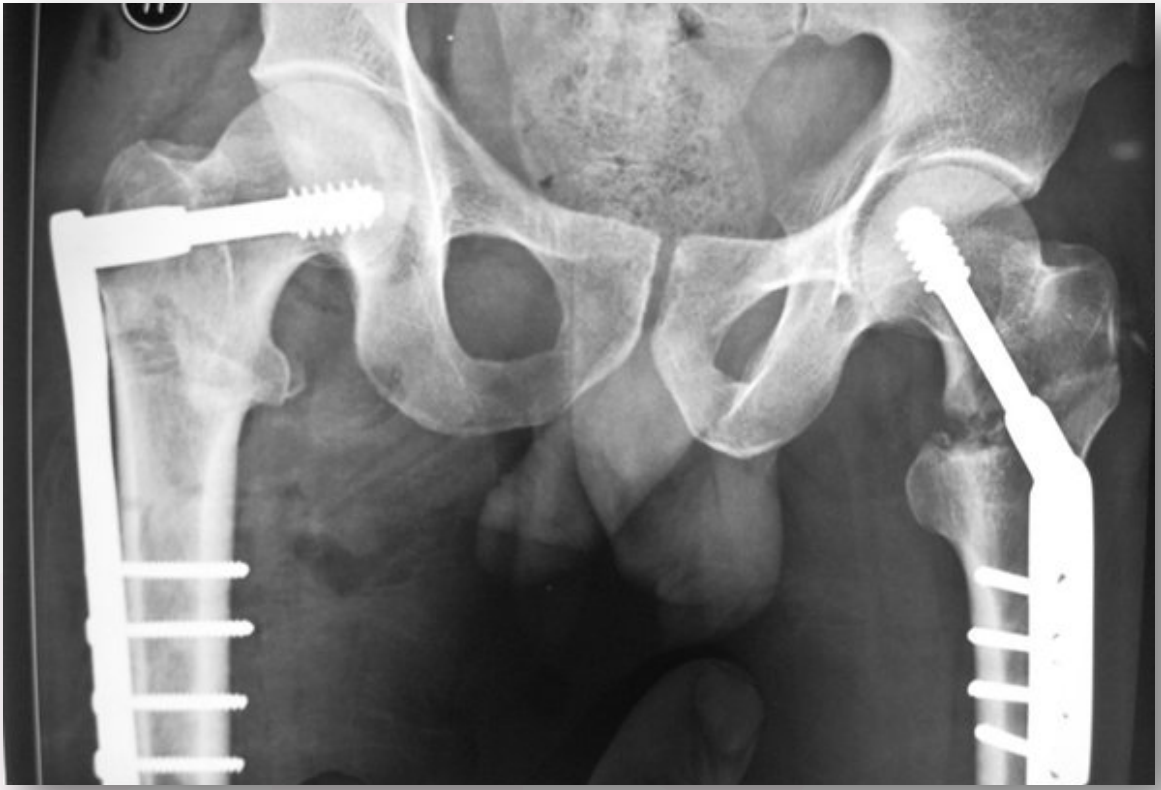


Dynamic Condylar Screw (DCS)





Simple, effective fixation



Thank you

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