

# JOINTS OF THE LOWER LIMB

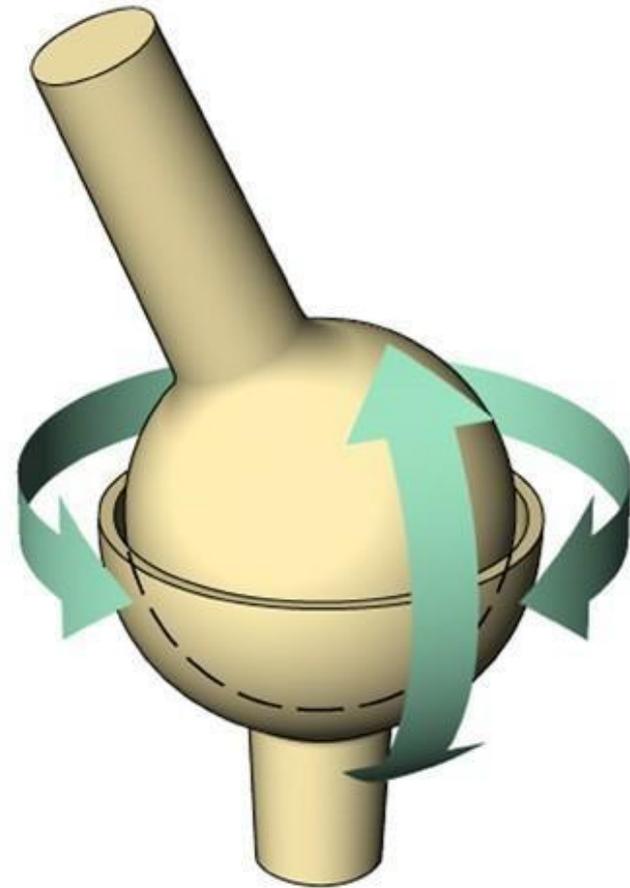
## HIP JOINT

BY DR. AMJAD SHATARAT



-1Type:

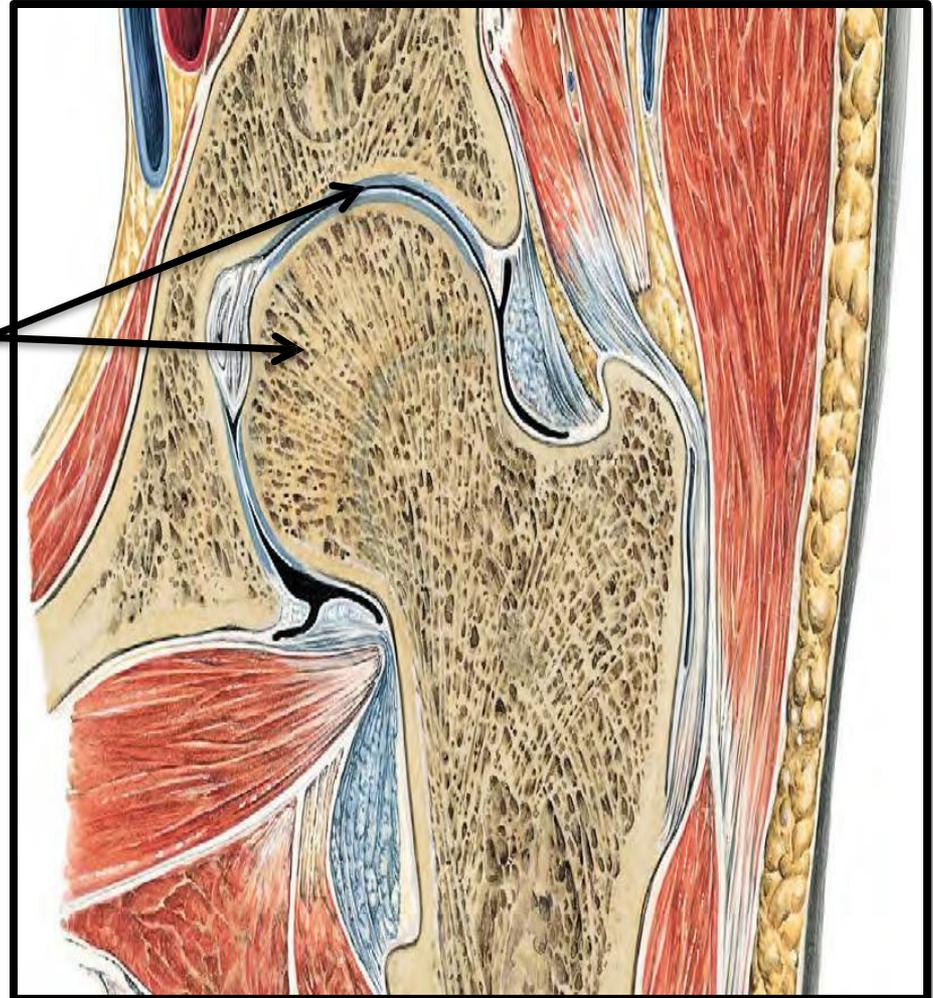
**Synovial multi-  
axial  
ball-and-socket  
joint.**



## 2-Articular surfaces:

- a. head of femur
- b. lunate surface of acetabulum

Which is deepened by the fibrocartilaginous *labrum acetabulare*



**-3Nerve**

**Supply:** Femoral  
nerve Obturator  
nerve Sciatic nerve

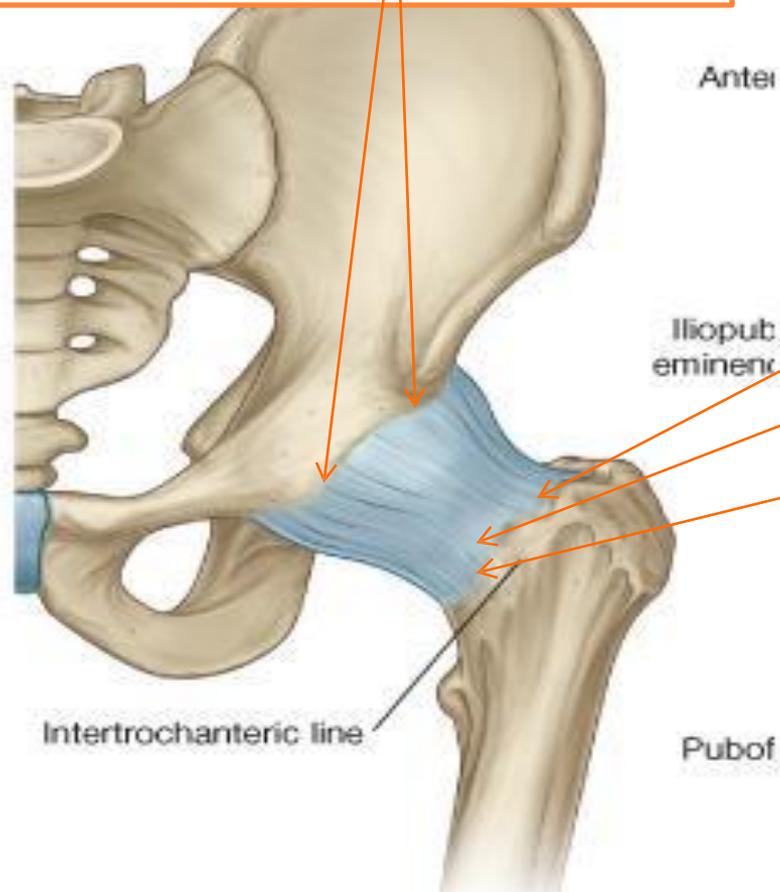
Remember referred pain



-4 The capsule of the hip is attached

proximally to the margins of the acetabulum

Capsule



Distally, it is attached along the trochanteric line, the bases of the greater and lesser trochanters

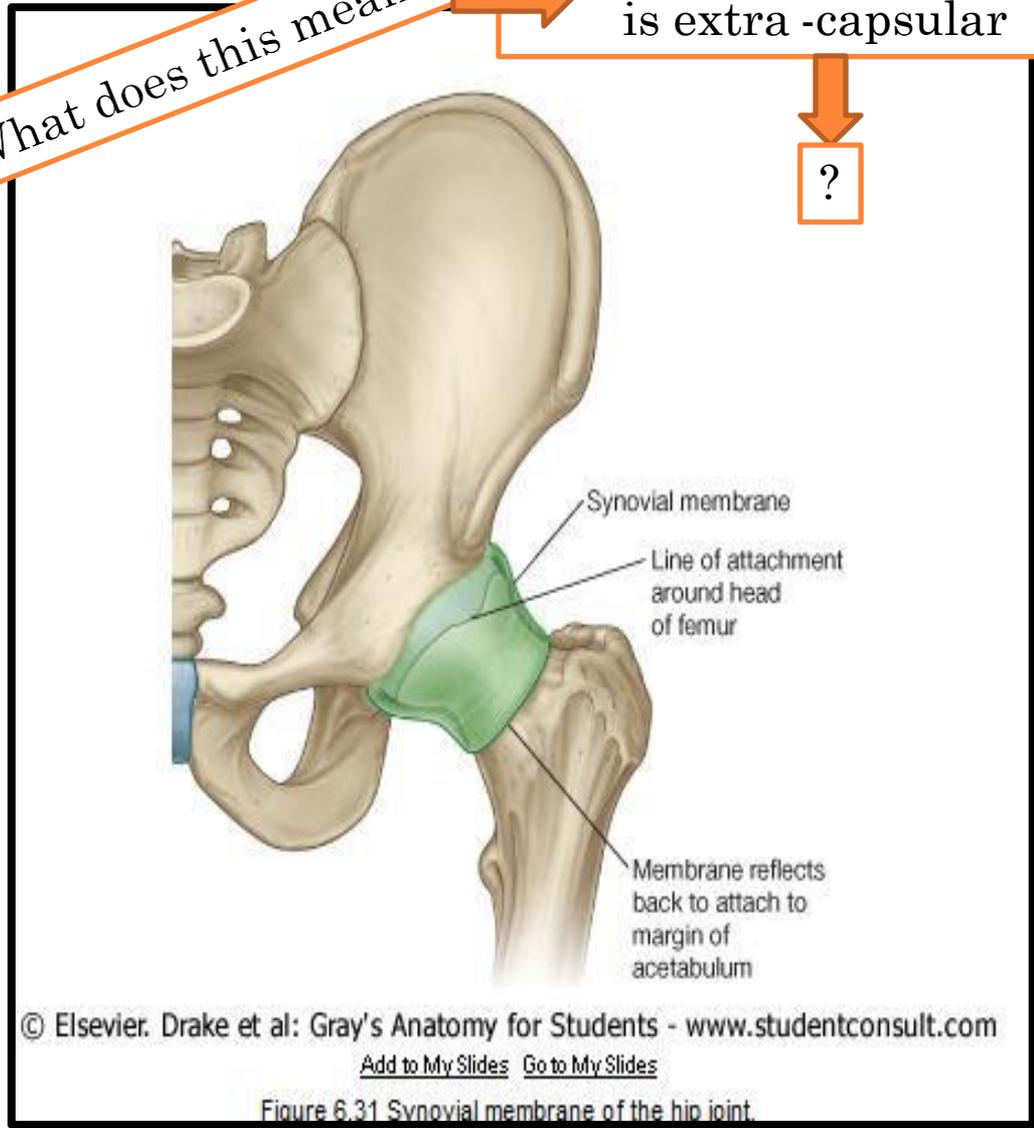
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posteriorly,  
to the femoral  
neck about 0.5in  
12)mm) from the  
trochanteric crest.  
From this distal  
attachment,  
capsular fibres are  
reflected on to the  
femoral  
neck as *retinacula*  
and provide one  
pathway for the  
blood supply to  
the  
femoral head

What does this mean?

Part of the neck posteriorly  
is extra -capsular

?

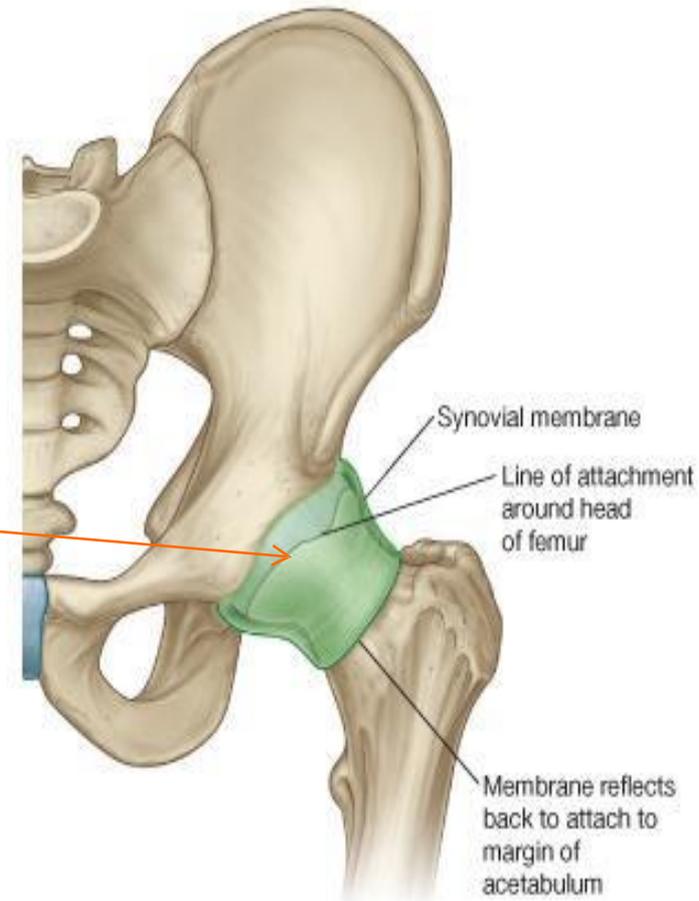


## -5The synovial membrane of the hip joint

**lines the fibrous layer as well as any intracapsular bony surfaces not lined with articular cartilage**

Thus, where the fibrous layer attaches to the femur, the synovial membrane reflects proximally along the femoral neck to the edge of

of the femoral head. The **synovial folds (retinacula)**, which reflect superiorly along the femoral neck as longitudinal bands, contain subsynovial retinacular arteries (branches of the medial and a few from the lateral femoral circumflex artery), which supply the head and neck of the femur



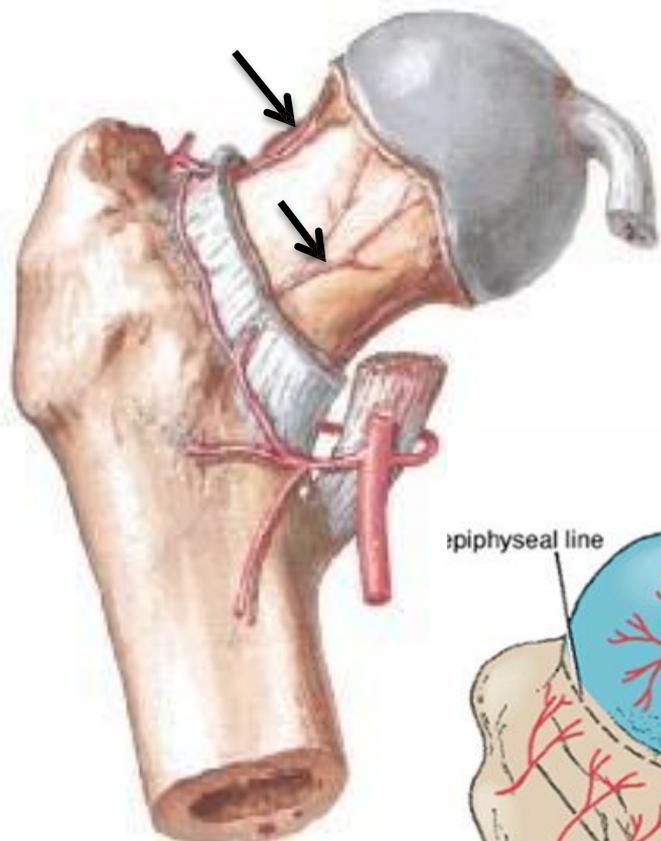
© Elsevier. Drake et al: Gray's Anatomy for Students - [www.studentconsult.com](http://www.studentconsult.com)

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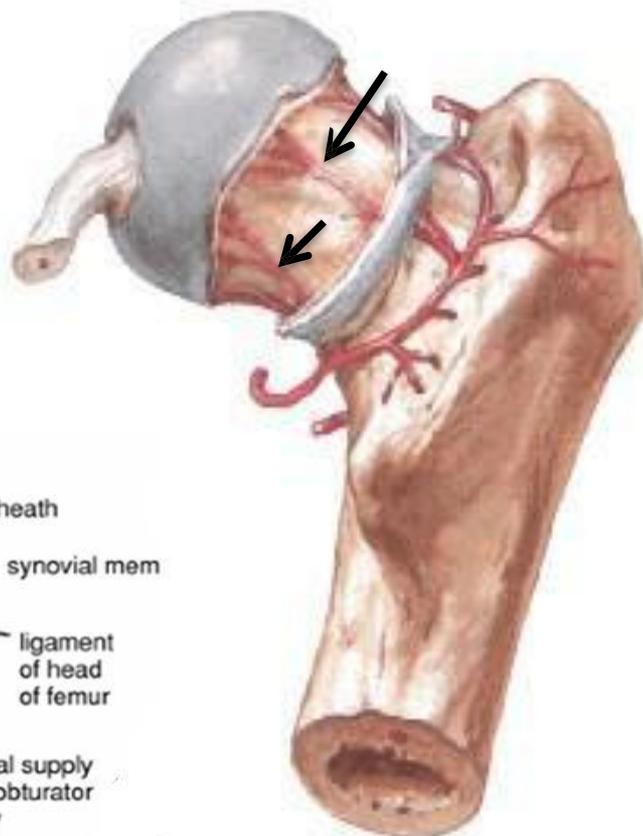
Figure 6.31 Synovial membrane of the hip joint.

important

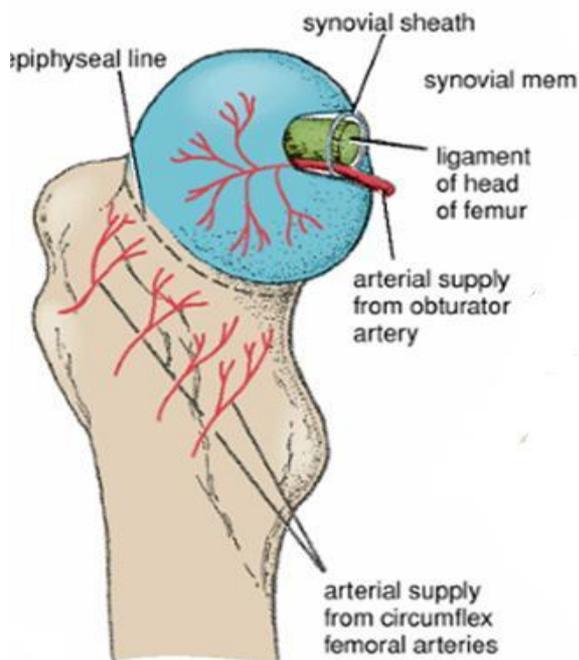
**6-Subsynovial retinacular arteries**  
(branches of the medial and a few from the lateral femoral circumflex artery), which supply the head and neck of the femur



Anterior view



Posterior view

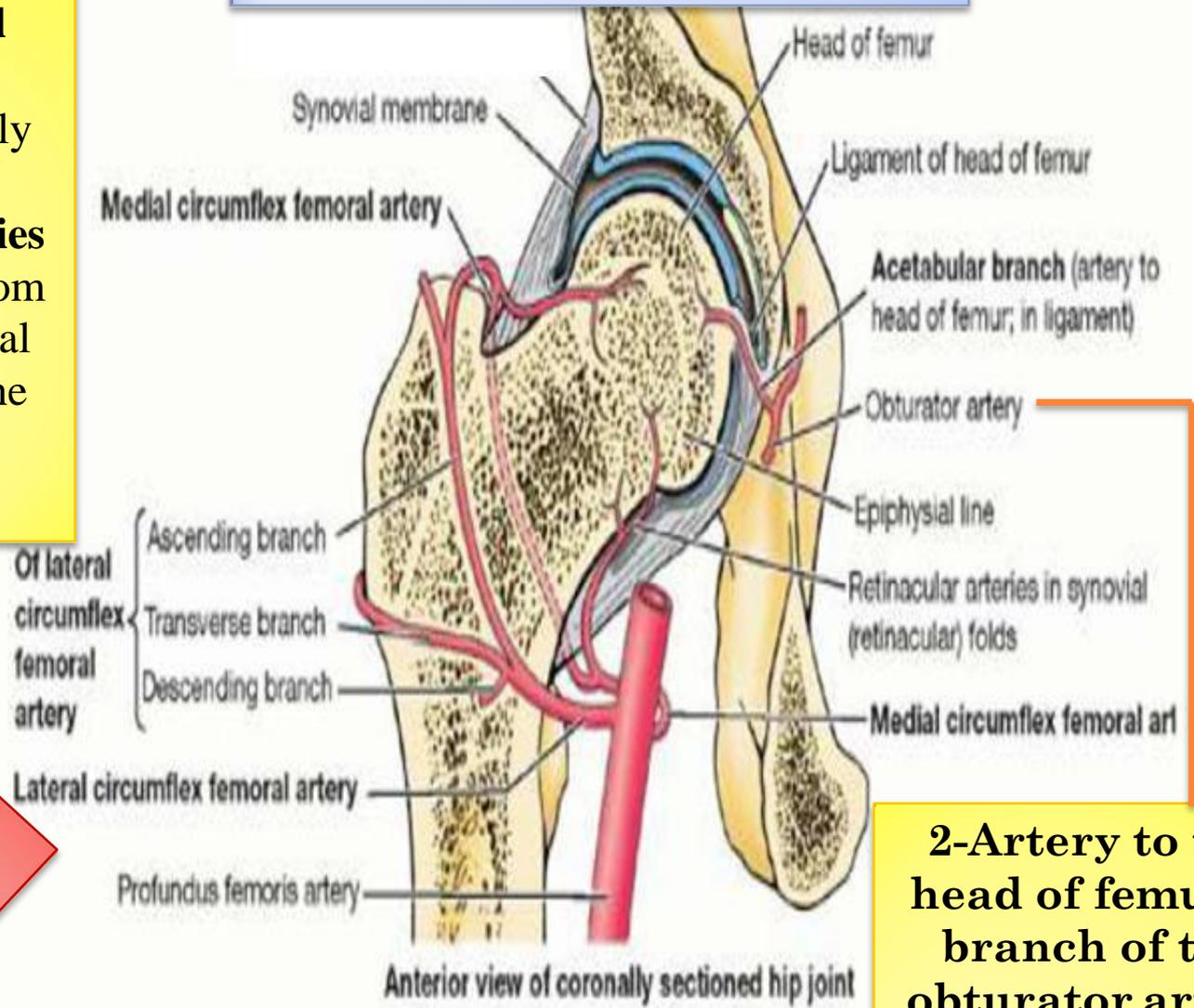




# 1-Medial and lateral circumflex femoral arteries

The main blood supply is from the **retinacular arteries** arising as branches from the circumflex femoral arteries (especially the *medial circumflex femoral artery*).

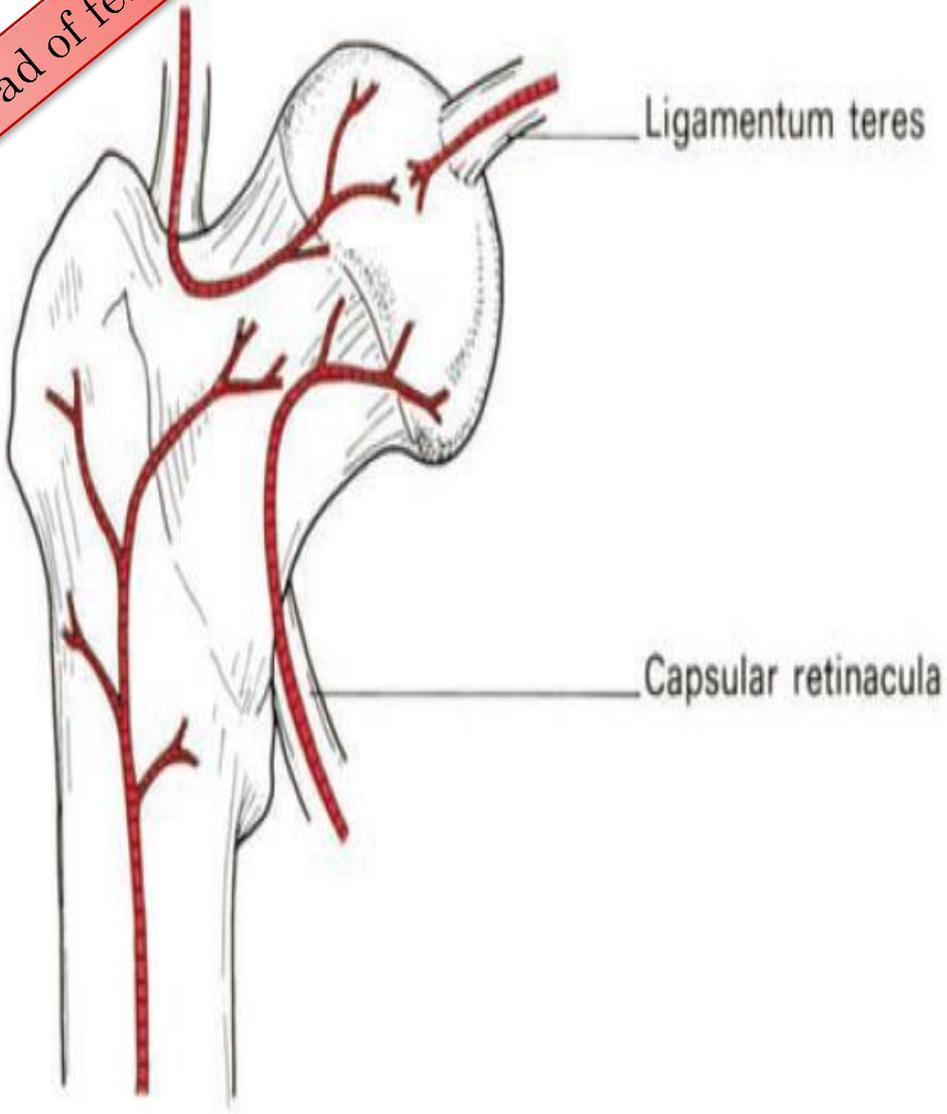
## Blood supply of the head of the femur

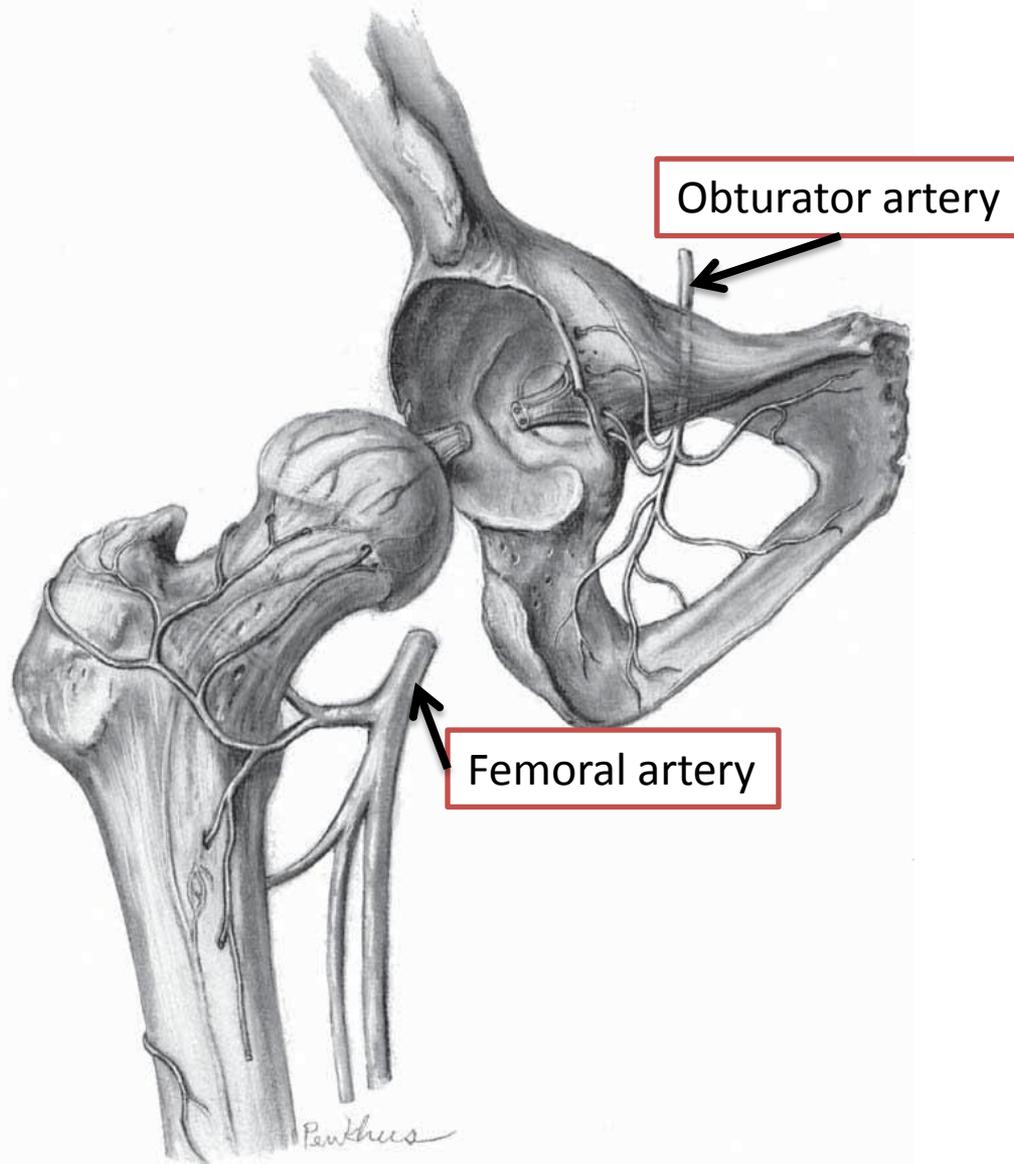


**2-Artery to the head of femur, a branch of the obturator artery that traverses the ligament of the head.**

Blood supply of the head of the femur

Practice the blood supply of the head of femur





Obturator artery

Femoral artery

The upper end of the femur is a common site  
for fracture

in the elderly

The neck may break  
1-immediately beneath the head

**subcapital**

2-near its midpoint

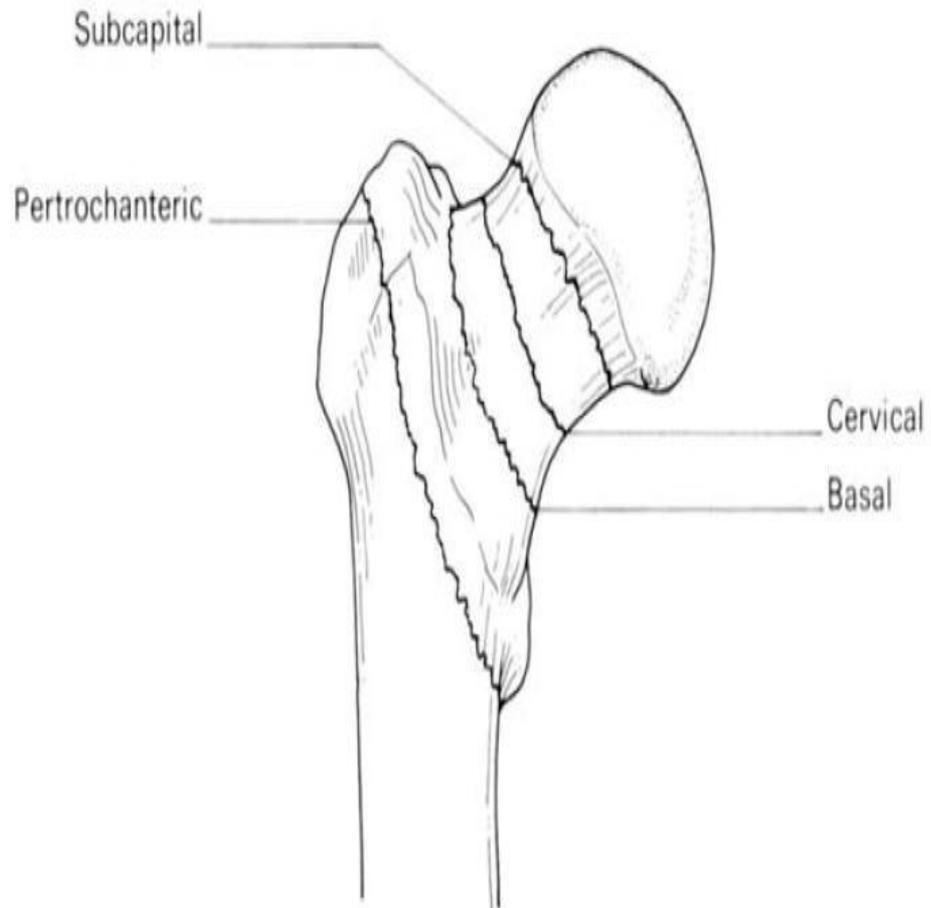
**cervical**

3-adjacent to the trochanters

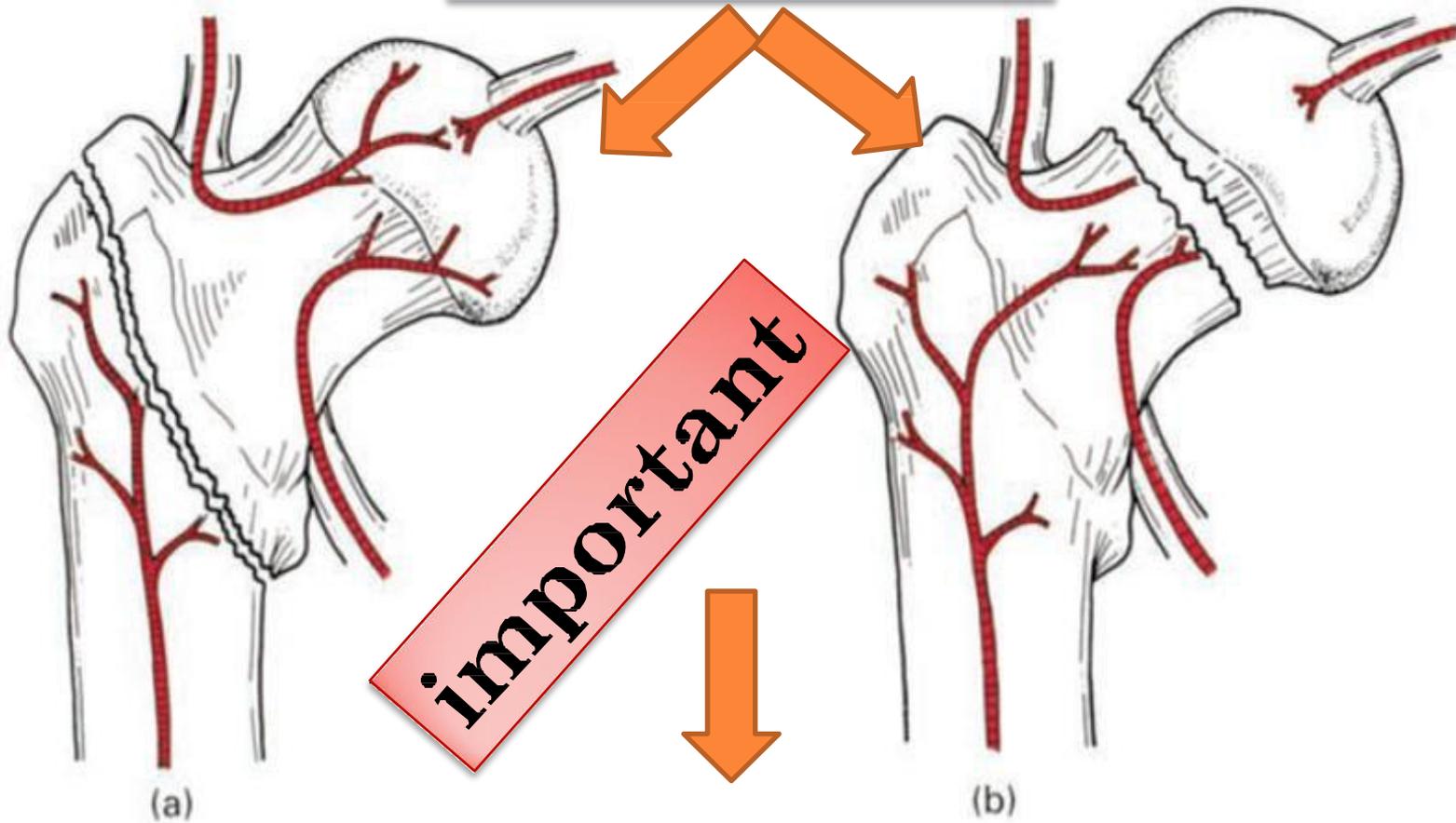
**basal**

4-the fracture line  
may pass between, along or just below  
the trochanters

**pretrochanteric**



Neck fracture will result in



(a) A pertrochanteric fracture does not damage the retinacular blood supply—aseptic bone necrosis does not occur. (b) A subcapital fracture cuts off most of the retinacular supply to the head—aseptic bone necrosis is common. Note that the blood supply via the ligamentum teres is negligible in adult life.

# 1-The Trochanteric Anastomosis

## The trochanteric anastomosis :

Creates an extracapsular 'arterial ring of the femoral neck' (Crock 1996). Branches from this ring, the retinacular vessels, pierce the capsule and ascend along the femoral neck to

give the main blood supply to **THE HEAD OF THE FEMUR**

**The nutrient arteries pass along the femoral neck beneath the capsule**

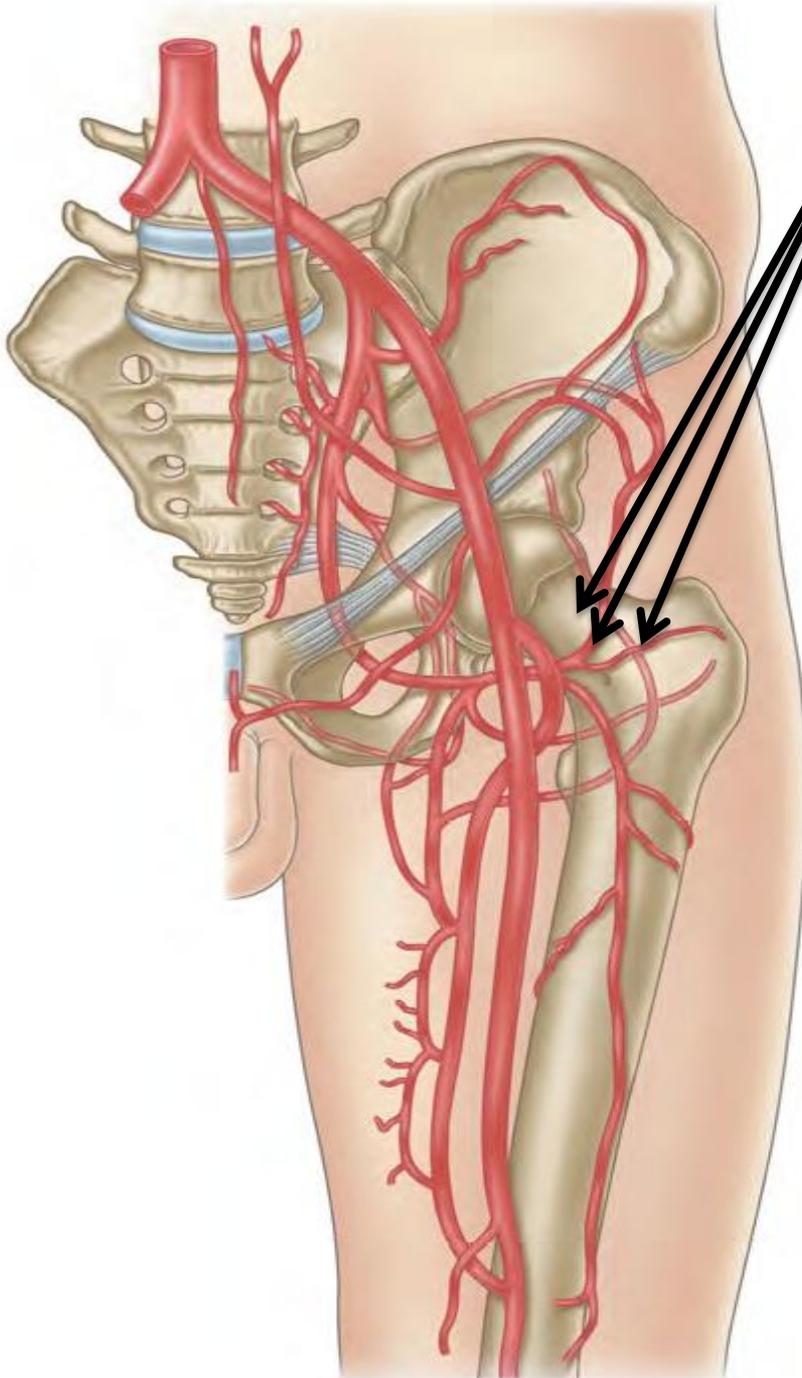
The following arteries take part in the anastomosis:

A) The superior gluteal artery, the inferior gluteal artery and the obturator artery

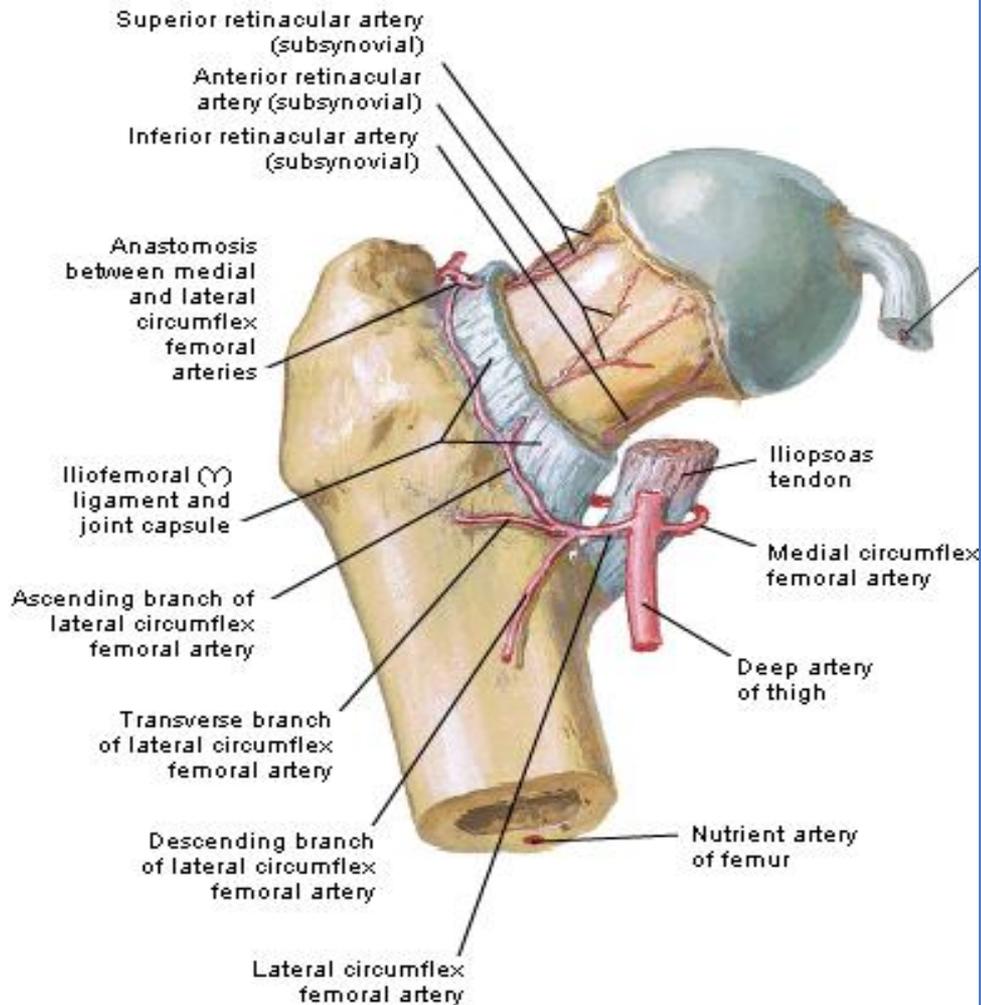
(from the internal iliac artery)

B) The medial femoral circumflex artery, and the lateral femoral circumflex artery

(from the femoral artery)

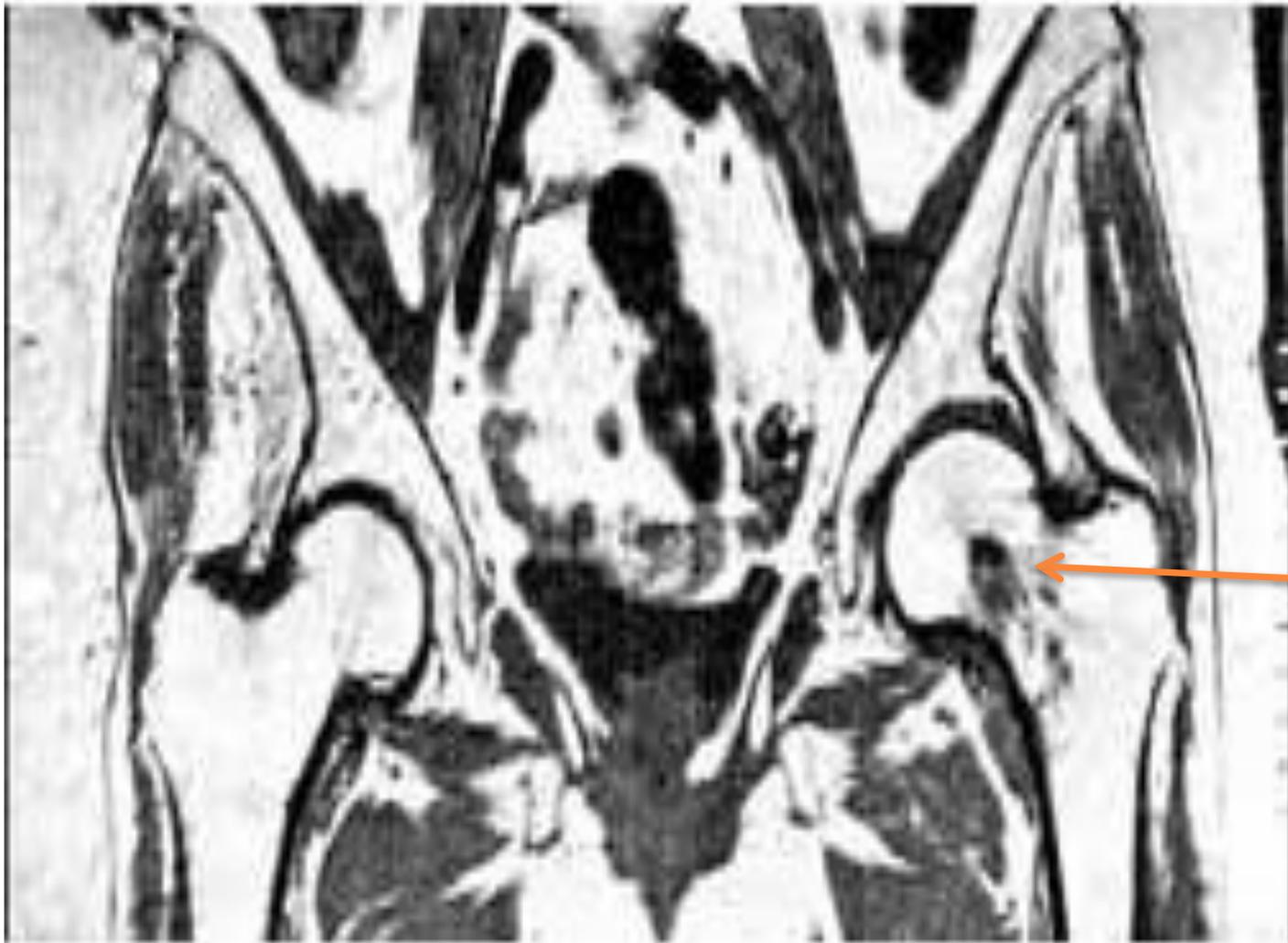


## 2-The Cruciate Anastomosis



### The Cruciate Anastomosis

The cruciate anastomosis is situated at the level of the lesser trochanter of the femur and, together with the trochanteric anastomosis, provides a connection between the internal iliac and the femoral arteries



For reading only

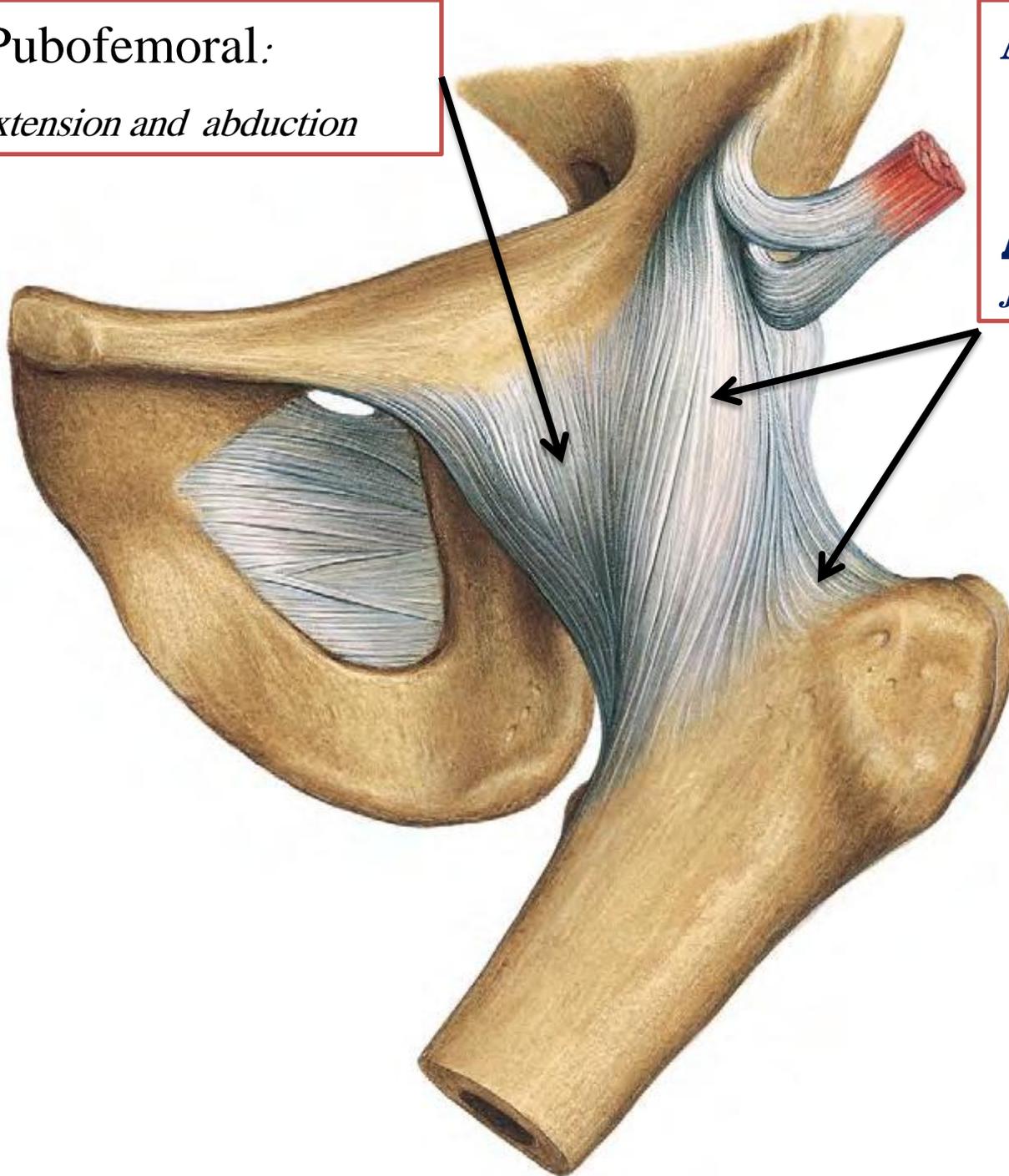
MRI  
revealing  
Left  
Femoral  
neck  
Fracture



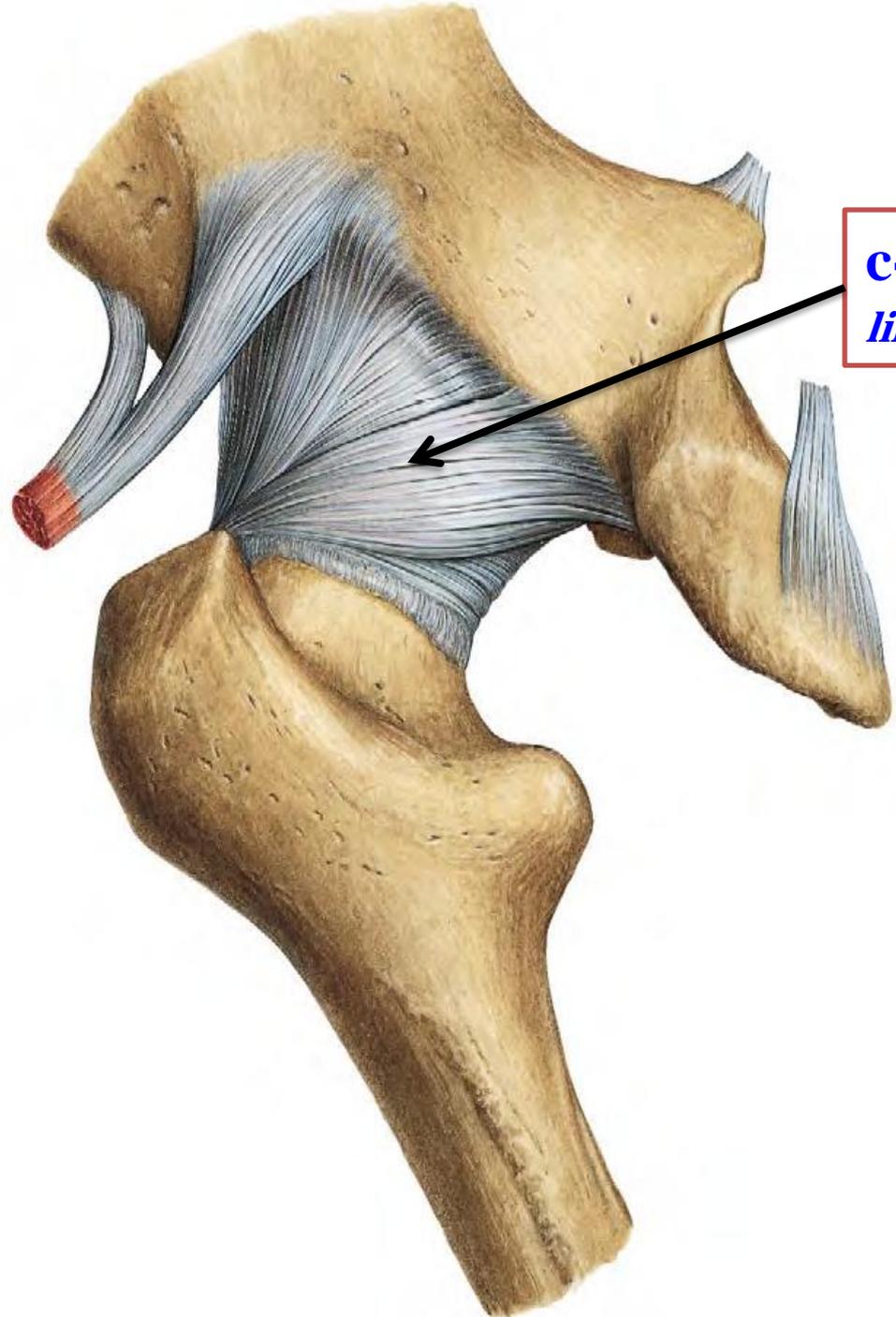
**-7MAIN LIGAMENTS OF THE HIP JOINT**

**b-Pubofemoral:**

*Limits extension and abduction*



**A-Iliofemoral:** *is a strong, inverted Y-shaped ligament Prevents hyperextension of hip joint during standing*



**c-Ischiofemoral:**  
*limits extension*

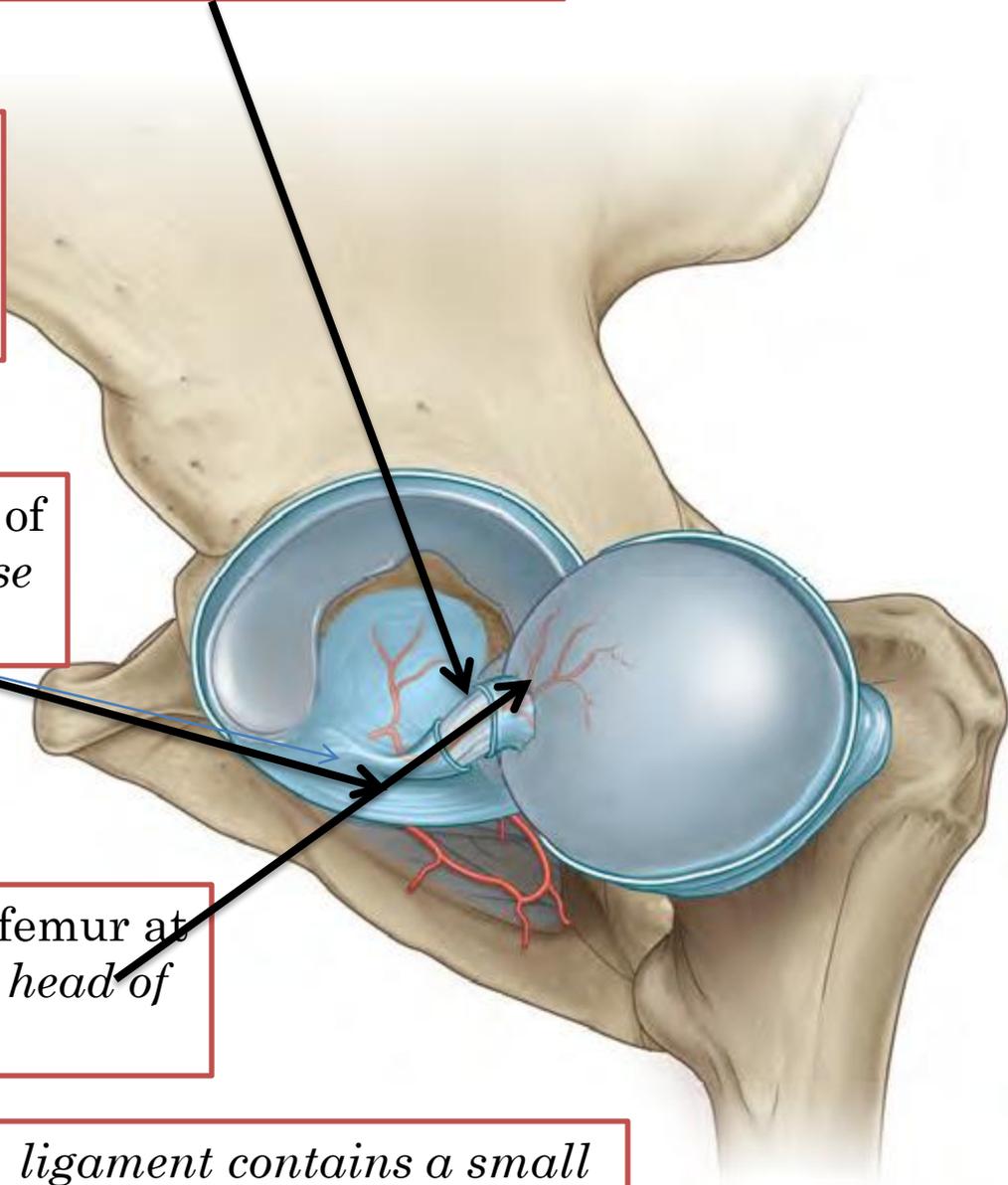
## D-The ligament of head of femur *ligamentum teres*

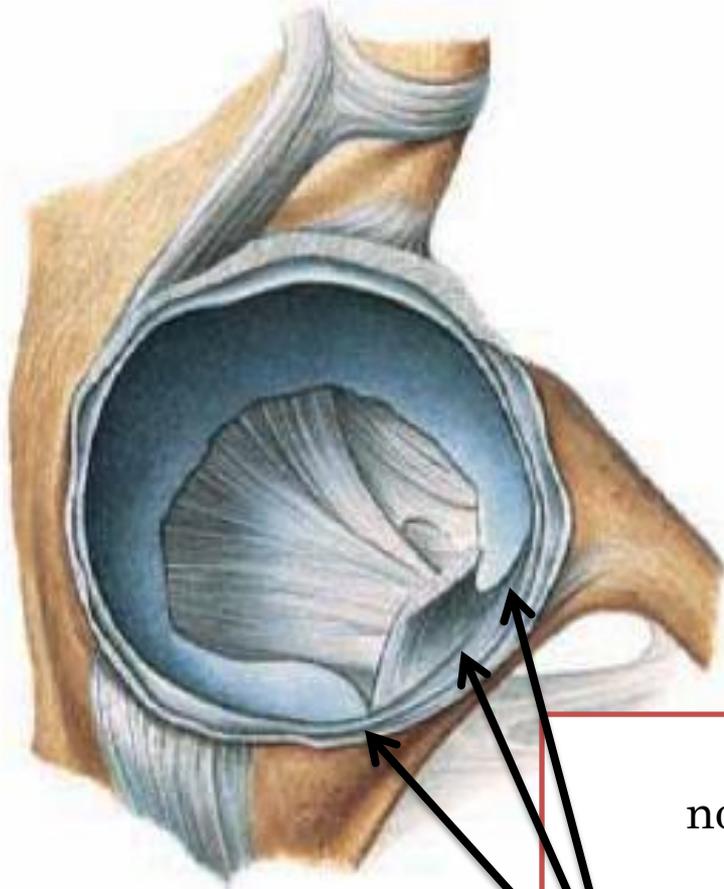
- primarily a synovial fold conducting a blood vessel
- is weak and of little importance in strengthening the hip joint

➤ Its wide end attaches to the margins of the acetabular notch and the *transverse acetabular ligament*;

➤ *its narrow end* attaches to the femur at the *fovea for the ligament of the head of femur*.

➤ Usually, the ligament contains a small artery to the head of the femur





The  
non-articular lower part of the  
acetabulum,  
the *acetabular notch*, is closed off  
below by the  
***E-transverse acetabular ligament***



8-Movements

➤ Flexion is performed by *the iliopsoas, rectus femoris, and sartorius*

➤ Extension is performed by *the gluteus maximus and the hamstring muscles.*

➤ Abduction is performed by *the gluteus medius and minimus*, assisted by the sartorius, tensor fasciae latae, and piriformis.

➤ Adduction is performed by *the adductor longus and brevis and the adductor fibers of the adductor magnus*. These muscles are assisted by the pectineus and the gracilis.

➤ Lateral rotation is performed by the short lateral rotator muscles and assisted by the gluteus maximus.

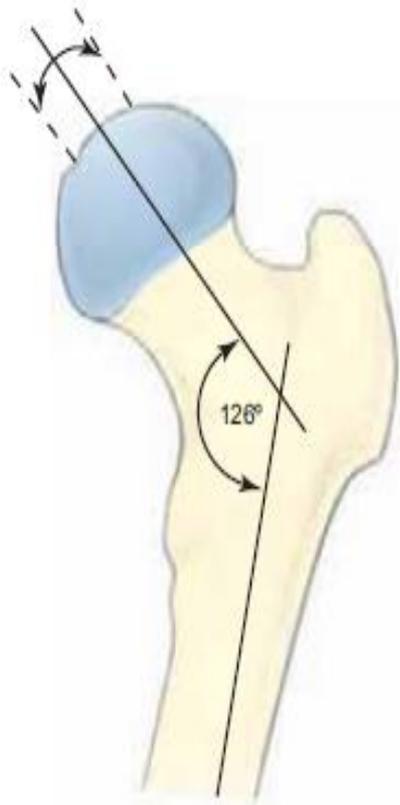
➤ Medial rotation is performed by *the anterior fibers of the gluteus medius and gluteus minimus* and the tensor fasciae latae.

Flexion is limited by the hamstring muscle group. Extension is limited by the ligamentous thickening of the capsule; abduction, by the adductor group of muscles; adduction, by the tensor muscle and fascia of the abductor muscles; and rotation, by the fibrous capsular



## 9- ANGLE OF INCLINATION

it is the angle between the neck and shaft of the femur



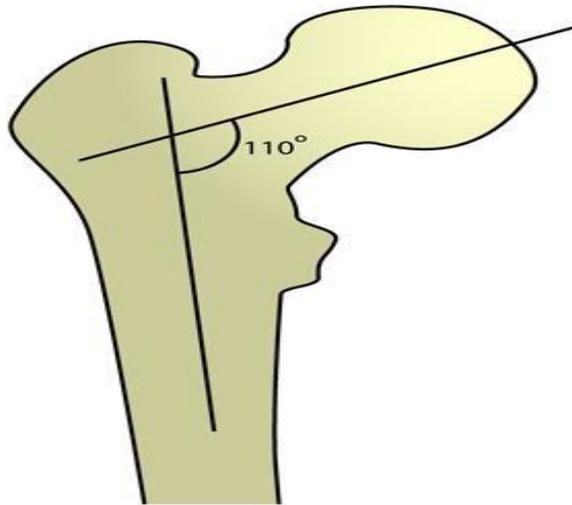
Approx.  $125^{\circ}$

typically ranges from 115 to 140 degrees

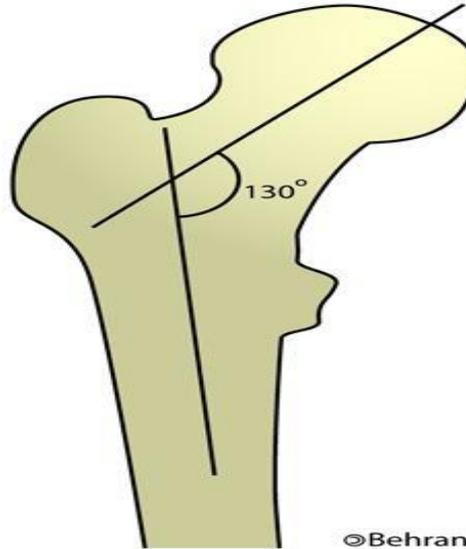
is about  $160^{\circ}$  in the young child and  
about  $125^{\circ}$  in the adult



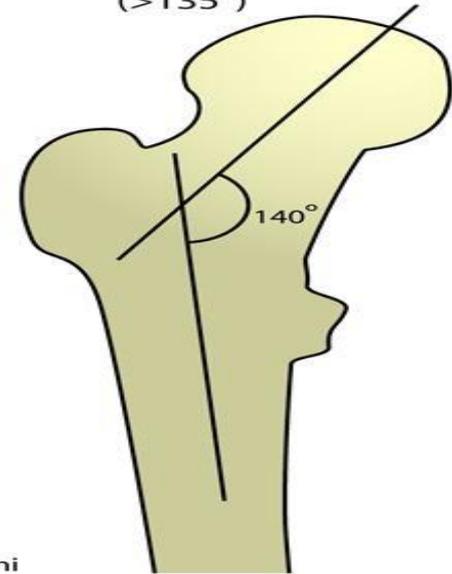
Coxa vara  
( $<120^\circ$ )



Normal  
( $120^\circ-135^\circ$ )



Coxa valga  
( $>135^\circ$ )



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Varus



Normal



Valgus

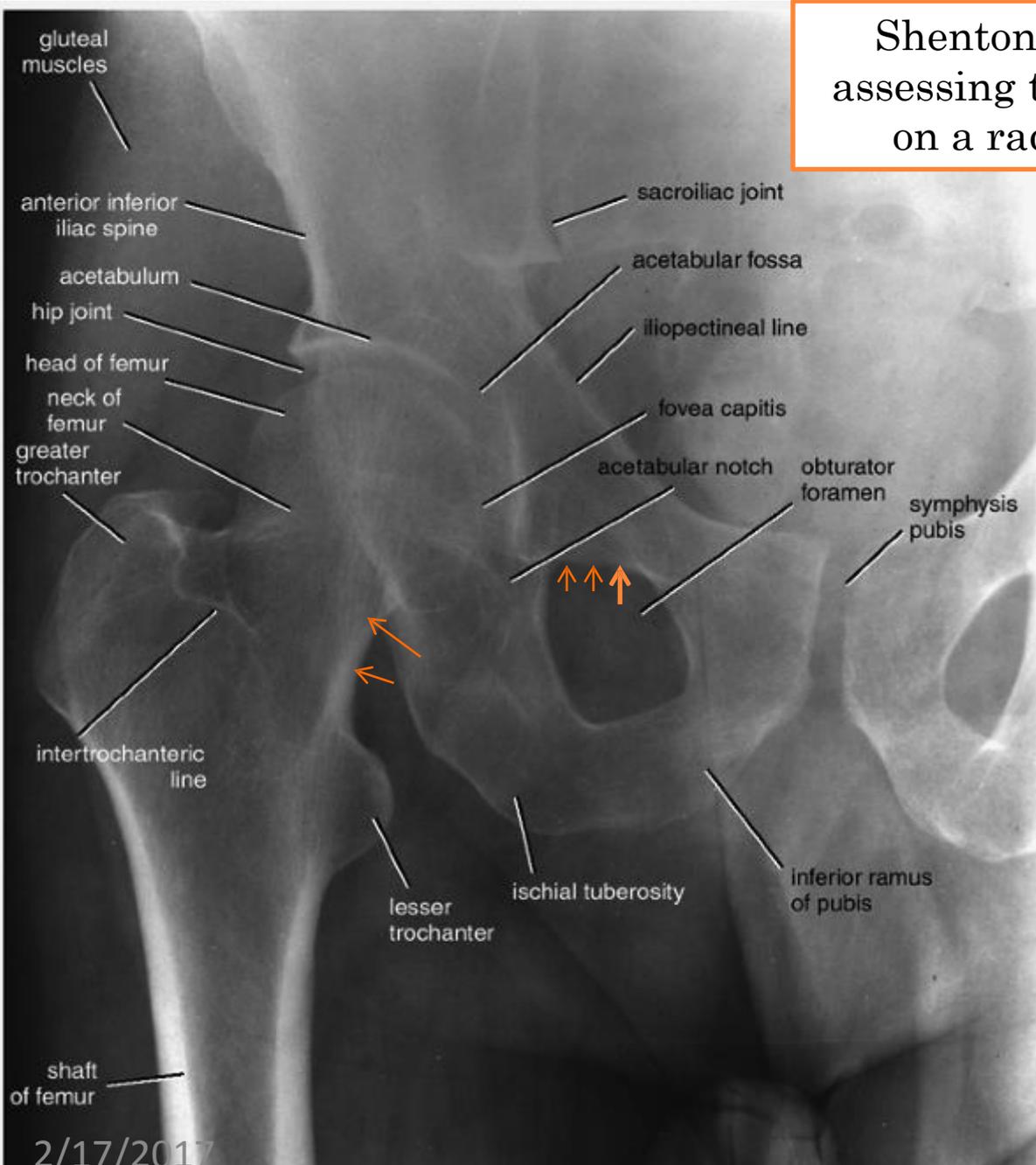
it occurs in fractures of the neck of the femur and in slipping of the femoral epiphysis. In this condition, abduction of the hip joint is limited

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for example, in cases of congenital dislocation of the hip. In this condition, adduction of the hip joint is limited

Shenton's line is a useful means of assessing the angle of the femoral neck on a radiograph of the hip region

Note that the inferior margin of the neck of the femur should form a continuous curve with the upper margin of the obturator foramen )Shenton's line(



10-There is a pattern of hip injuries;

**In children may sustain greenstick fractures of the femoral neck**

**schoolboys may displace the epiphysis of the femoral head**

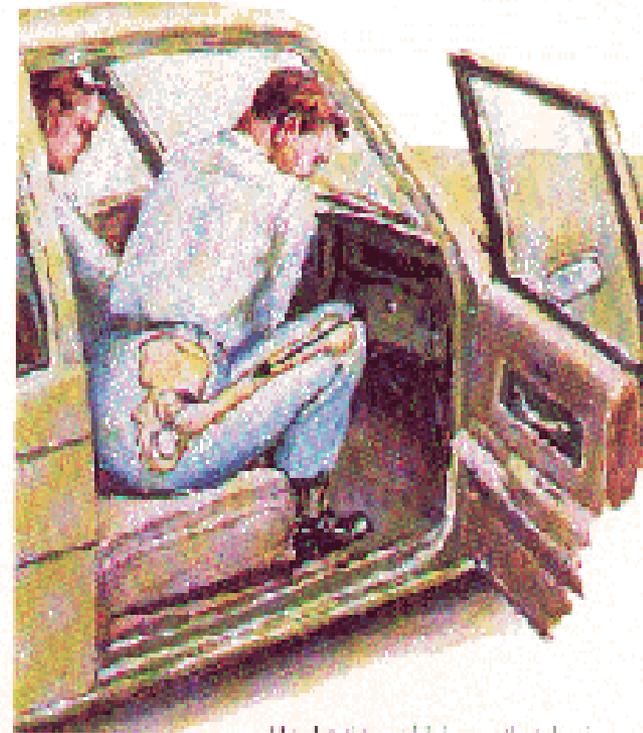
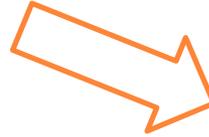
**in adult life the hip dislocates**

**in old age  
fracture of the neck of the femur  
again becomes the usual lesion**



## **Dislocation of the hip**

The hip is usually dislocated backwards and this is produced by a force applied along the femoral shaft with the hip in the flexed position (e.g. the knee striking against the opposite seat or in car accident



The sciatic nerve, is in a close posterior relation with the hip joint therefore, it is in a danger of damage in these injuries



# Ankle Joint

## Type

The ankle is a synovial hinge joint.

## Articulation

the lower end of the tibia, the two malleoli, and the body of the talus

## Ligaments

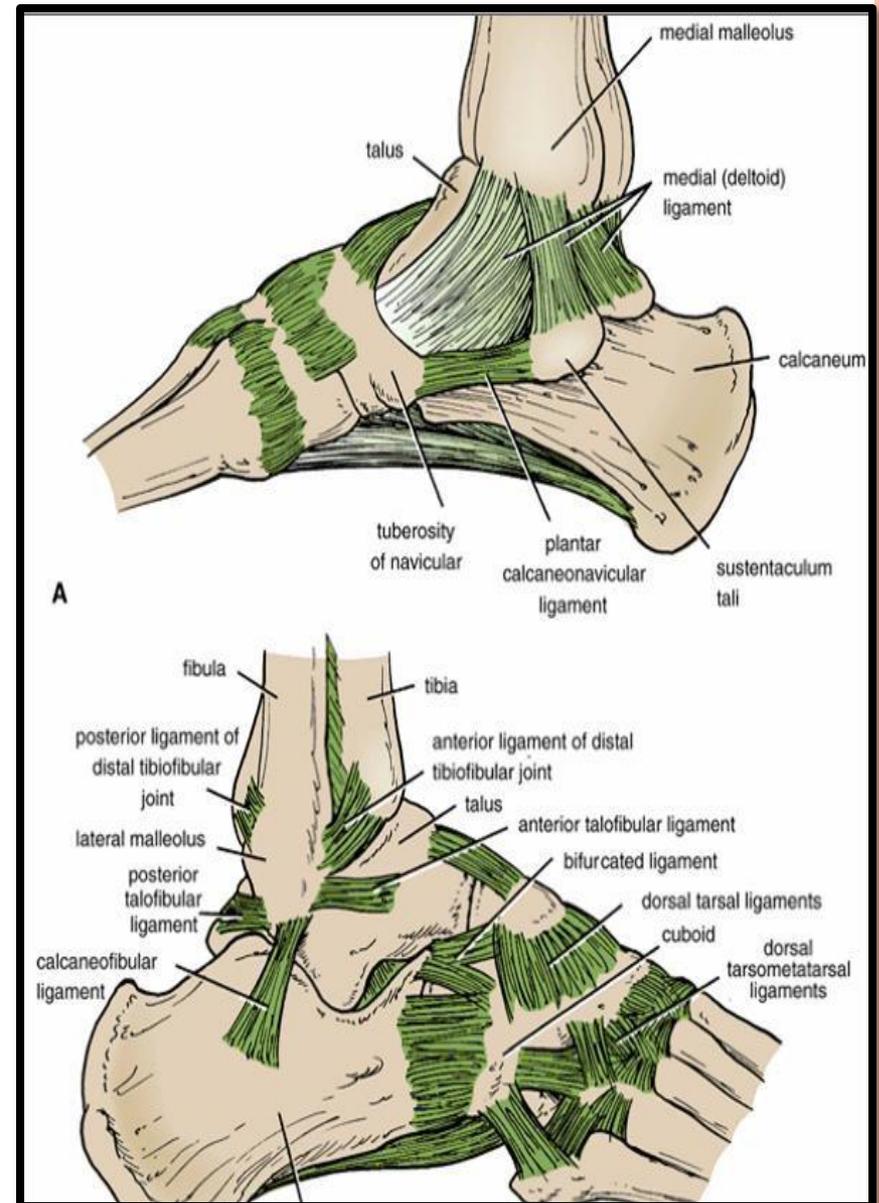
The medial, or deltoid, ligament

The lateral ligament

## Movements

**Dorsiflexion** is performed by the **tibialis anterior, extensor hallucis longus, extensor digitorum longus, and peroneus tertius.** (muscles of the anterior compartment of the leg)

**Plantar flexion** is performed by the **gastrocnemius, soleus, plantaris, peroneus longus, peroneus brevis, tibialis posterior, flexor digitorum longus, and flexor hallucis longus.** (all the muscles of lateral and posterior compartment except popliteus muscle)



## Proximal Tibiofibular Joint

### ➤ Articulation

Articulation is between the lateral condyle of the tibia and the head of the fibula).

The articular surfaces are flattened and covered by hyaline cartilage.

### ➤ Type

This is a synovial, plane, gliding joint.

### ➤ Capsule

The capsule surrounds the joint and is attached to the margins of the articular surfaces.

### ➤ Ligaments

*Anterior and posterior ligaments strengthen the capsule.*

### ➤ Synovial Membrane

The synovial membrane lines the capsule and is attached to the margins of the articular surfaces.

### ➤ Nerve Supply

The common peroneal nerve supplies the joint.

### Movements

A small amount of gliding movement takes place during movements at the ankle joint.

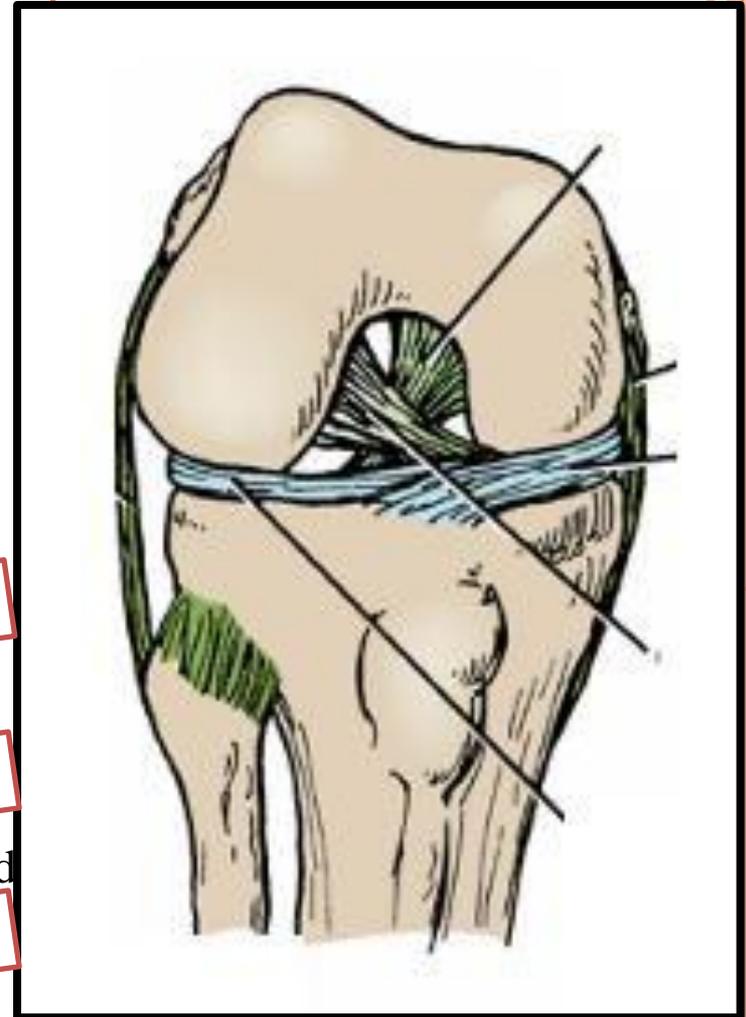
Read only

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# Distal Tibiofibular Joint

## ➤ Articularion

Articulation is between the fibular notch at the lower end of the tibia and the lower end of the fibula

## ➤ Type

The distal tibiofibular joint is

**a fibrous joint**

## ➤ Capsule

There is no capsule.

Ligaments

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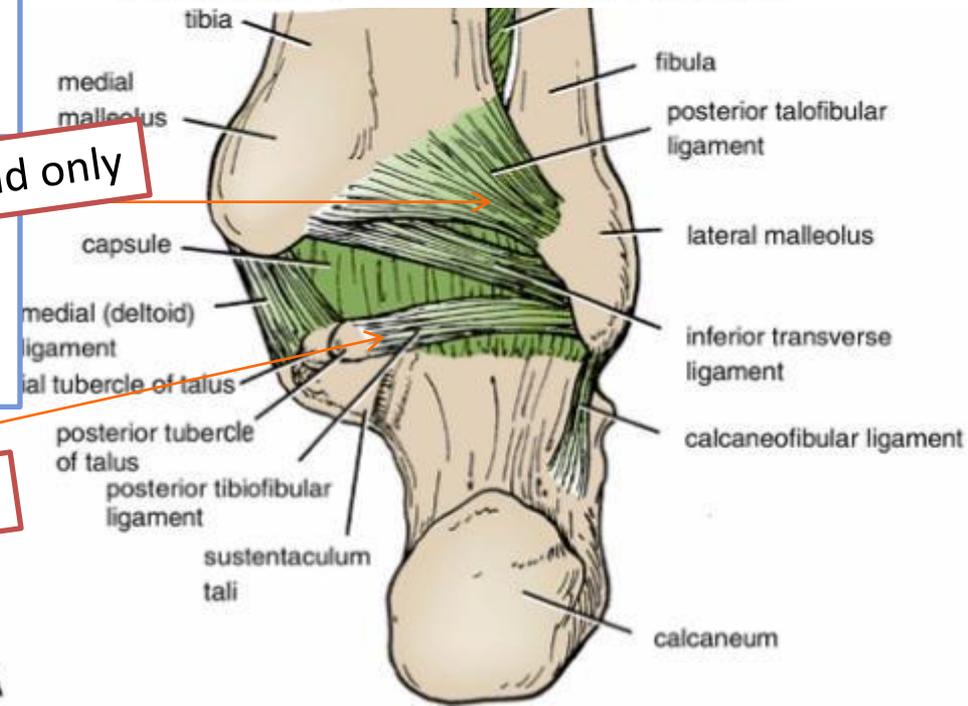
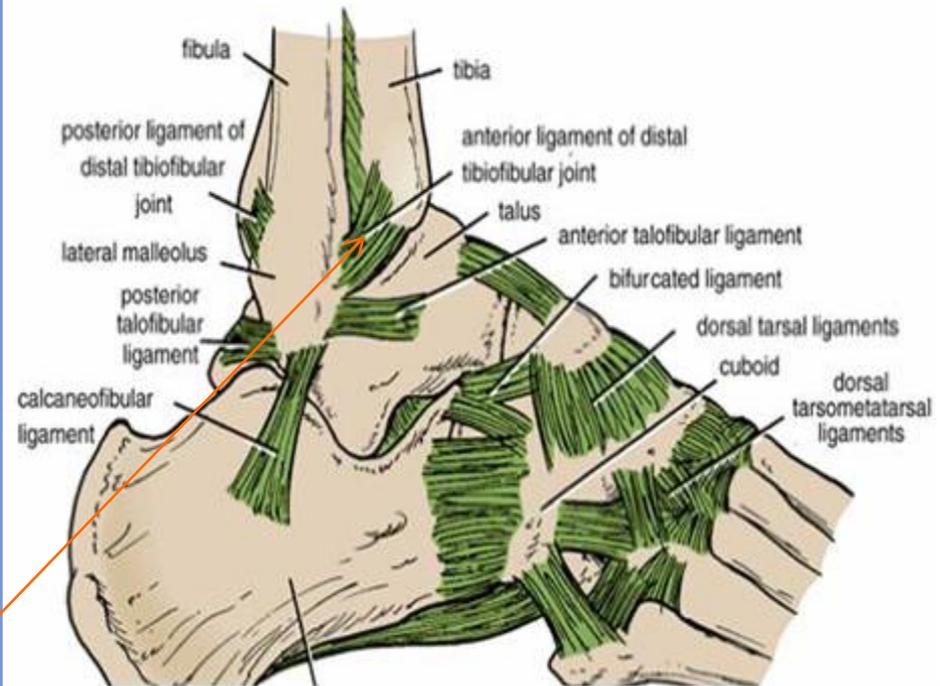
1 The **interosseous ligament** is a strong, thick band of fibrous tissue that binds the two bones together.

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2 The **anterior and posterior ligaments** are flat bands of fibrous tissue connecting the two bones together in front and behind the interosseous ligament

Read only

3 The **inferior transverse ligament**



## Tarsal Joints

### **1-Subtalar Joint**

The subtalar joint is the posterior joint between the talus and the calcaneum.

#### Articulation

is between the inferior surface of the body of the talus and the facet on the middle of the upper surface of the calcaneum

#### Type

These joints are synovial, of the plane variety

#### Ligaments

Medial and lateral (talocalcaneal) ligaments strengthen the capsule. The interosseous (talocalcaneal) ligament is strong and is the main bond of union between the two bones. It is attached above to the sulcus tali and below to the sulcus calcanei..

#### Movements

Gliding and rotatory movements are possible



## **2-Talocalcaneonavicular Joint**

is the anterior joint between the talus and the calcaneum and also involves the navicular bone

### **Articulation**

Articulation is between the rounded head of the talus, the upper surface of the sustentaculum tali, and the posterior concave surface of the navicular bone.

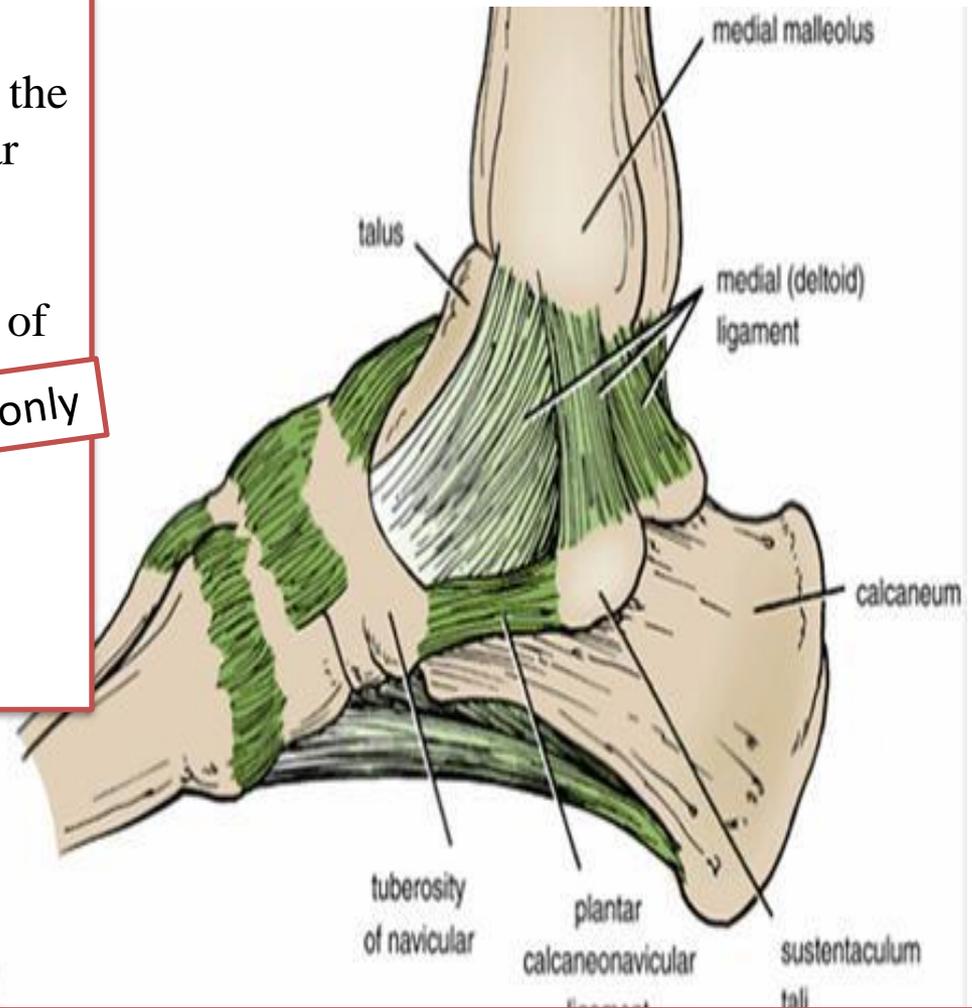
### **Type**

The joint is a synovial joint..

### **Ligaments.**

Read only

Read only



**The plantar calcaneonavicular ligament** is strong and runs from the anterior margin of the sustentaculum tali to the inferior surface and tuberosity of the navicular bone. The superior surface of the ligament is covered with fibrocartilage and supports the head of the talus..

### **Movements**

Gliding and rotatory movements are possible

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## **-3Calcaneocuboid Joint**

### Articulation

Articulation is between the anterior end of the calcaneum and the posterior surface of the cuboid

The calcaneocuboid joint is synovial, of the plane variety.

*The talocalcaneonavicular and the calcaneocuboid joints are together referred to as themidtarsal or transverse tarsal joints*

### Ligaments

The bifurcated ligament



# Tarsal Tunnel Syndrome????

