PLEASE CLICK ON THE FOLLOWING LINK TO WATCH THE LECTURE ONILNE:-

https://www.youtube.com/watch?v=UGg0eKZTtaI&list=PLuBRb5B7fa_dtajIUw2E01E-8Uv8vVNmR&index=4

Total hip replacement

- By :

Dr. Mohammad Aloun

Introduction

so-called arthroplasty : it is a reconstructive surgery to restore joint motion , function and relieve the pain with low friction articular surface

- .must be durable , stable , functional and pain free
- Total arthroplasty
- hemiarthoplasty

History

- Charnley (1979) low friction arthroplasty
- Three major evolution :
- Concept of low friction arthroplasty
- Bone cement bone fixation
- Introduction of high density PE bearing surface

Indication

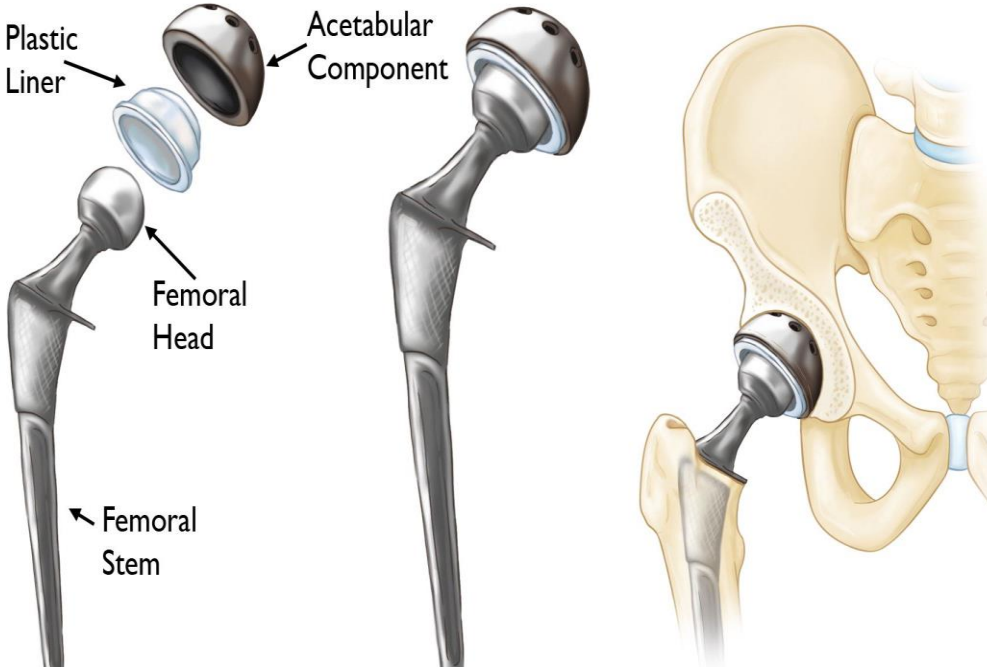
1. Inflammatory arthrities
2. Osteoarthrities
3. Osteonecrosis
4. Developmental (DDH, perth , slipped capital)
5. Trauma
6. Tumor
7. achondrplasia

Contraindication

- Recent infection
- Pt under 60 yr and alternative surgery available
- Not sever pain
- Labor employed

Prosthesis design

- Acetabular component
- Femoral component
- Articular bearing surface



Type of fixation

- Cemented

By using PMMA

- Uncemented

Biological fixation (ingrowth , ongrowth)

Bearing articular surface

1. Ceramic
2. Metal on metal
3. Metal on PE

DOOR CLASSIFICATION

- TYPE A
- TYPE B
- TYPE C

APPLIED BIOMECHANICS

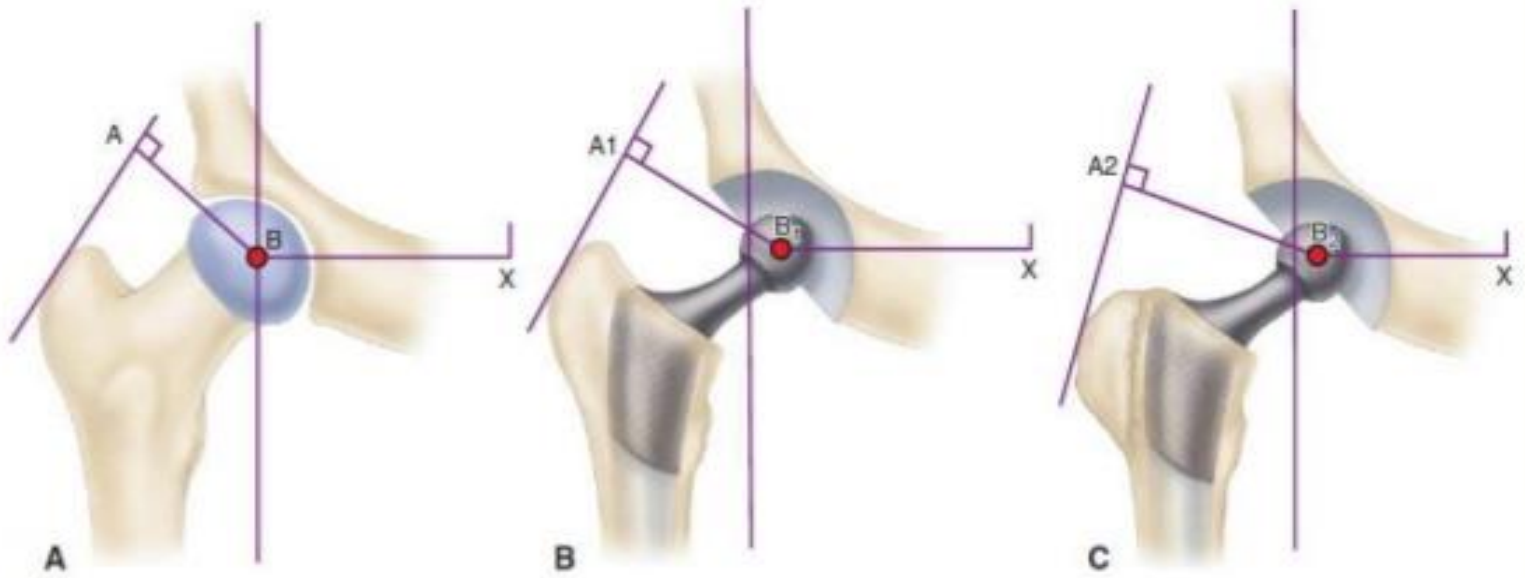
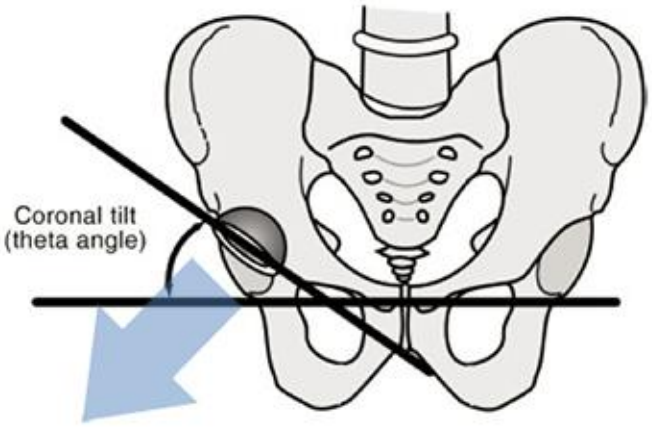
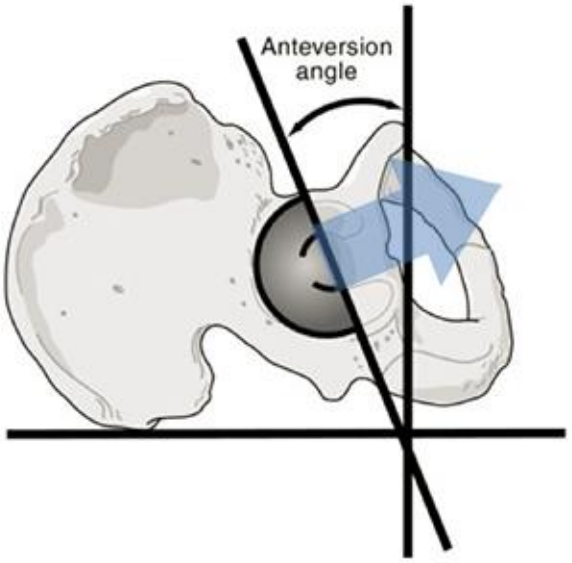
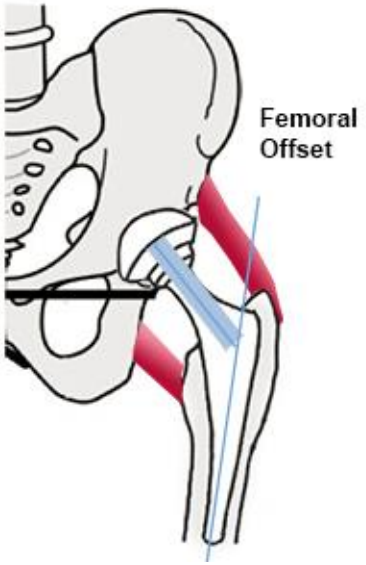


FIGURE 3-1 Lever arms acting on hip joint. **A,** Moment produced by body weight applied at body's center of gravity, X, acting on lever arm, B-X, must be counterbalanced by moment produced by abductors, A, acting on shorter lever arm, A-B. Lever arm A-B may be shorter than normal in arthritic hip. **B,** Medialization of acetabulum shortens lever arm B-X, and use of high offset neck lengthens lever arm A-B. **C,** Lateral and distal reattachment of osteotomized greater trochanter lengthens lever arm A-B further and tightens abductor musculature.

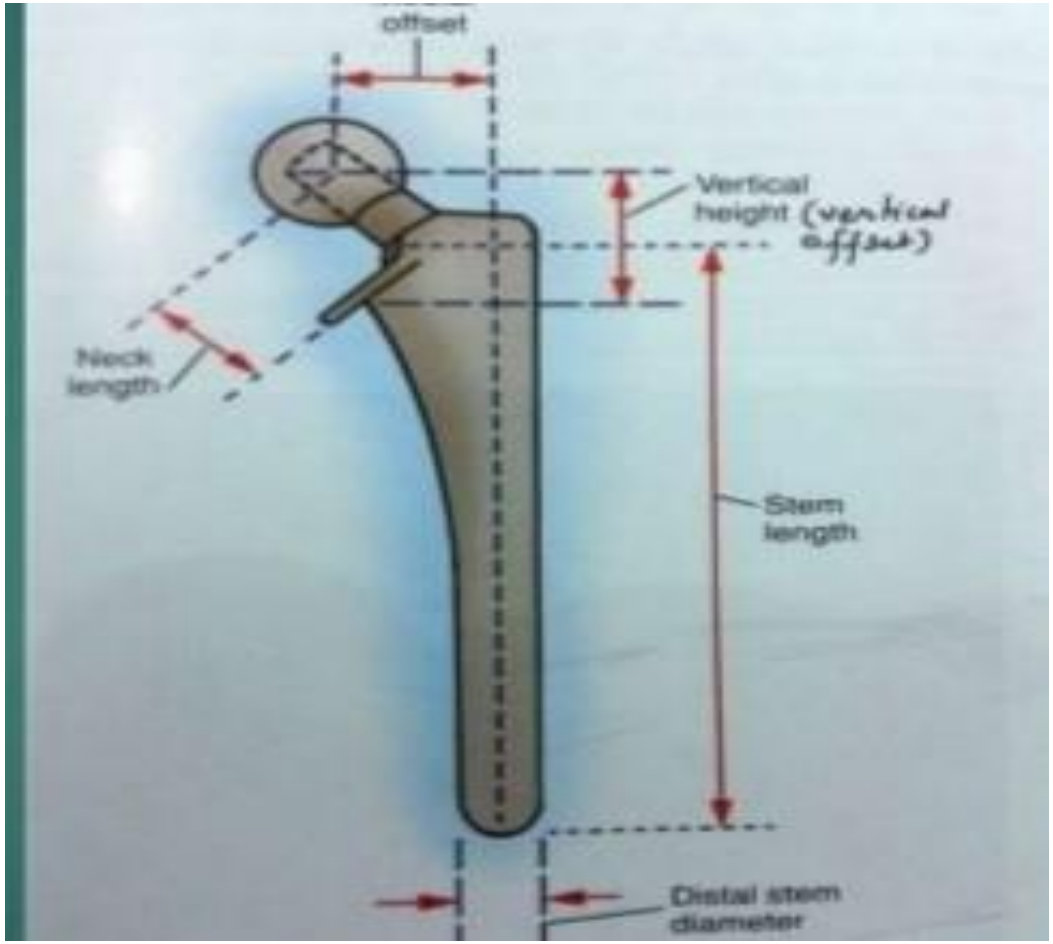
APPLIED ANATOMY OF HIP







Femoral component



- Cemented

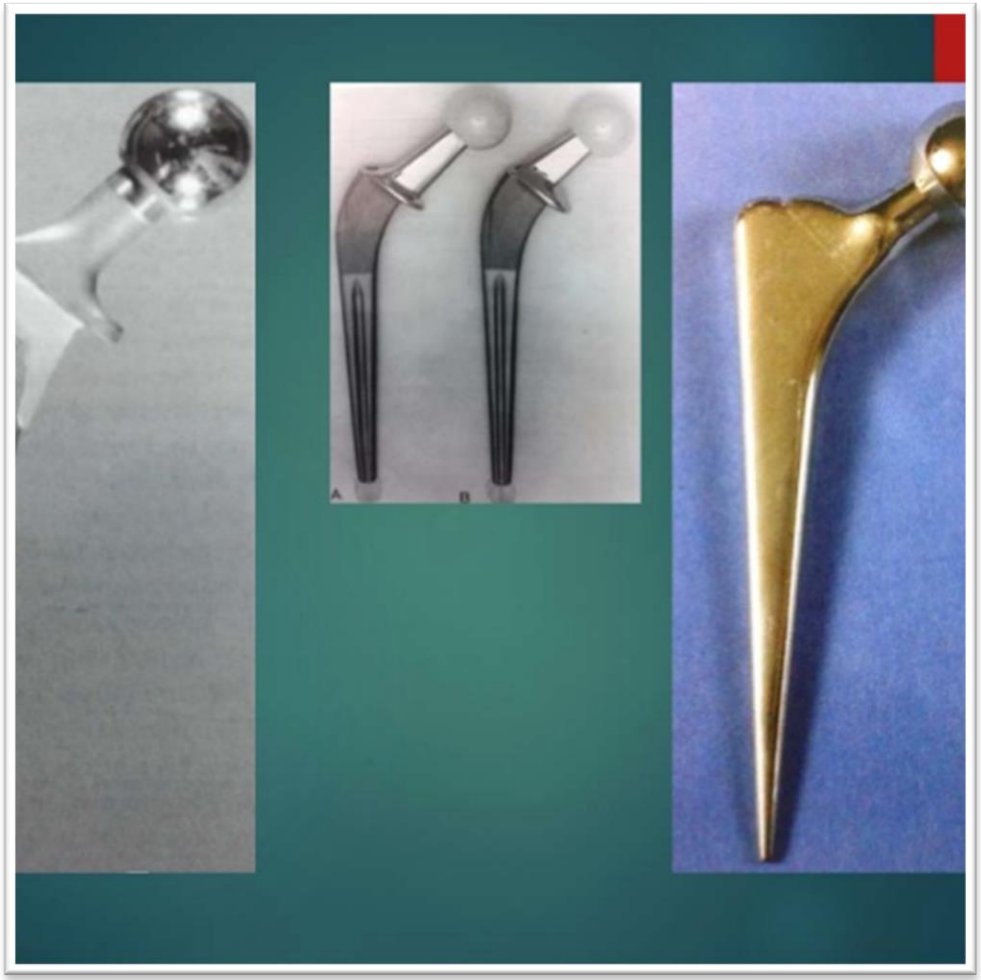
Depend on bone cement fixation
indicated in irradiated bone , osteoporotic and ostepenia bone
Door classification type 3
Cobalt chrom

Stem must central , rigid , smooth . Cement mantle > 2 cm

- Uncemented… press fit

Biological fixation (in, ongrowth)
Compression hoop stress is initail fixation
Cobalt chrom , titanium
type :
Proximal porous coated
Fully porous coated
Fluted tappered

Modular stems

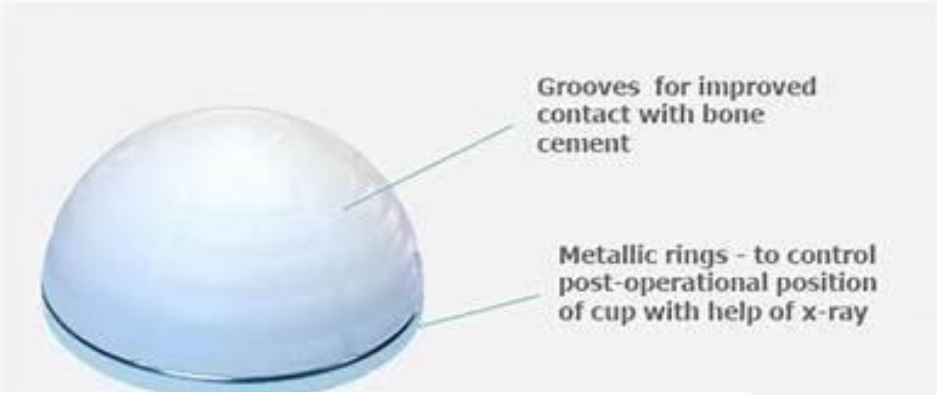

A
B


A
B

Acetabular component

- Cemented

Cemented mantle 3 mm

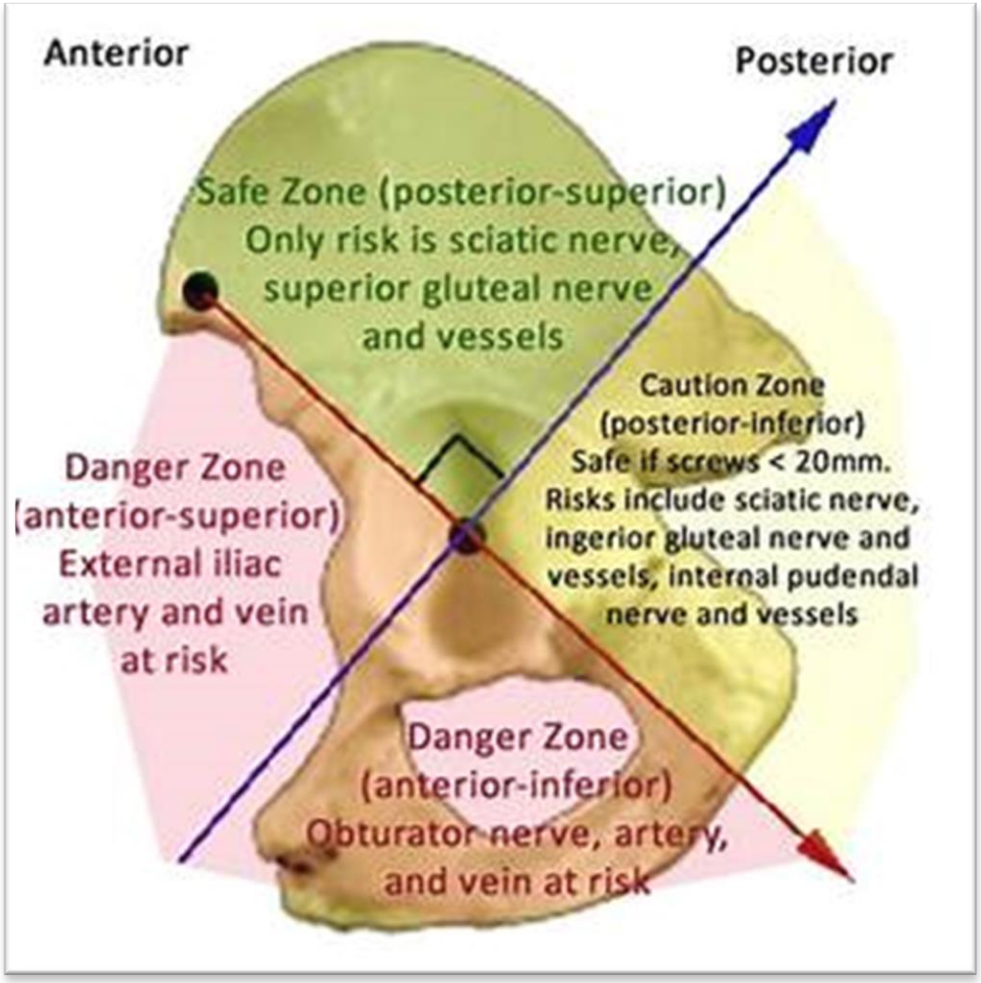


Indicated in low demand elderly , tumo

- Uncemented

porous coated (ingowoth fixation)

Trans acetbaular screw fixation


Anterior
Posterior
Safe Zone (posterior-superior)
Only risk is sciatic nerve, superior gluteal nerve and vessels
Caution Zone (posterior-inferior)
Safe if screws < 20mm.
Risks include sciatic nerve, ingerior gluteal nerve and vessels, internal pudendal nerve and vessels
Danger Zone (anterior-superior)
External iliac artery and vein at risk
Danger Zone (anterior-inferior)
Obturator nerve, artery, and vein at risk

Bearing surface alternative

- Metal on PE

Highly crossed PE to decrease rate of wearing

- Metal on metal

Elevated serum ion and urin

Pseudotumor

Contraindicated in renal disease and pregnancy

Type 4 hypersnsivity (mediated T cell)

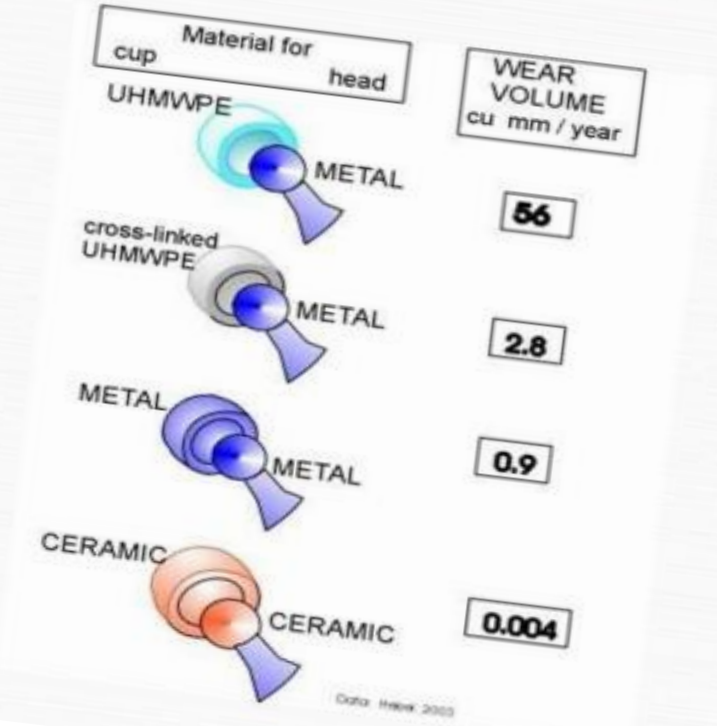
- Ceramic on ceramic

Harder than metal and resistible to scratch and less wear rate

Disadvantage :

Strip wear , squeezing , impingment femur neck – acetabular rim

Wear- volumetric analysis



Approach

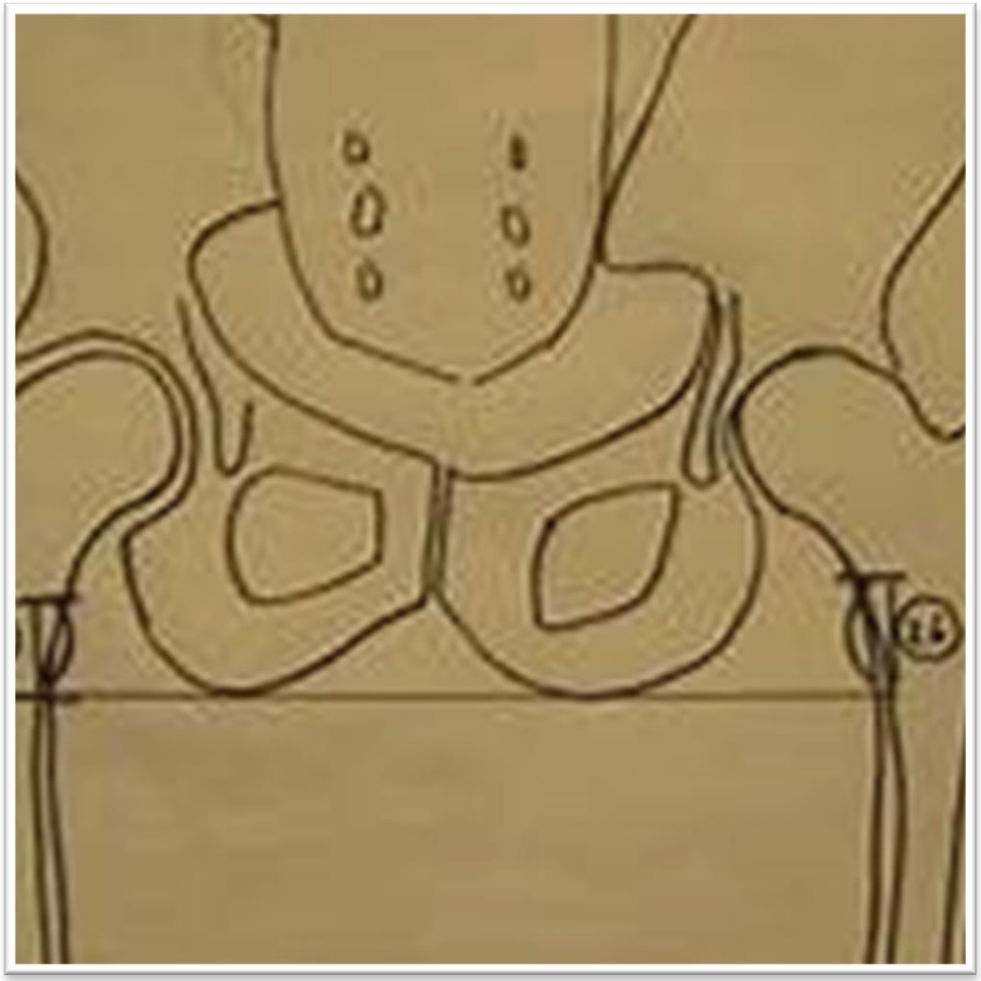
- Anterior
- Posterior
- Lateral
- Anteriolateral

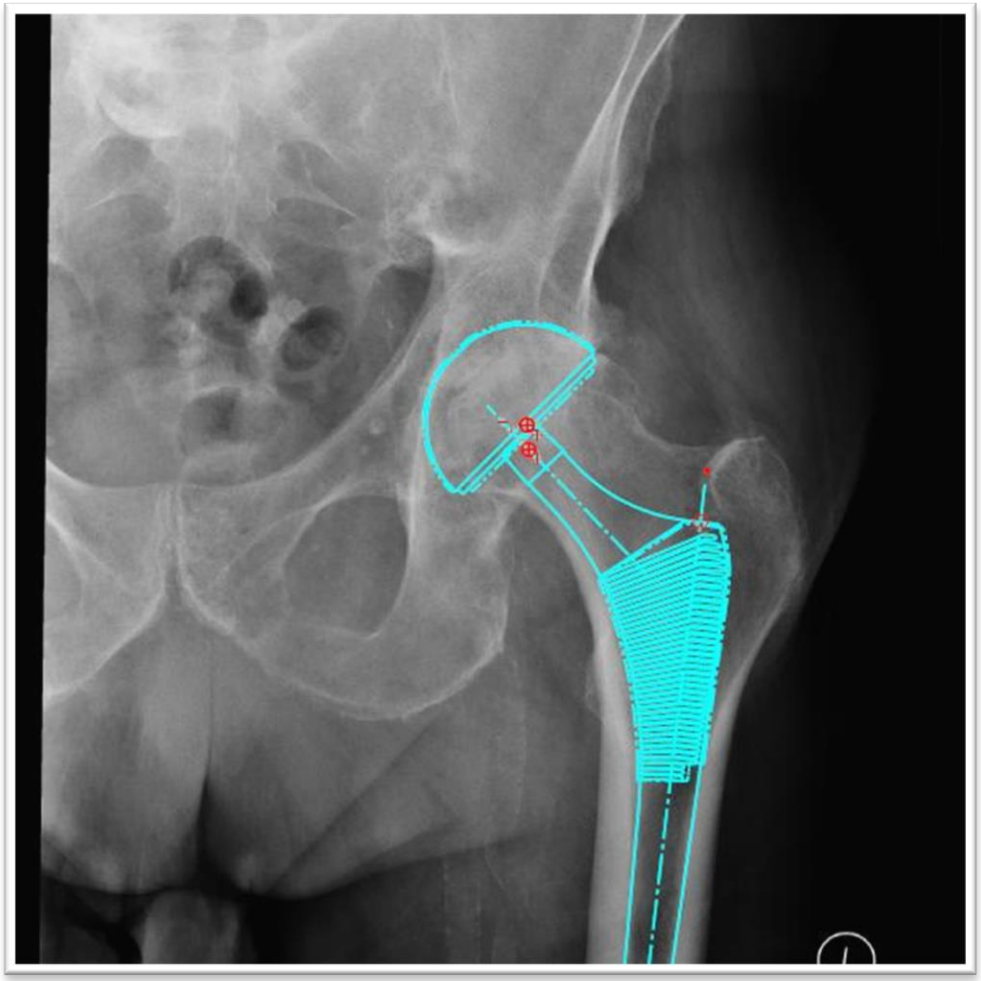
The is no compelling evidence in the literature for any particular approach , but consensus of expert opinion favors either posterior or modified anteriolateral approach(watson - jones)

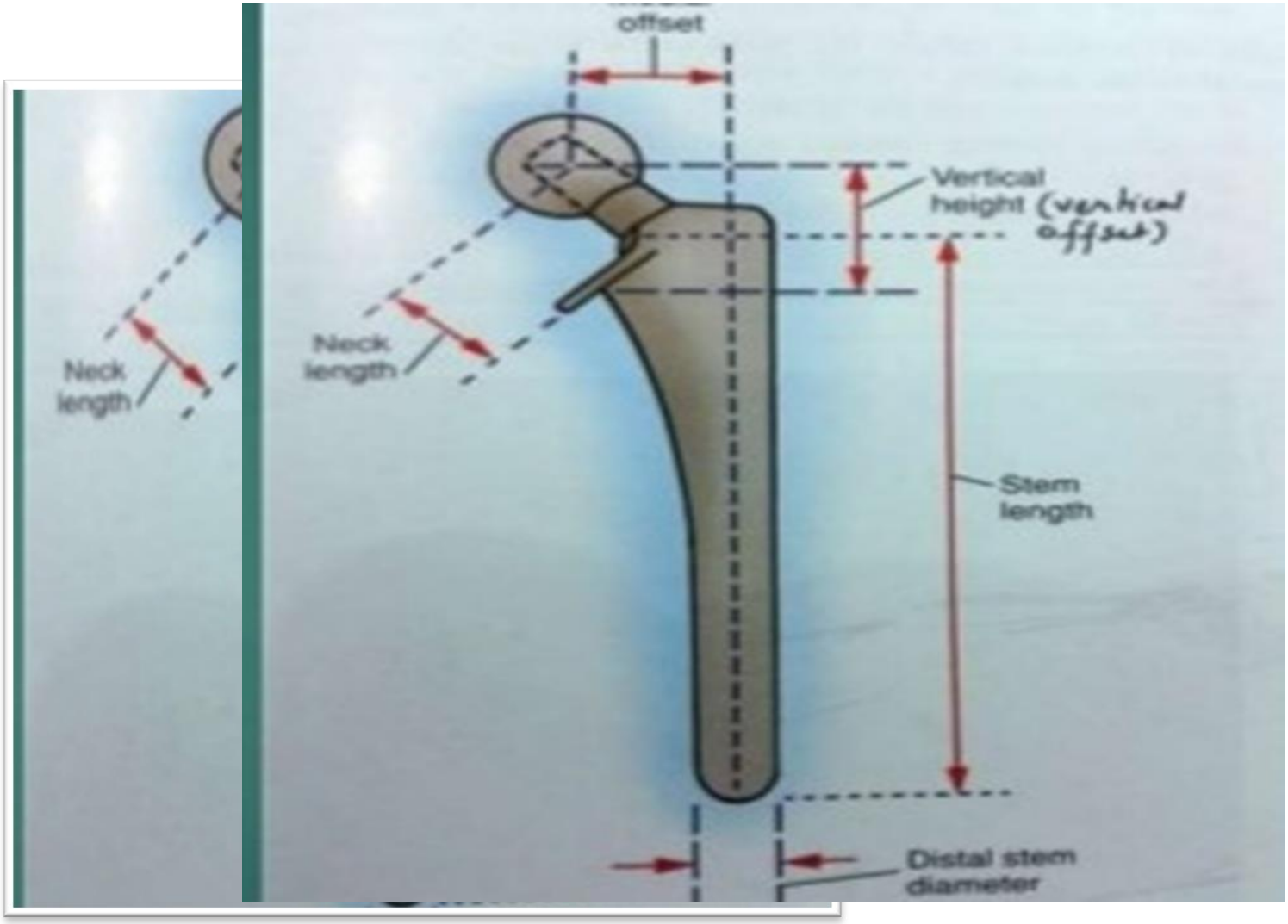
TEMPLATING

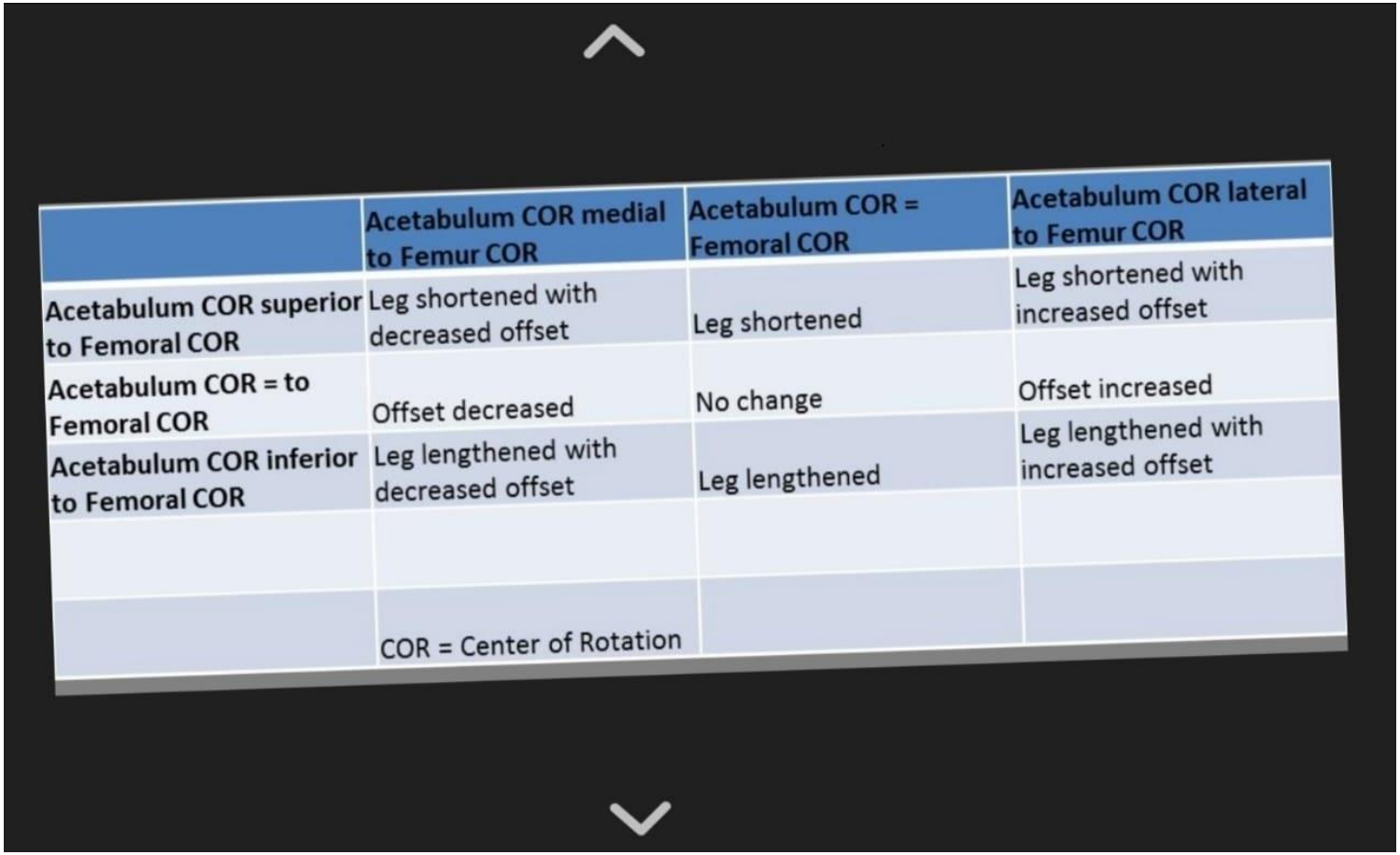
- It is process of anticipating of prosthesis size , position and design pre- op
- Proper ap xray

1. Determine the limb shortening and LLD
2. Outline of acetabulum and center of rotation
3. Femoral overlay and measure precise proximal femur canal and center of rotation of head
4. Appropriate femoral neck length selection to restore limb length and femoral offset
5. If there is LLD the distance between both COR must equal the LLD



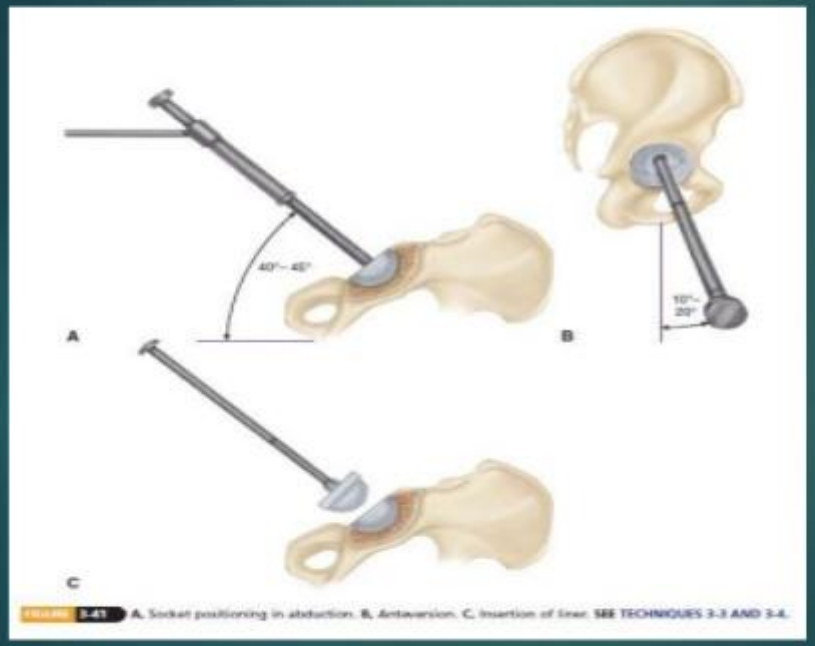



offset
Vertical height (vertical offset)
Neck length
Stem length
Distal stem diameter
Neck length



	Acetabulum COR medial to Femur COR	Acetabulum COR = Femoral COR	Acetabulum COR lateral to Femur COR
Acetabulum COR superior to Femoral COR	Leg shortened with decreased offset	Leg shortened	Leg shortened with increased offset
Acetabulum COR = to Femoral COR	Offset decreased	No change	Offset increased
Acetabulum COR inferior to Femoral COR	Leg lengthened with decreased offset	Leg lengthened	Leg lengthened with increased offset
	COR = Center of Rotation		

SOCKET POSITIONING



A, Socket positioning in abduction. B, Antaversion. C, Insertion of liner. SEE TECHNIQUES 3-3 AND 3-4.

Neck is cut planned at appropriate level and angle by using trial components of templeted size

Reaming of femoral canal

Hand or power reamer must be lateralized into GT to maintain neutral alignment of femoral canal

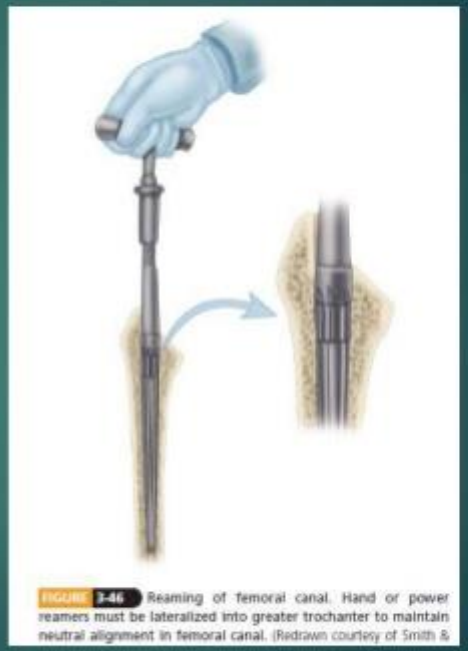


FIGURE 3-46 Reaming of femoral canal. Hand or power reamers must be lateralized into greater trochanter to maintain neutral alignment in femoral canal. (Redrawn courtesy of Smith &

Hip should be stable

- Full extension with external rotation 40 degree
- Flexion 90 degree and internal rotation 40 degree
- Flexion 40 degree with adduction and axial loading

STABILITY FACTOR

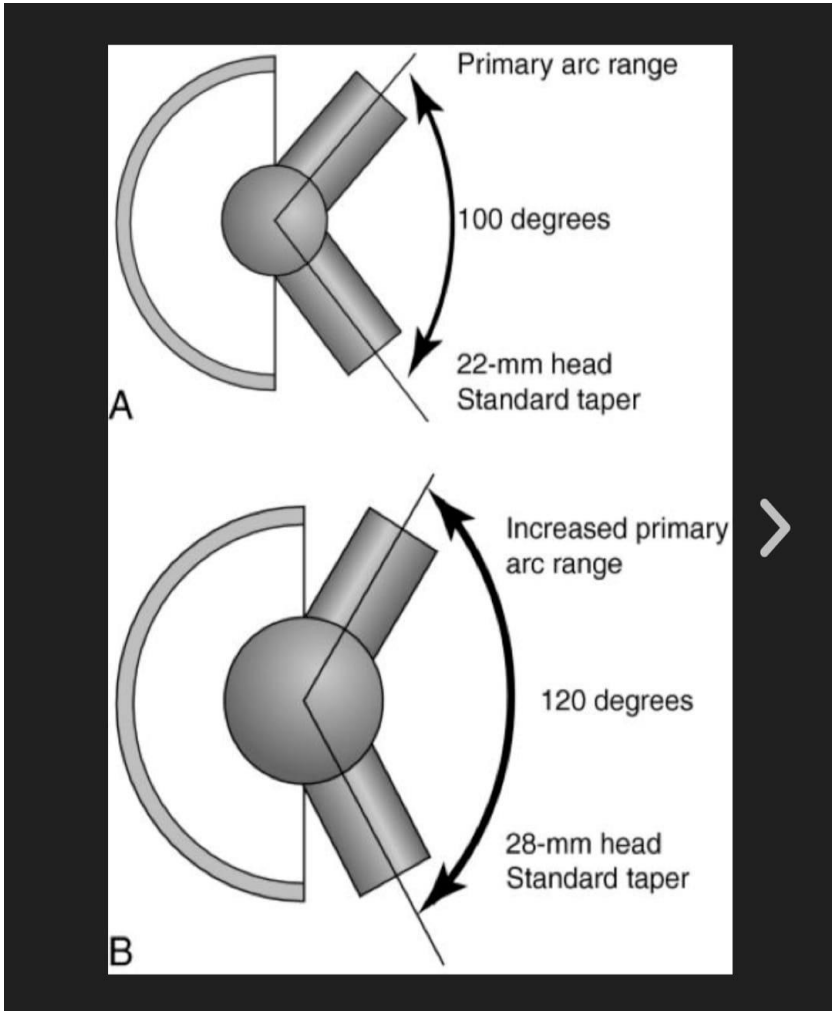
1. Component design
2. Component position
3. Soft tissue tensioning
4. Soft tissue fuction

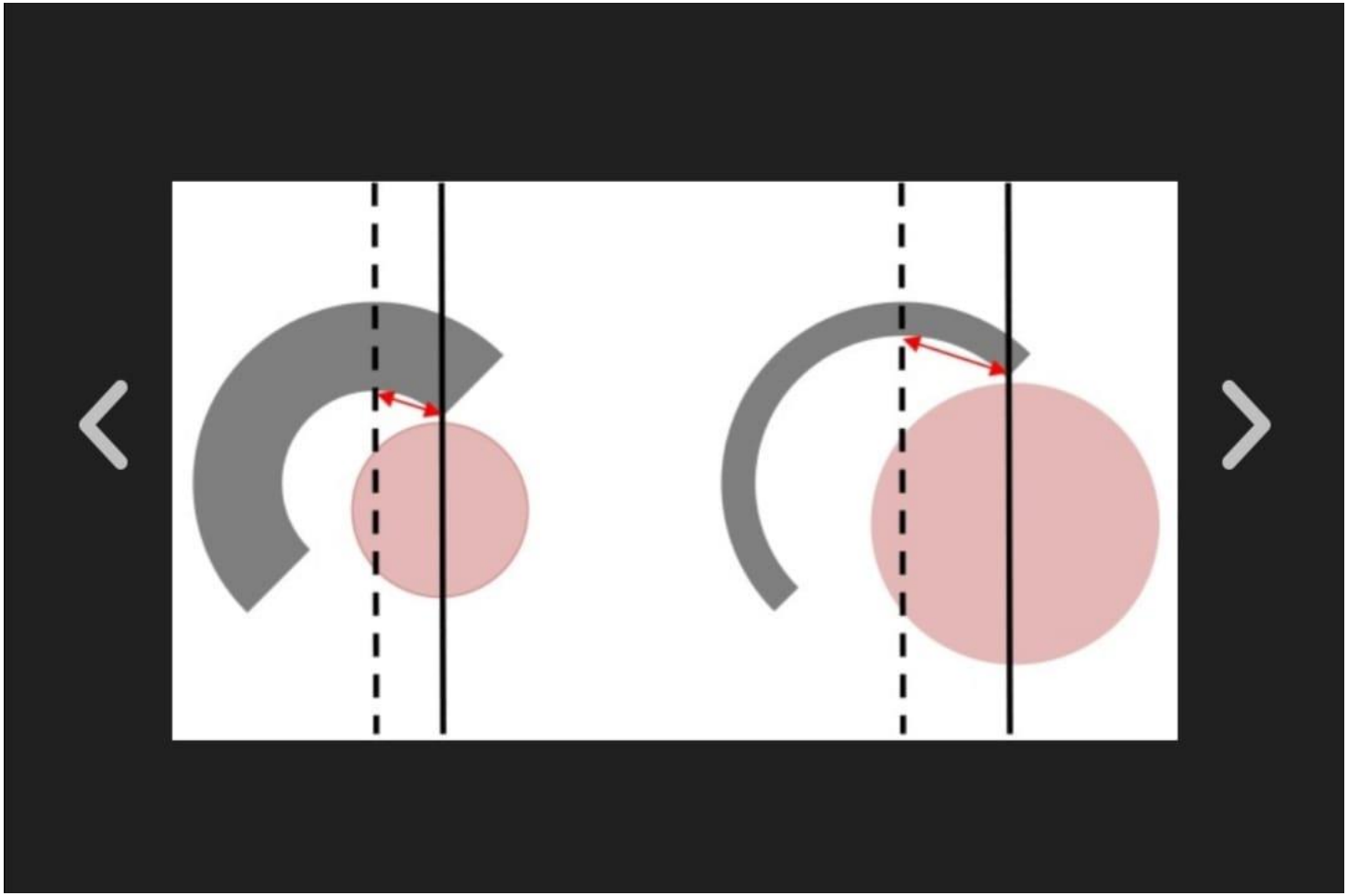
Component design

- Increase head neck ratio of femur

That increase arc of movement and jump distance
Avoid skirt
Increase offset

- Increase acetabular liner rim

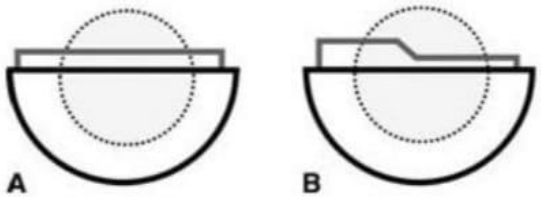

Primary arc range
100 degrees
22-mm head
Standard taper
A
Increased primary
arc range
120 degrees
28-mm head
Standard taper
B



Liner Profile

A, Standard.

B, Elevated rim.



Component position

- Acetabular position

Anteversion 5-25 degree

(excessive anteversion cause ant dislocation and retroversion cause posterior dislocation)

Abdduction 30 – 50 degree

Exessive abbduction (vertical cup) cause posteriosuperior dislocation

Decrease abdduction (horizontal cup) cause inferior dislocation

Medialization of acetabulum cup increase lever arm of abbductor … decrease reaction joint force

- Femoral position

Anteversion 10 – 15 degree

Soft tissue tension

By increase of offset :

Increase soft tissue tension

Decrease impingment

Decrease reaction force of the joint

Soft tissue fuction

- Central nervous system (strock , dementia , ms..)
- Peripheral nervous system(radiculopathy, neuropathy…)
- Local soft tissue integrity (trauma, tumor, infection .. .)

Complication

- Osteolysis
- Infection
- Instability
- Impingment
- Sciatic nerve injury
- DVT, PE
- LLD
- fracture

- Thank you