

FEMUR

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Longest and strongest bone in the body.

Parts:

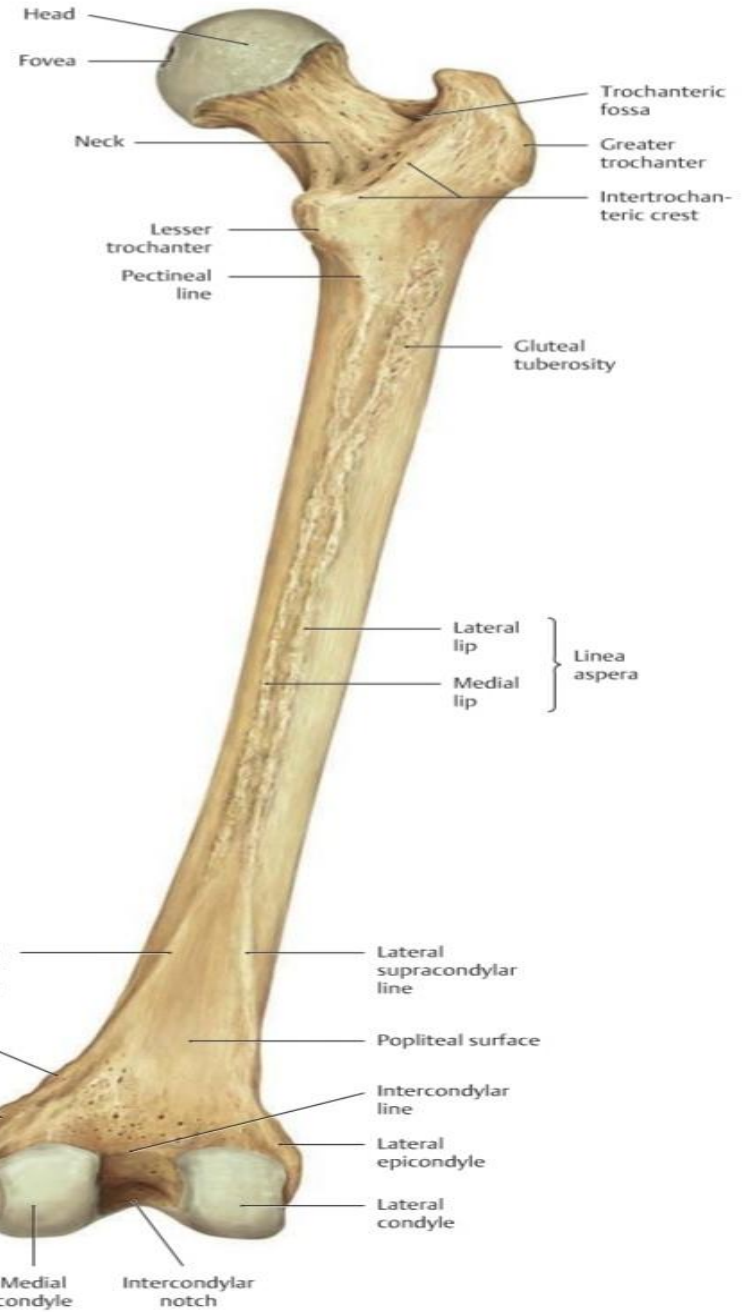
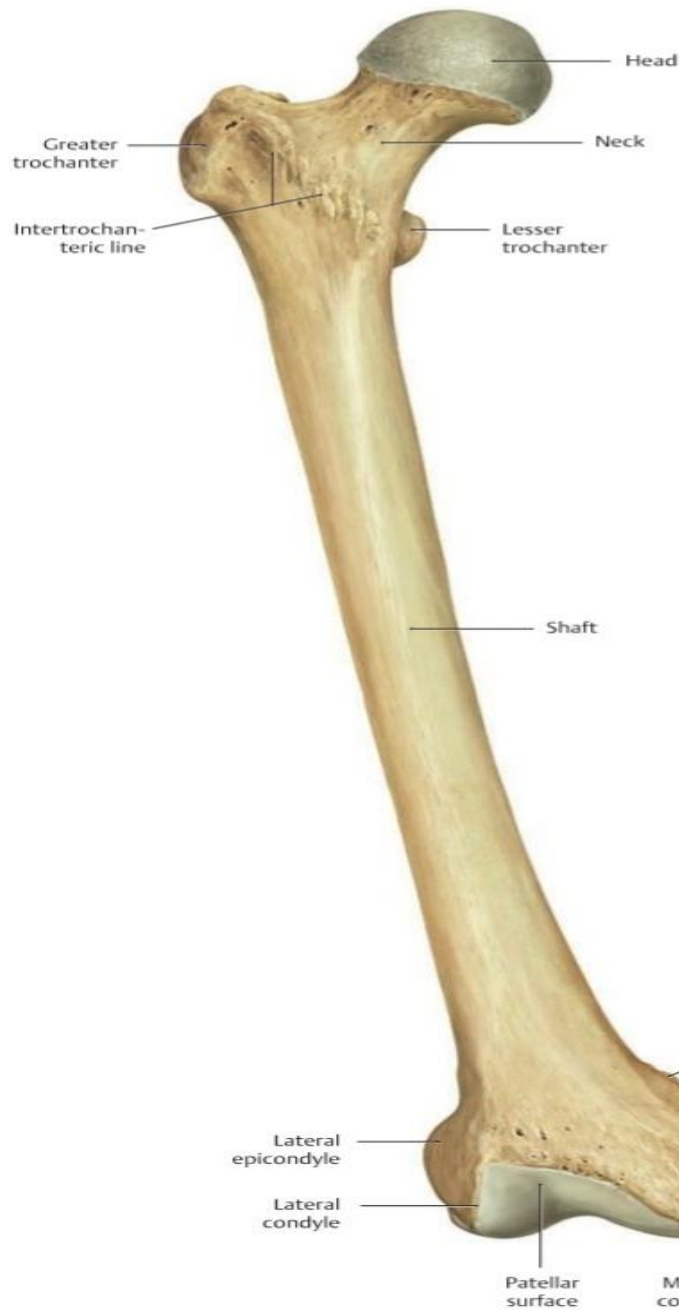
1.Upper end

2.Shaft

3.Lower end

At the upper end it articulates with the hip bone to form the hip joint, and at the lower end it articulates with the patella and tibia.

The femur transmits body weight from the hip bone to the tibia in standing position.



A The right femur
Anterior view.

B The right femur
Posterior view.

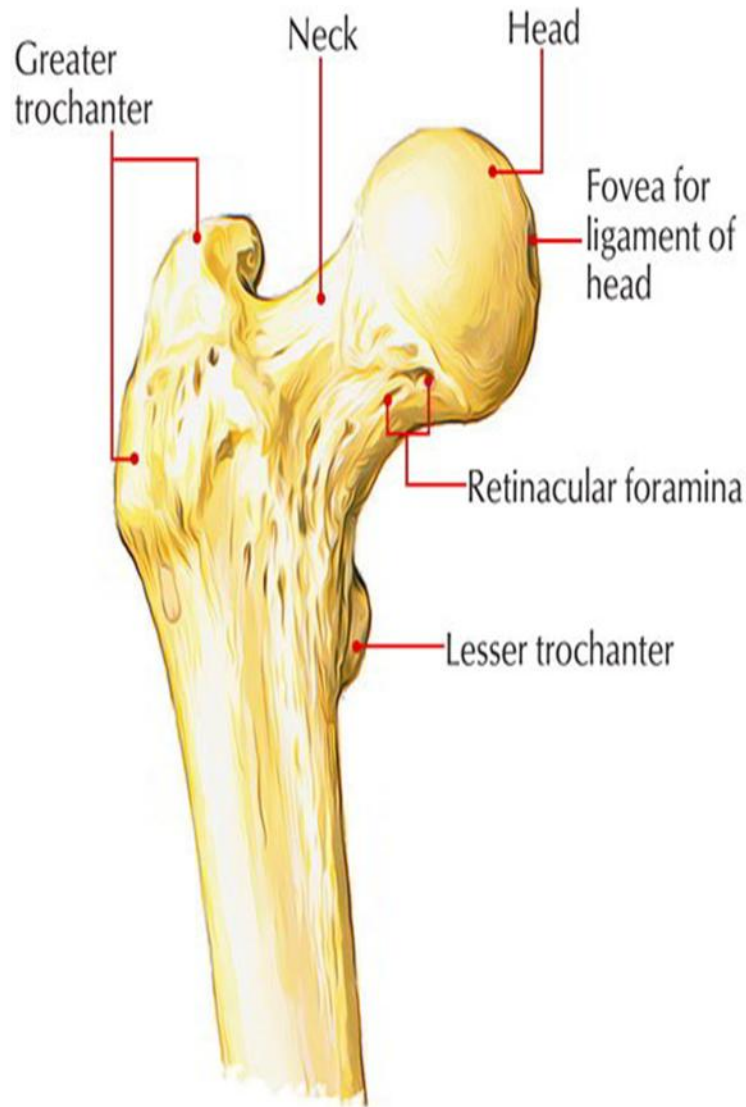
SIDE DETERMINATION

- The side of femur is determined by holding bone vertically in such a way that:
- Its head faces **upward, medially, and slightly forward**.
- **Long axis** of the shaft is directed **downward and medially** with convexity of the shaft facing anteriorly.
- Lower surfaces of both the condyles are in the same horizontal plane.

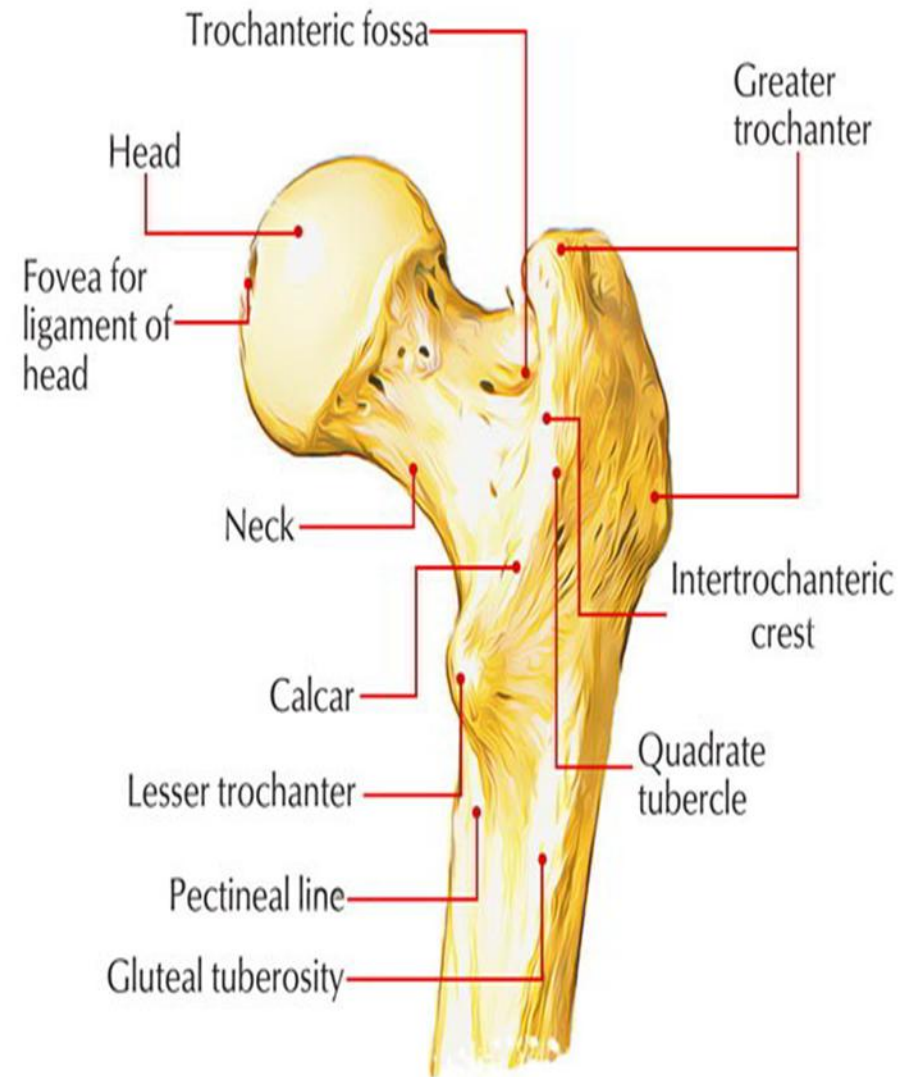
UPPER END:

- It possesses:
 1. Head
 2. Neck
 3. Greater trochanter: 3 surfaces and 1 border
 - a) anterior surface
 - b) lateral surface
 - c) medial surface
 - d) superior border
 4. Lesser trochanter

Anterior view



Posterior view



UPPER END:

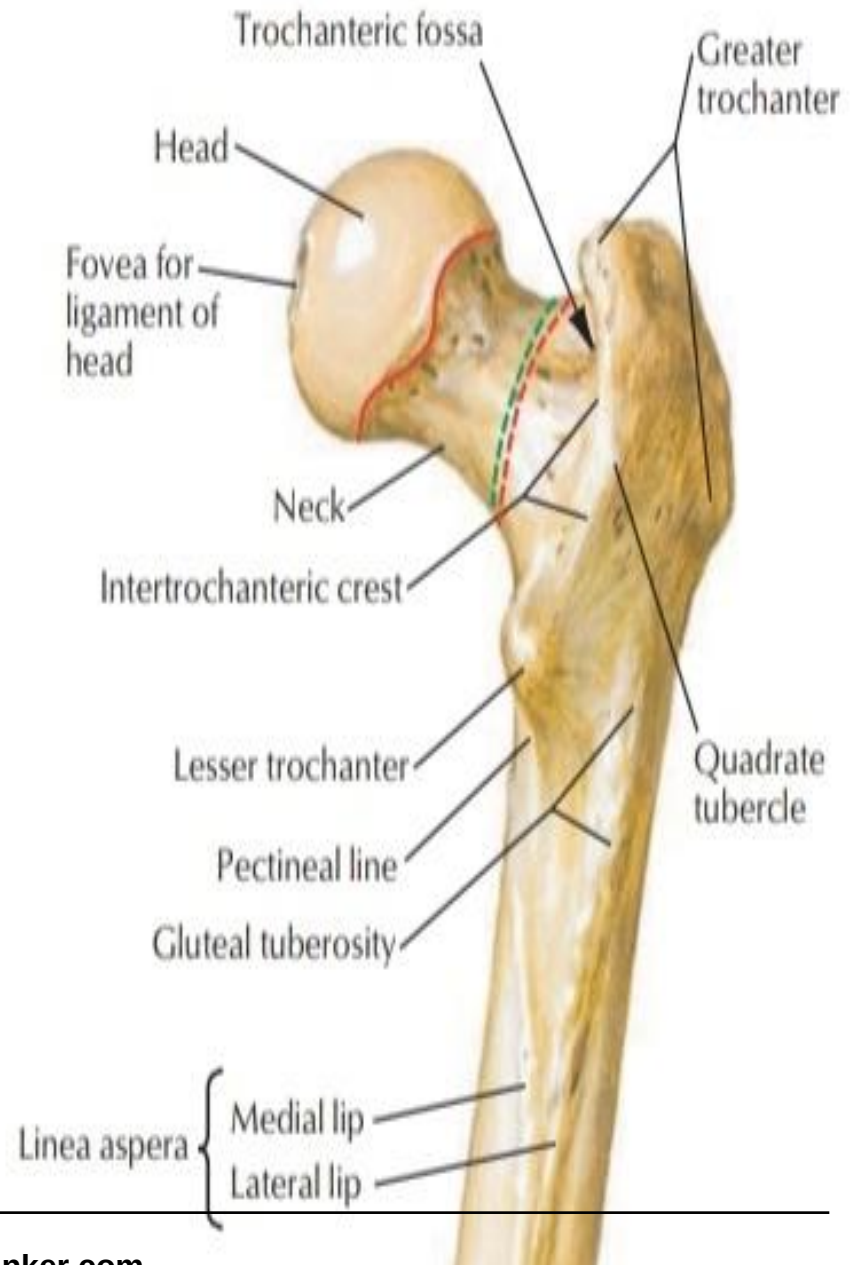
❖ HEAD:

- Projects from the medial side of upper end the shaft.
- Faces upward forwards and medially.
- It forms about two-third of a sphere and articulates with the acetabulum of the hip bone to form the hip joint.
- It presents a small pit, the fovea, just below and behind the centre, which provides attachment to the ligament of the head of femur (ligamentum teres femoris).
- Lies within the capsule of hip joint.

Anterior view



Posterior view



❖ NECK:

- It is 5 cm long and connects the head with the shaft.
- It is directed upward, medially, and slightly forward.
- The angle between its lower border and the medial border of shaft is called neck–shaft angle.
- The neck presents two borders—upper and lower, and two surfaces—anterior and posterior.

UPPER BORDER:

- It is concave and horizontal.
- It meets the shaft near the greater trochanter.

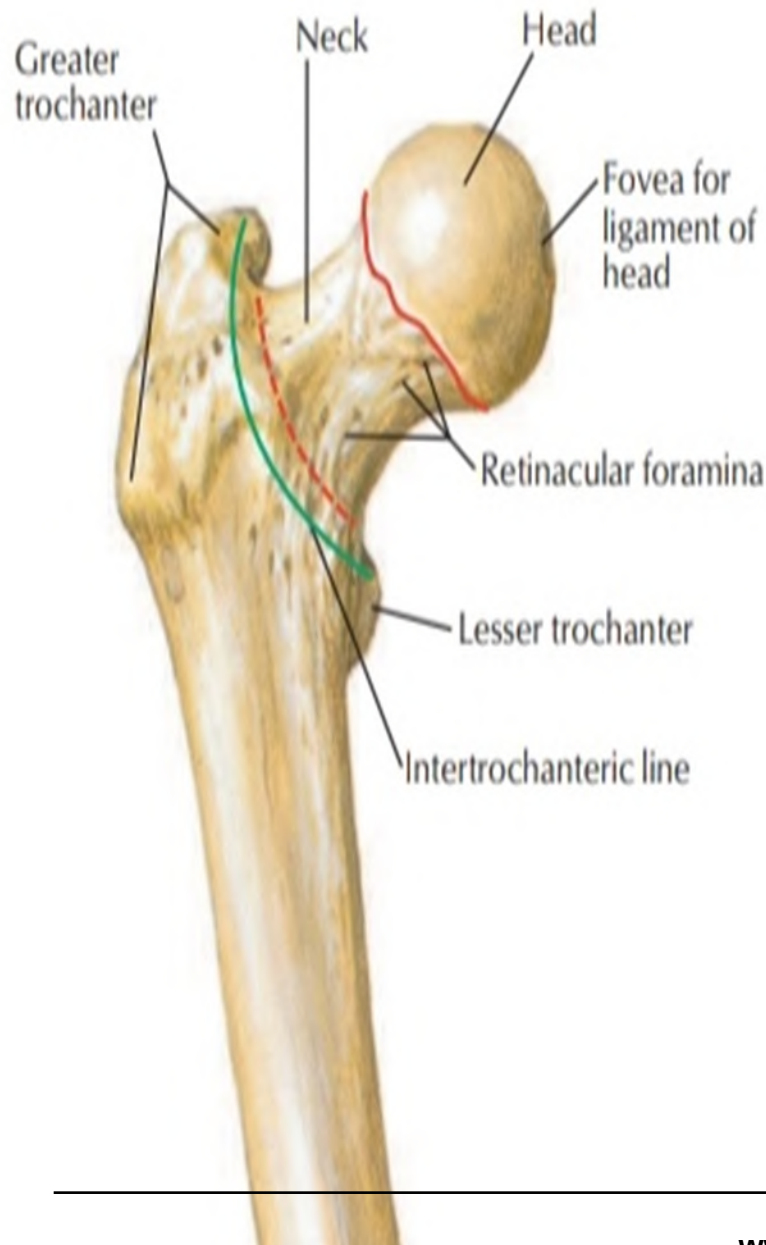
LOWER BORDER:

- It is straight and oblique.
- It meets the shaft near the lesser trochanter.

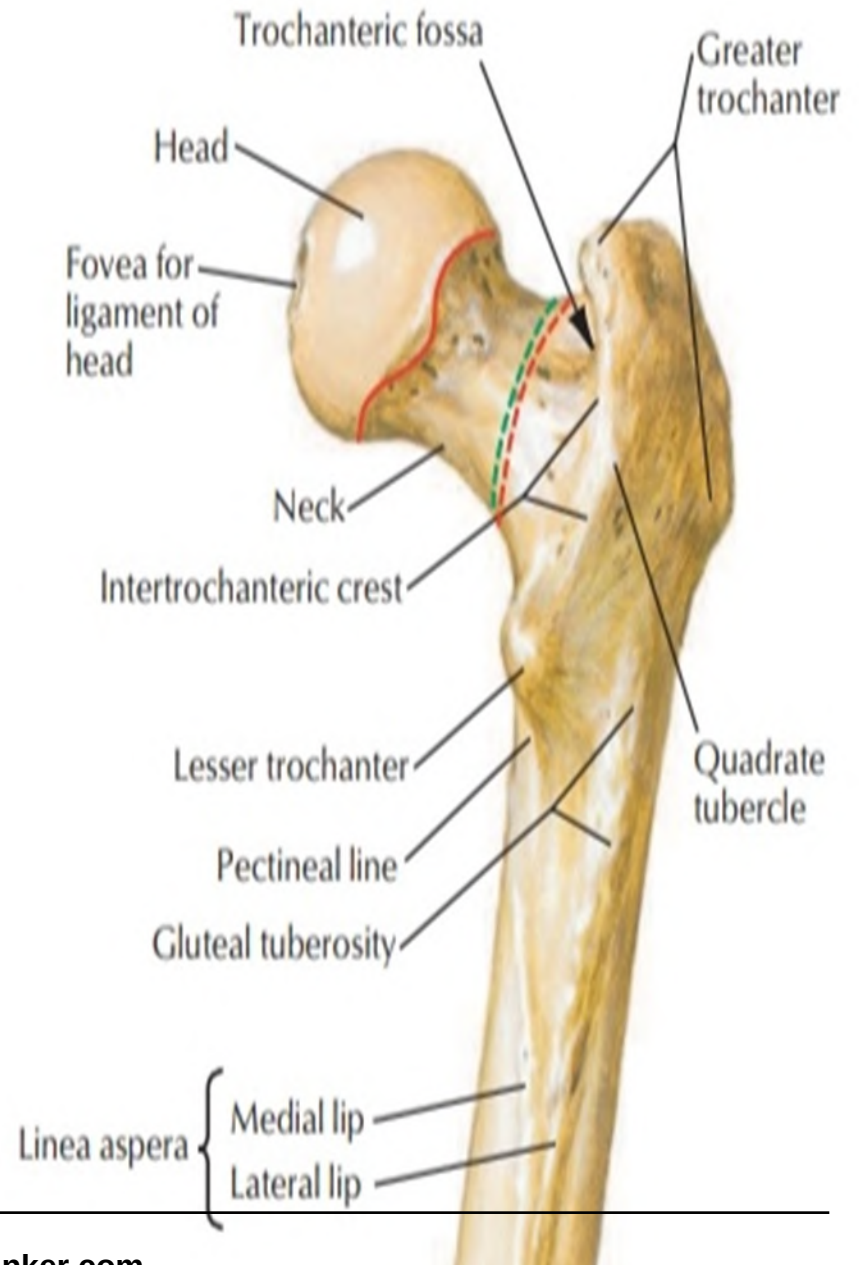
ANTERIOR SURFACE:

- It is flat and bears a number of oblique bony ridges.
- It meets the shaft at intertrochanteric line.
- It is completely intracapsular.

Anterior view



Posterior view

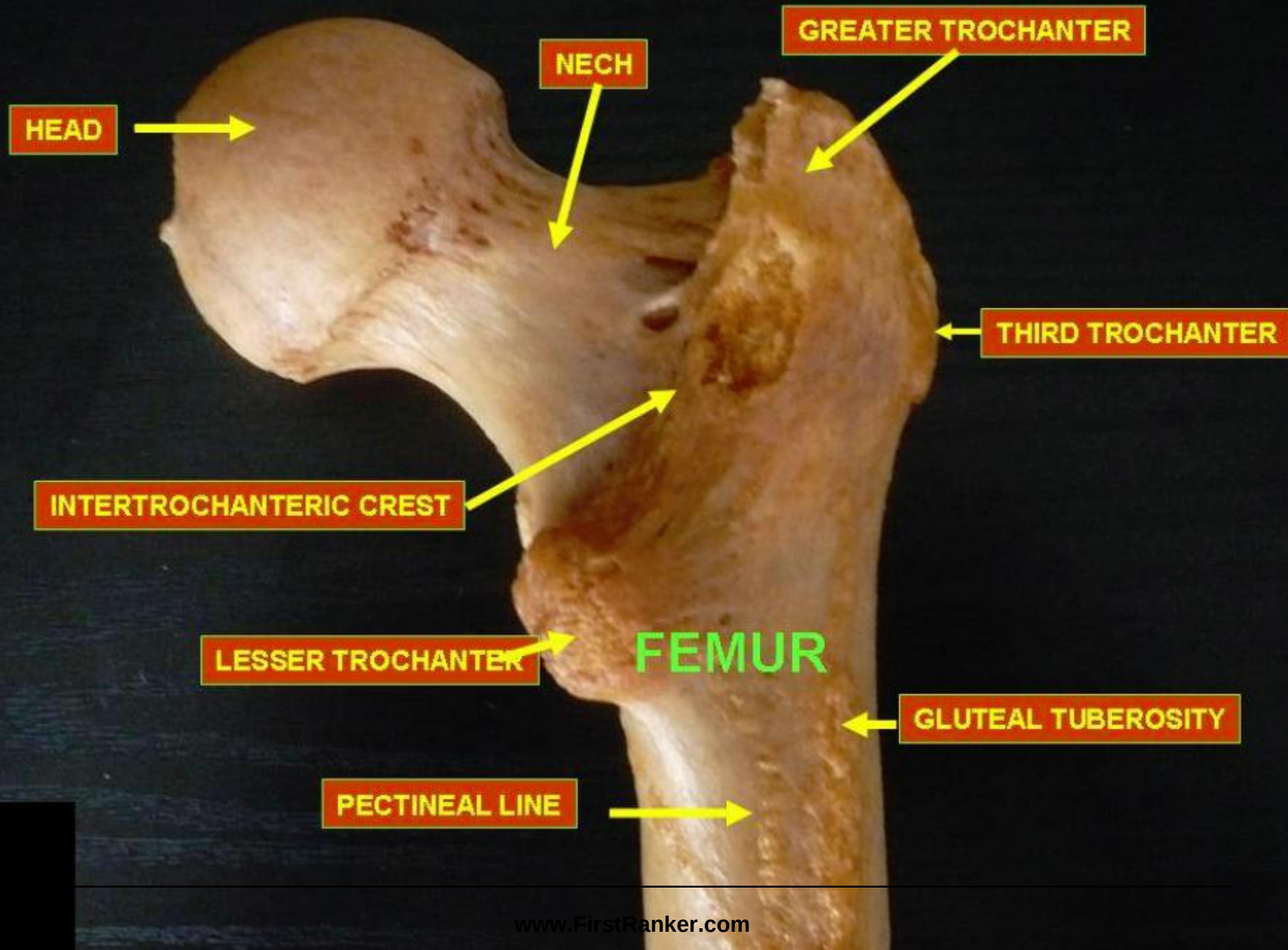


POSTERIOR SURFACE:

- It is convex from above downward and concave from side-to-side.
- It meets the shaft at intertrochanteric crest.
- Its medial half is intracapsular.
- It presents a faint groove, which lodges the tendon of obturator externus.

❖ **GREATER TROCHANTER:**

- It is a quadrilateral elevation, projecting upward from the lateral aspect of the junction of neck and shaft.
 - It presents:
 1. One border (upper)
 2. Three surfaces (anterior, medial, and lateral).
-



Greater Trochanter

Anterior
View



Posterior
View



right femur

UPPER BORDER:

- Its posterior part presents the apex or tip of greater trochanter, which provides attachment to the piriformis.

ANTERIOR SURFACE:

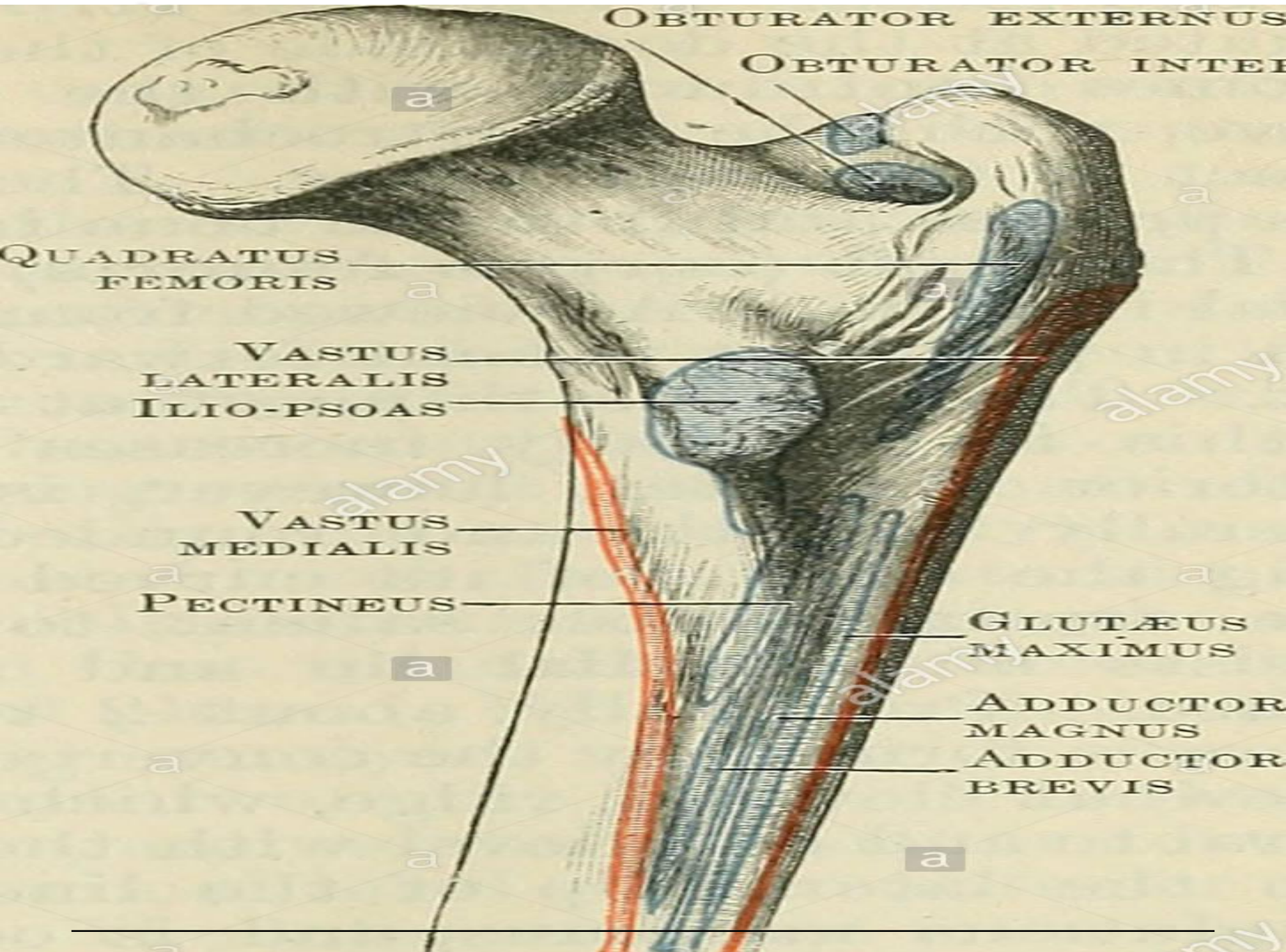
- It provides attachment to the gluteus minimus on a ridge in its lateral part.

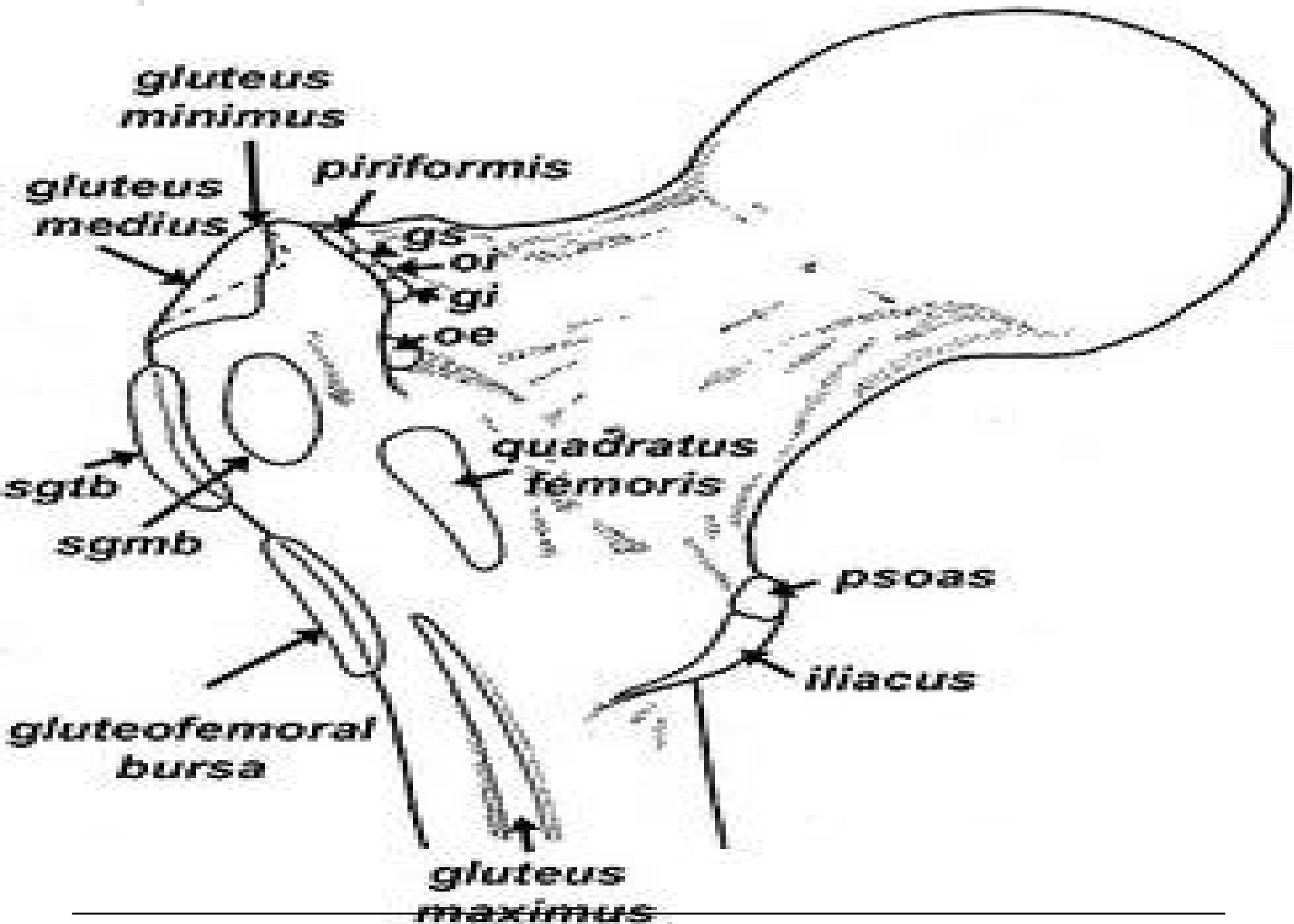
MEDIAL SURFACE:

- It presents two depressions:
- A depression (trochanteric fossa) at its junction with the neck for insertion of obturator externus.
- A shallow depression above and in front of trochanteric fossa for insertion of obturator internus along with the gemellus superior and gemellus inferior.

LATERAL SURFACE:

- It is quadrilateral and divided diagonally by an oblique ridge into the upper and lower triangular areas.
- The ridge provides attachment to the gluteus medius muscle.
- The triangular areas—anterior and posterior to the ridge are related to the trochanteric bursae of the gluteus medius and gluteus maximus, respectively.



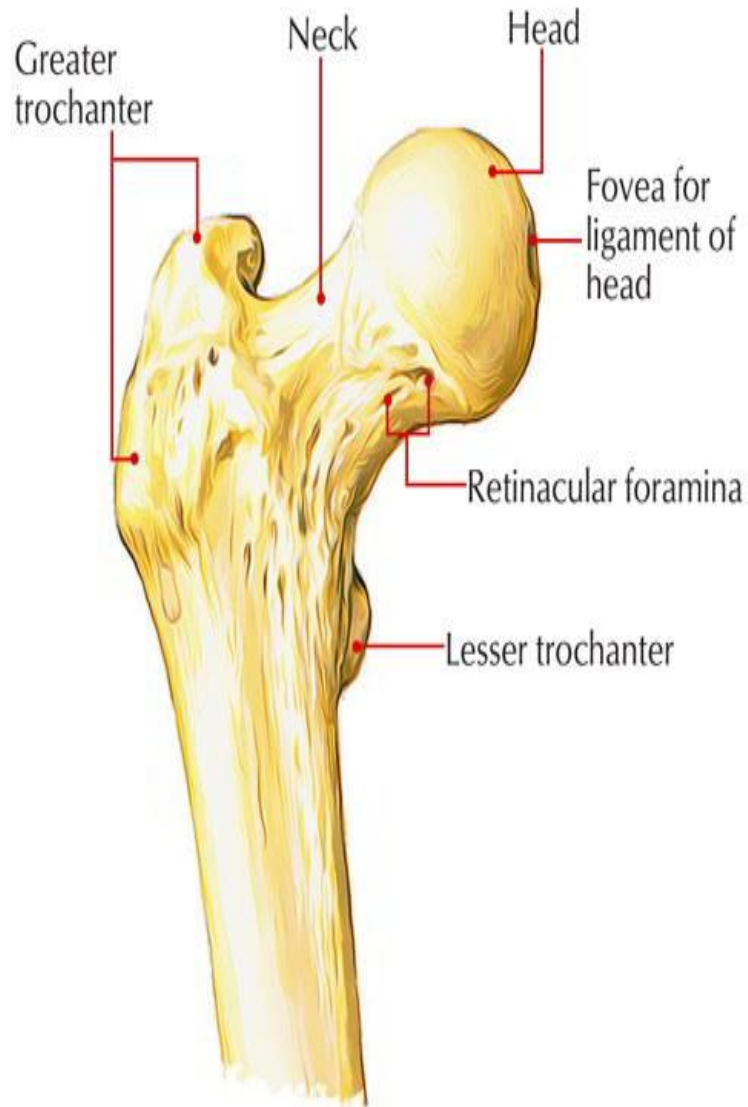




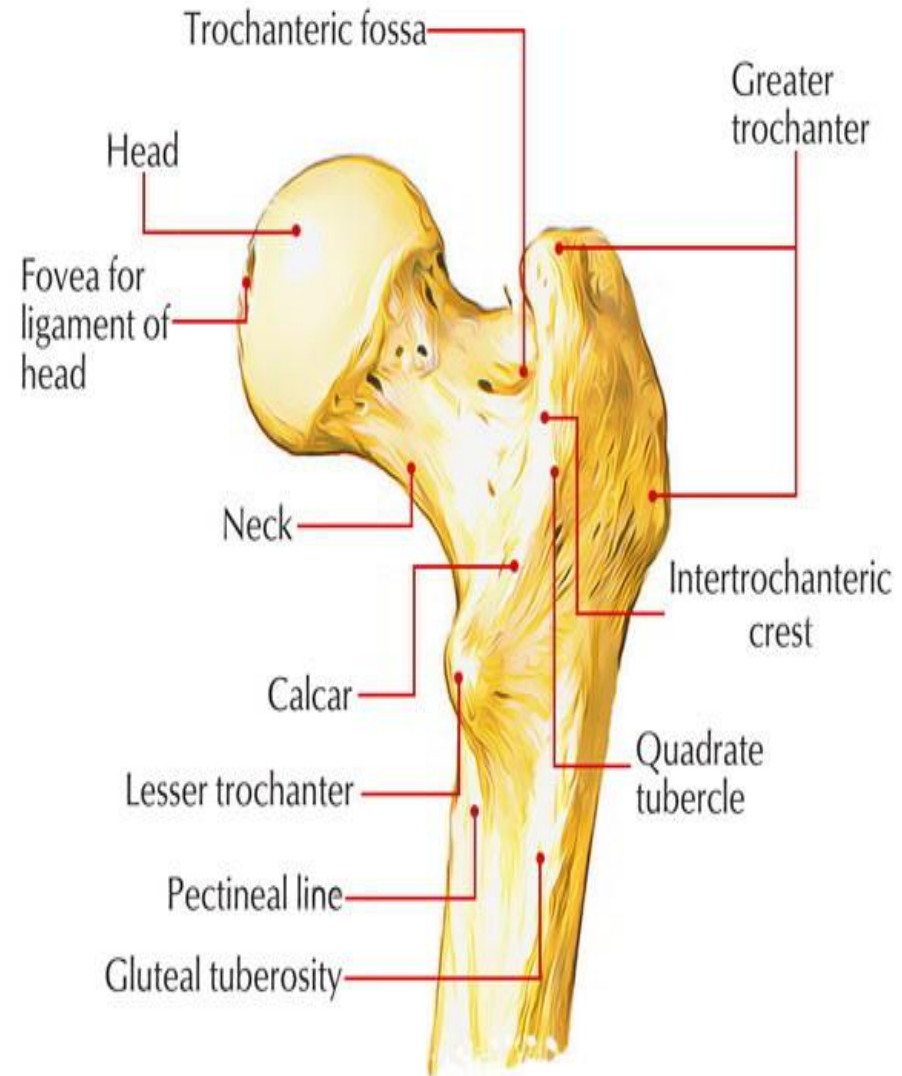
❖ LESSER TROCHANTER:

- It is a conical projection arising from the posteromedial surface of the neck–shaft angle.
- It is directed medially.
- Its apex provides attachment to the **psoas major**.
- **Iliacus** is attached to its base on the front.

Anterior view

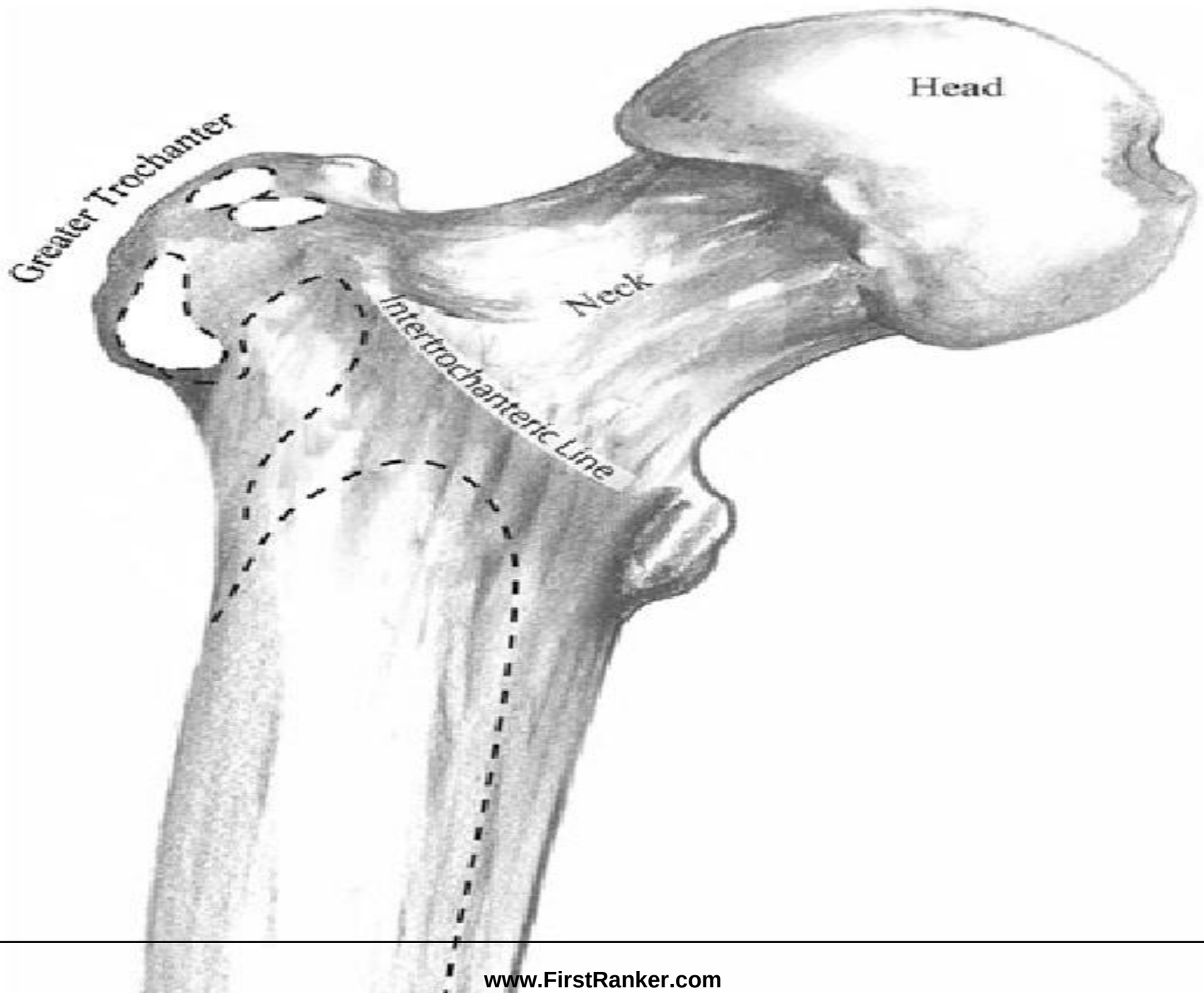


Posterior view



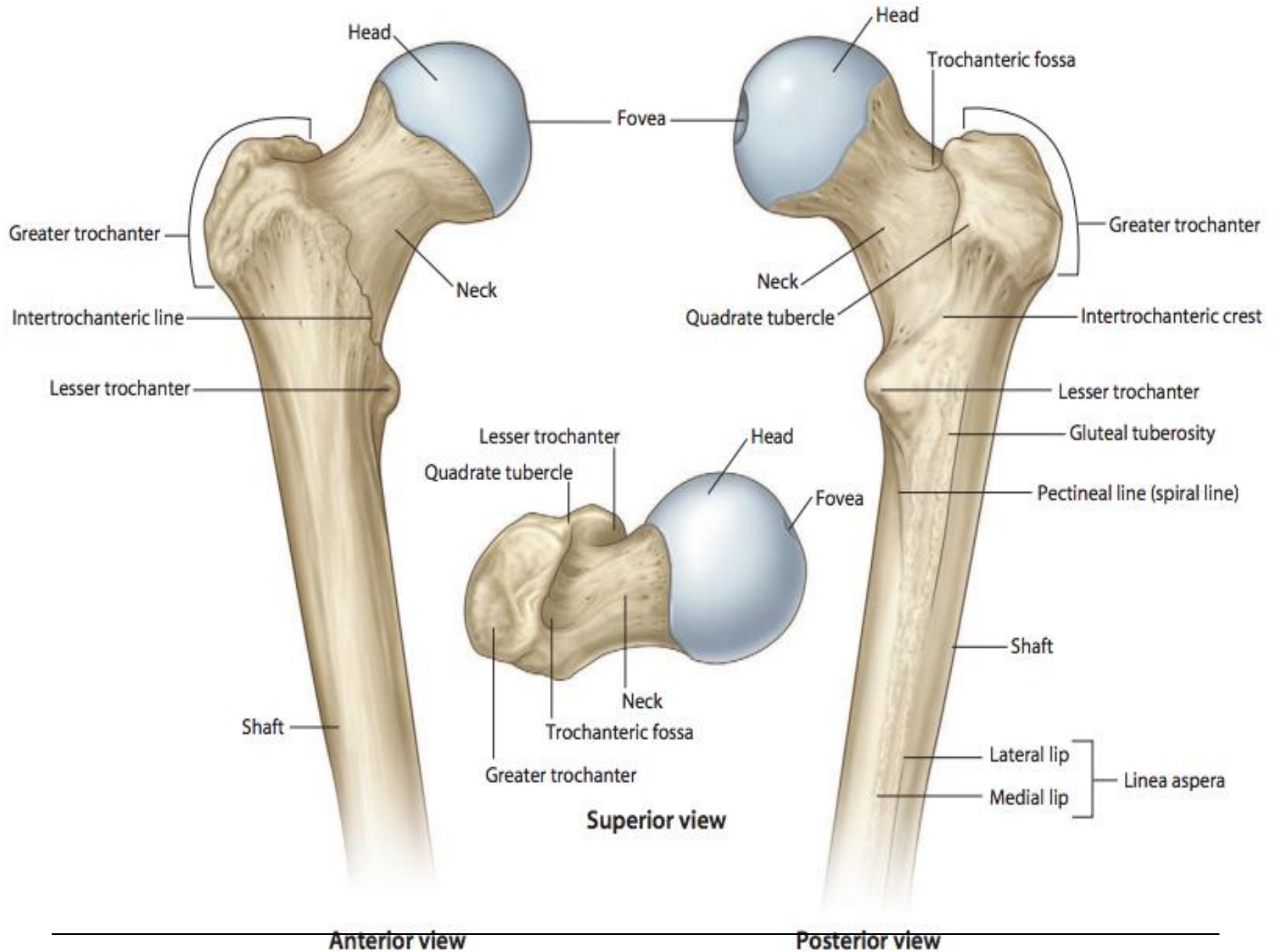
Intertrochanteric line

- It continues downward and medially below the lesser trochanter on the posterior aspect of femur as spiral line.
- It provides attachment to two ligaments and two muscles:
 - (a) Capsule of the hip joint.
 - (b) Iliofemoral ligament (strongest ligament in the body).
 - (c) Vastus lateralis to its upper end.
 - (d) Vastus medialis to its lower end..



Intertrochanteric crest

- It extends from the posterosuperior angle of greater trochanter to the tip of lesser trochanter.
- It presents a rounded tubercle near the middle called **quadrate tubercle**, which provides insertion to the quadratus femoris.



SHAFT:

- The shaft of femur presents:

1. Borders: Medial border

Lateral border

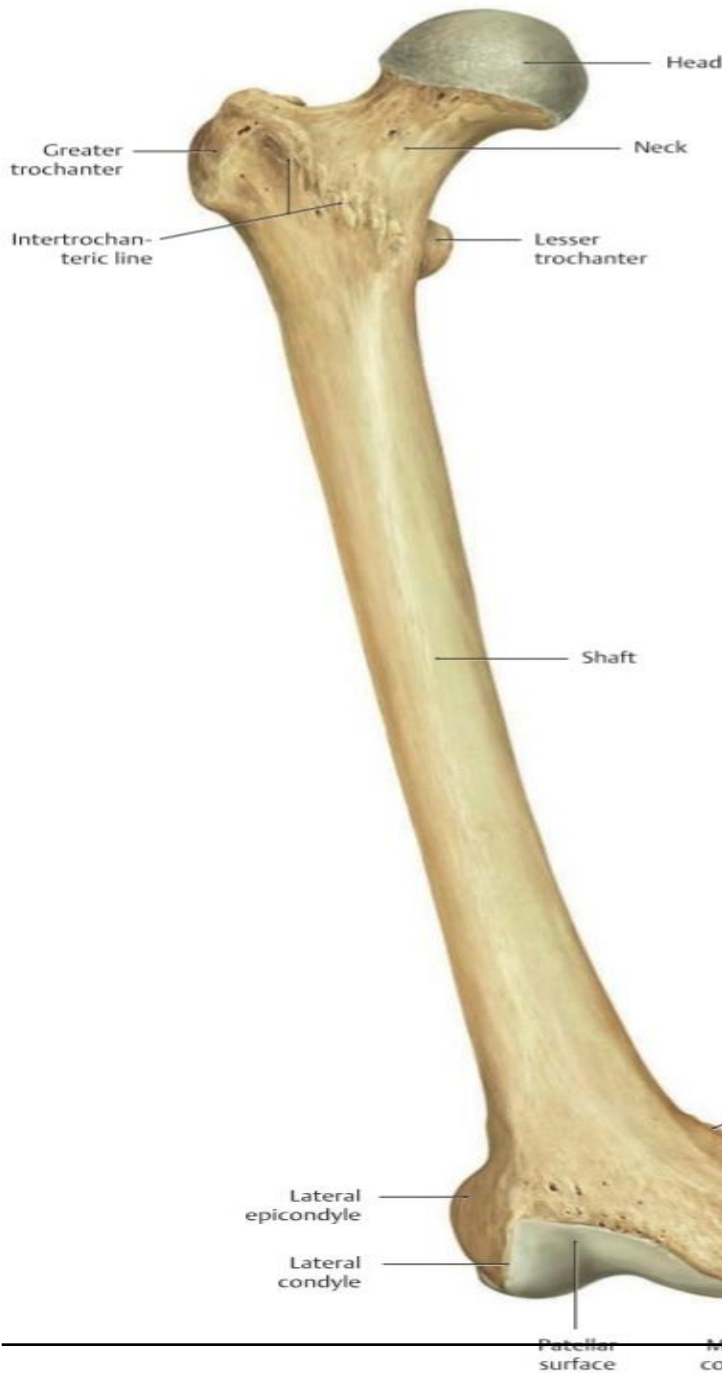
Posterior border.

2. Surfaces: (4 surfaces in upper and lower thirds but only 3 surfaces in middle third.)

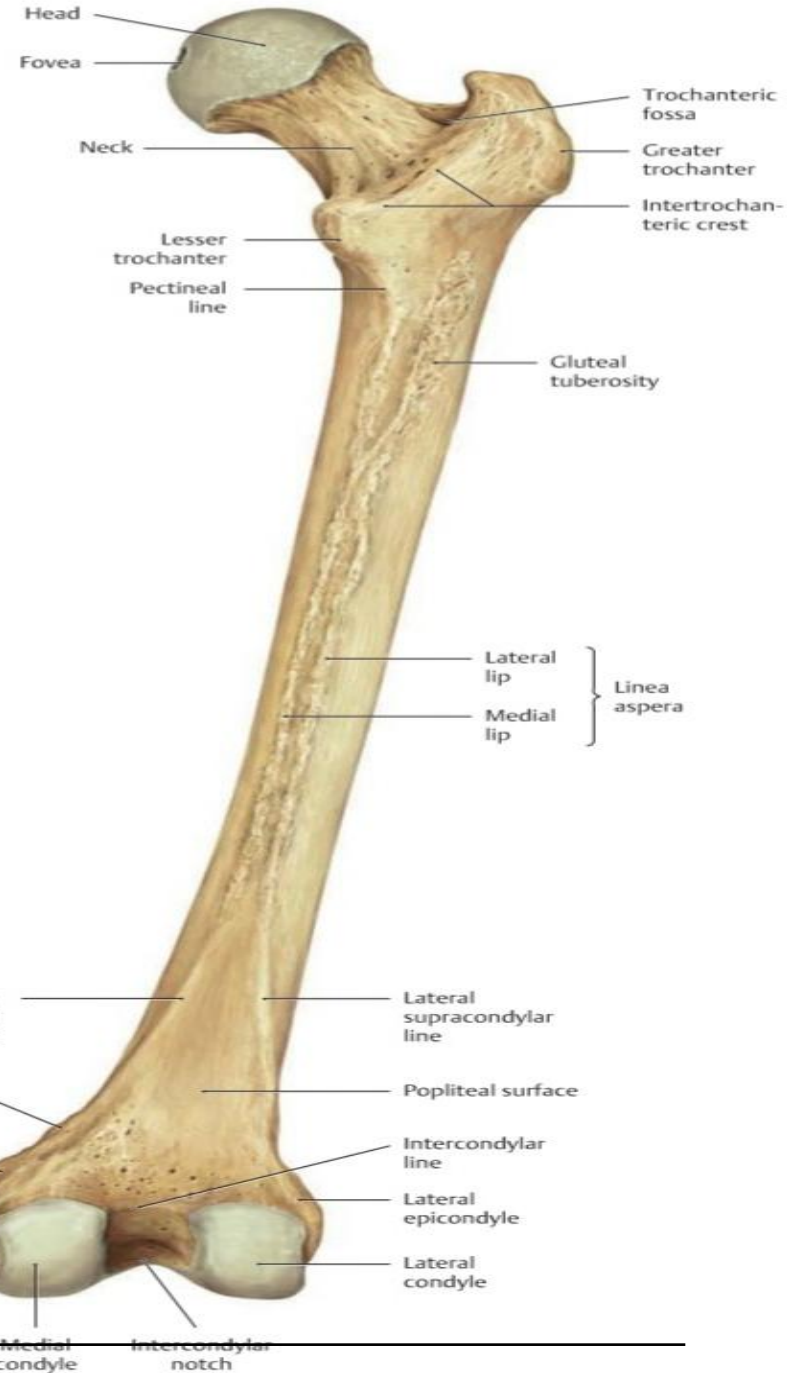
Anterior surface

Medial surface

Lateral surface.



A The right femur



B The right femur

BORDERS:

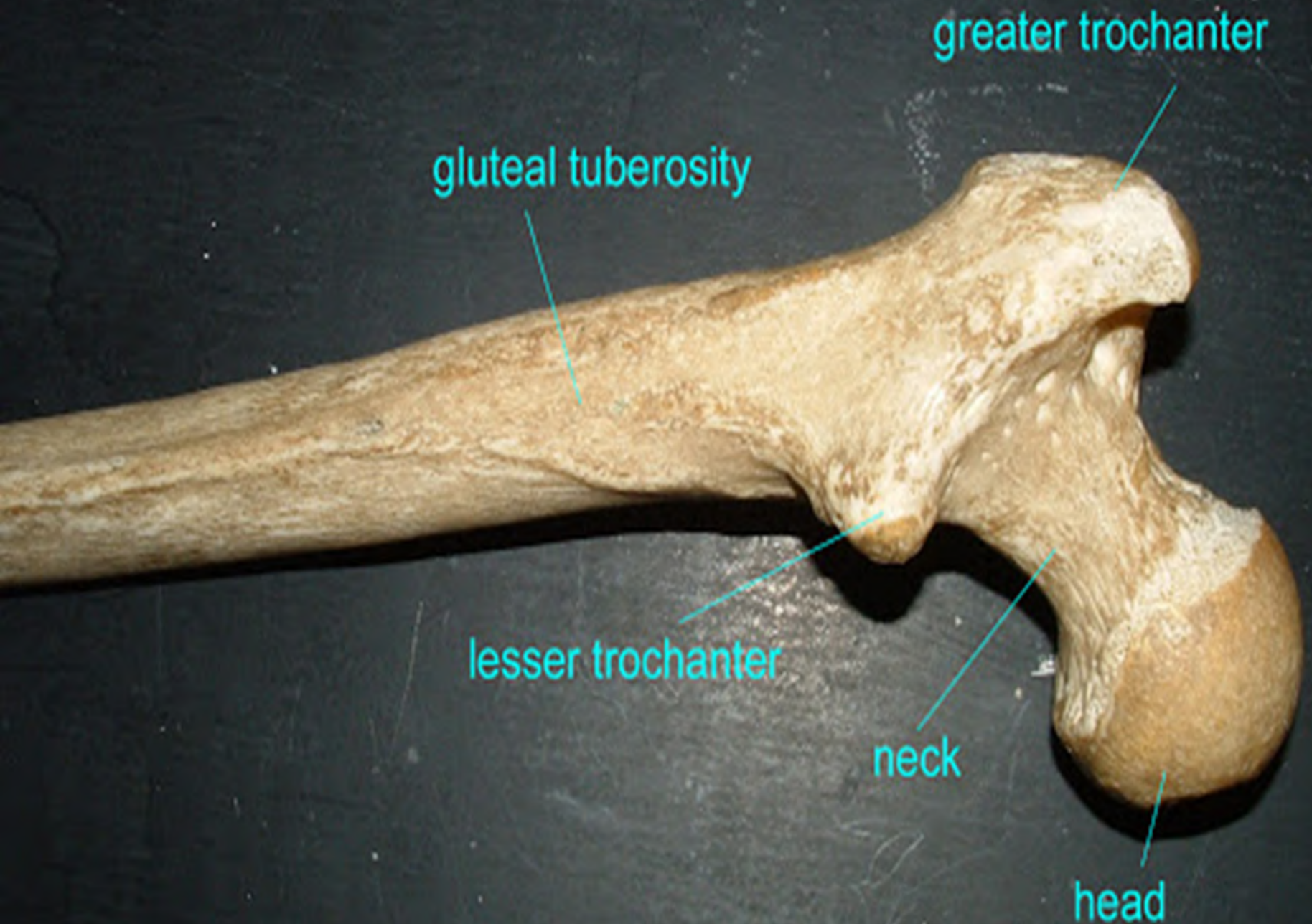
- **Medial border:** rounded, ill defined, separates anterior from medial surface.
- **Lateral border:** rounded: rounded ill defined. Separates anterior from the lateral surface.
- **Posterior border/ linea aspera:**
 - It is thick roughened crest opposite the middle third of the shaft.
 - Possesses a lateral and a medial lip and an intermediate area.
 - Medial lip is continuous above with spiral line and below with supra condylar ridge while the lateral lip is continuous above with gluteal tuberosity and below with the lateral supra condylar ridge.

SURFACES:

1. **ANTERIOR SURFACE:** is smooth and convex and lies between medial and lateral borders.
2. **LATERAL SURFACE:** faces backwards and laterally and lies between lateral and posterior borders.
3. **MEDIAL SURFACE:** faces backwards and medially and lies between posterior and medial borders. It does not give attachment to any muscle but is covered by vastus medialis muscle.

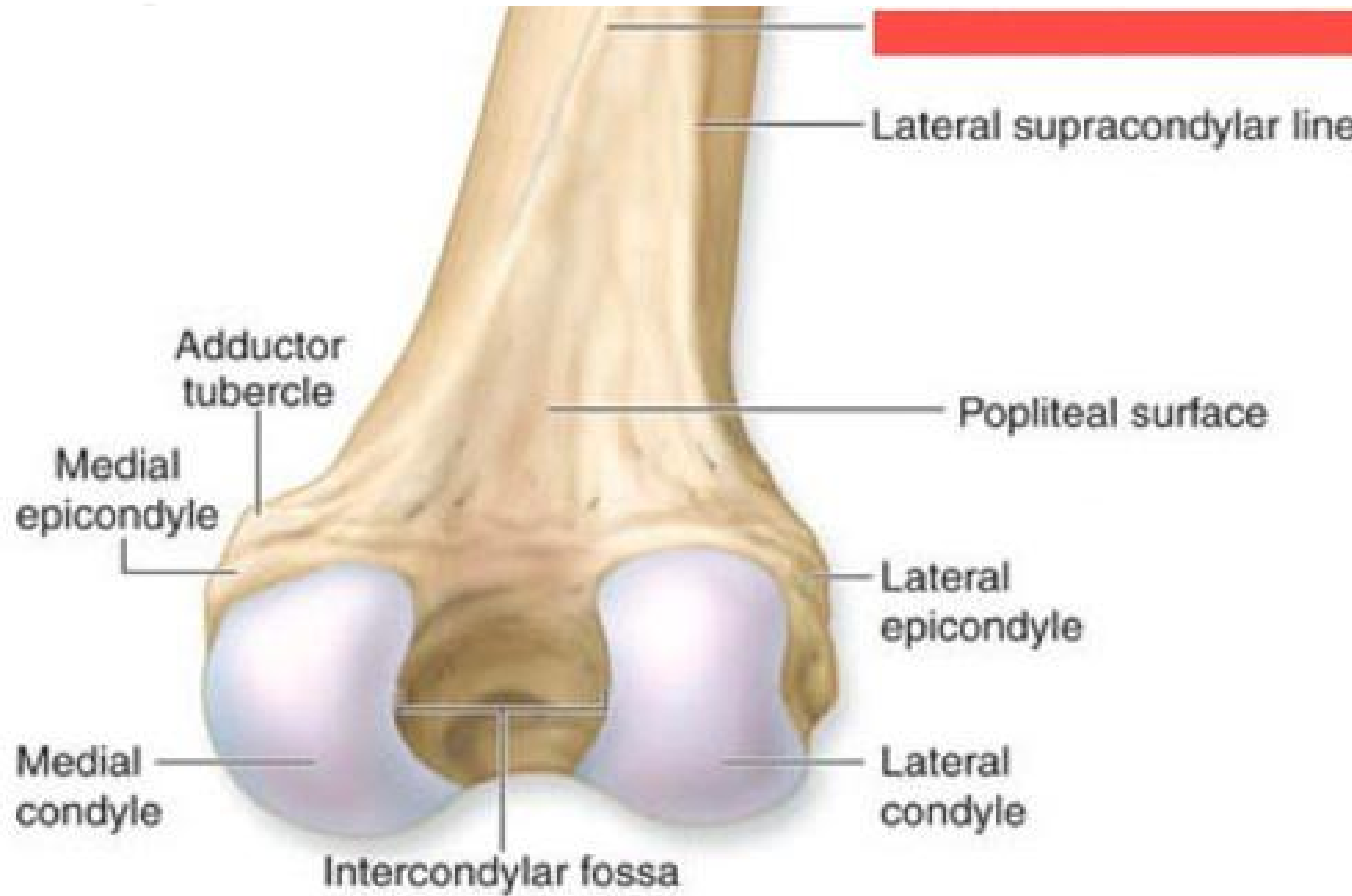
UPPER POSTERIOR:

- Lies between spiral line medially and gluteal tuberosity laterally. spiral line is continuous above with lower end of trochanteric line and below with medial lip of linea aspera.
- **Gluteal tuberosity** is a bony ridge which is continuous below with the lateral lip of linea aspera.
- Attachments:(from lateral to medial side): **gluteus maximus, adductor magnus, adductor brevis, pectinius, iliacus and vastus medialis.**



LOWER POSTERIOR:

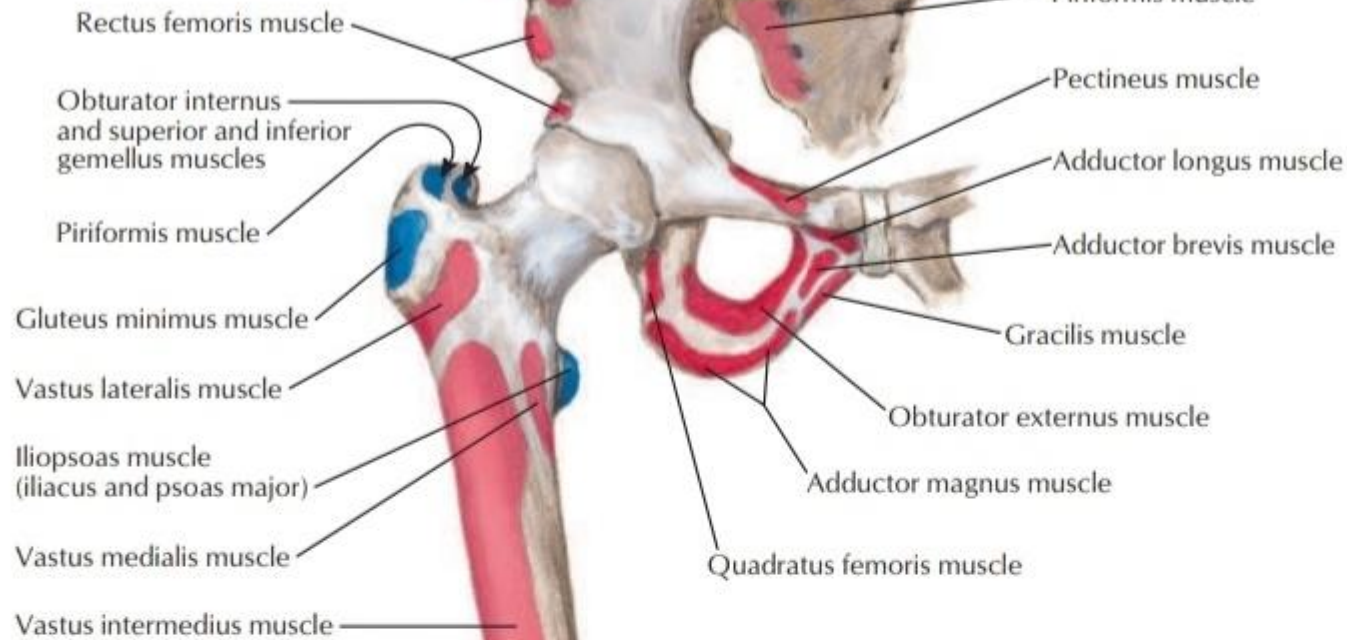
- Lies between medial and lateral supracondylar lines which are continuous above and medial and lateral lip of linea aspera respectively.
- It is also called the popliteal surface because it forms the floor of popliteal fossa.



(d) Right femur, posterior view

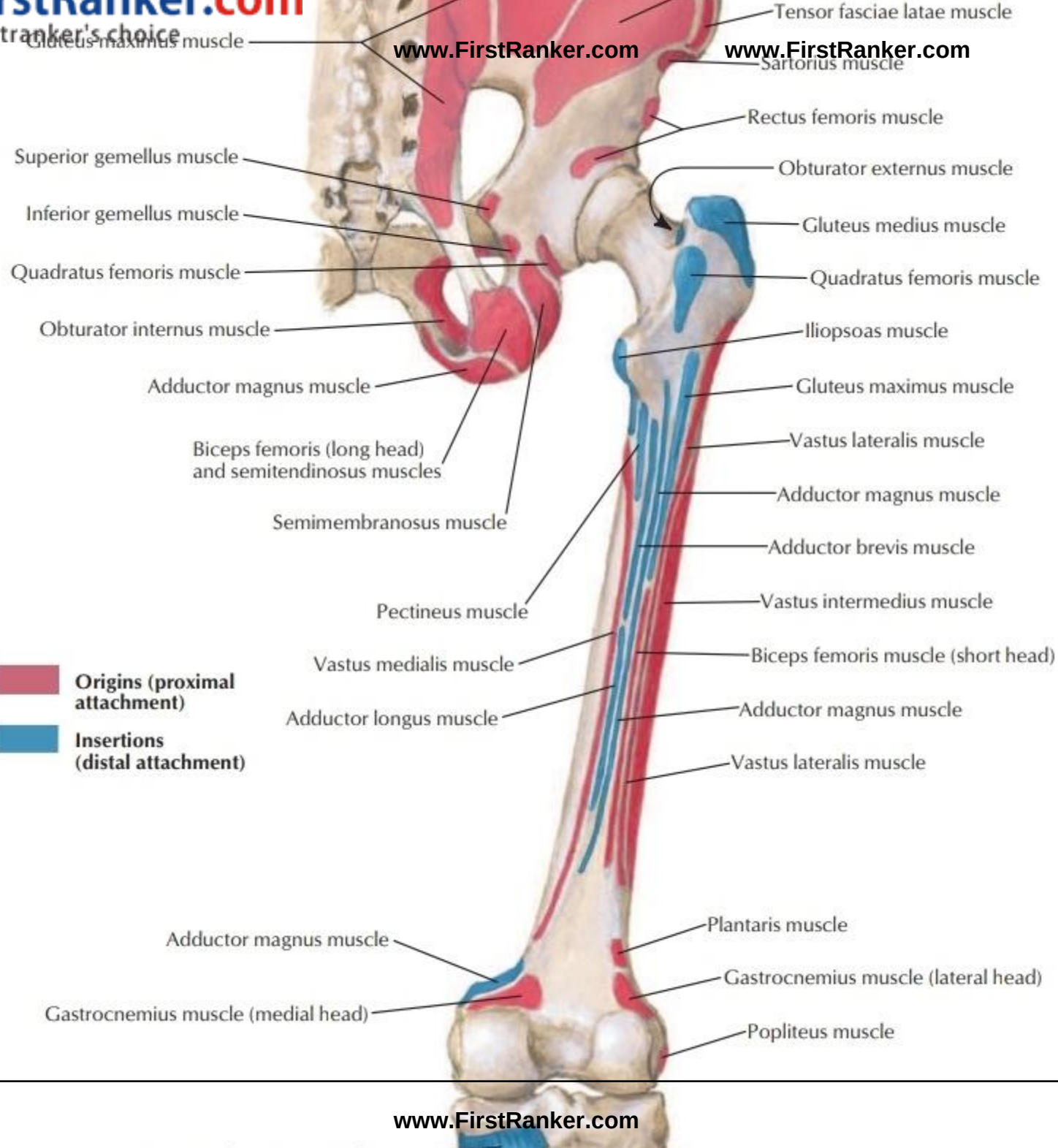
ATTACHMENTS TO THE SHAFT:

- Vastus intermedius
- Articularis genu
- Vastus lateralis
- Vastus medialis
- Gluteus maximus
- Adductor magnus
- Pectiniis
- Adductor brevis
- Adductor longus
- Biceps femoris
- Plantaris
- Gastrocnemius
- Lateral and medial intermuscular septa are attached to the linea aspera.



Origins (proximal attachment)
Insertions (distal attachment)

Iliotibial tract
Biceps femoris muscle



Arrangement of structures on linea aspera: (medial to lateral)

1. Vastus medialis
2. Medial intermuscular septum
3. Adductor brevis (in the upper part)
4. Adductor longus (in the lower part)
5. Adductor magnus
6. Posterior intermuscular septum
7. Short head of biceps femoris
8. Lateral intermuscular septum
9. Vastus lateralis
10. Vastus intermedius

Mnemonic: (lateral to medial)

- **I**- vastus *INTERMEDIUS*
- **LOVE**- vastus *LATERALIS*
- **B**- short head of *BICEPS* femoris
- **MR**- adductor *MAGNUS*
- **B**- adductor *BREVIS*
- **LOVES** – adductor *LONGUS*
- **ME**- vastus *MEDIALIS*

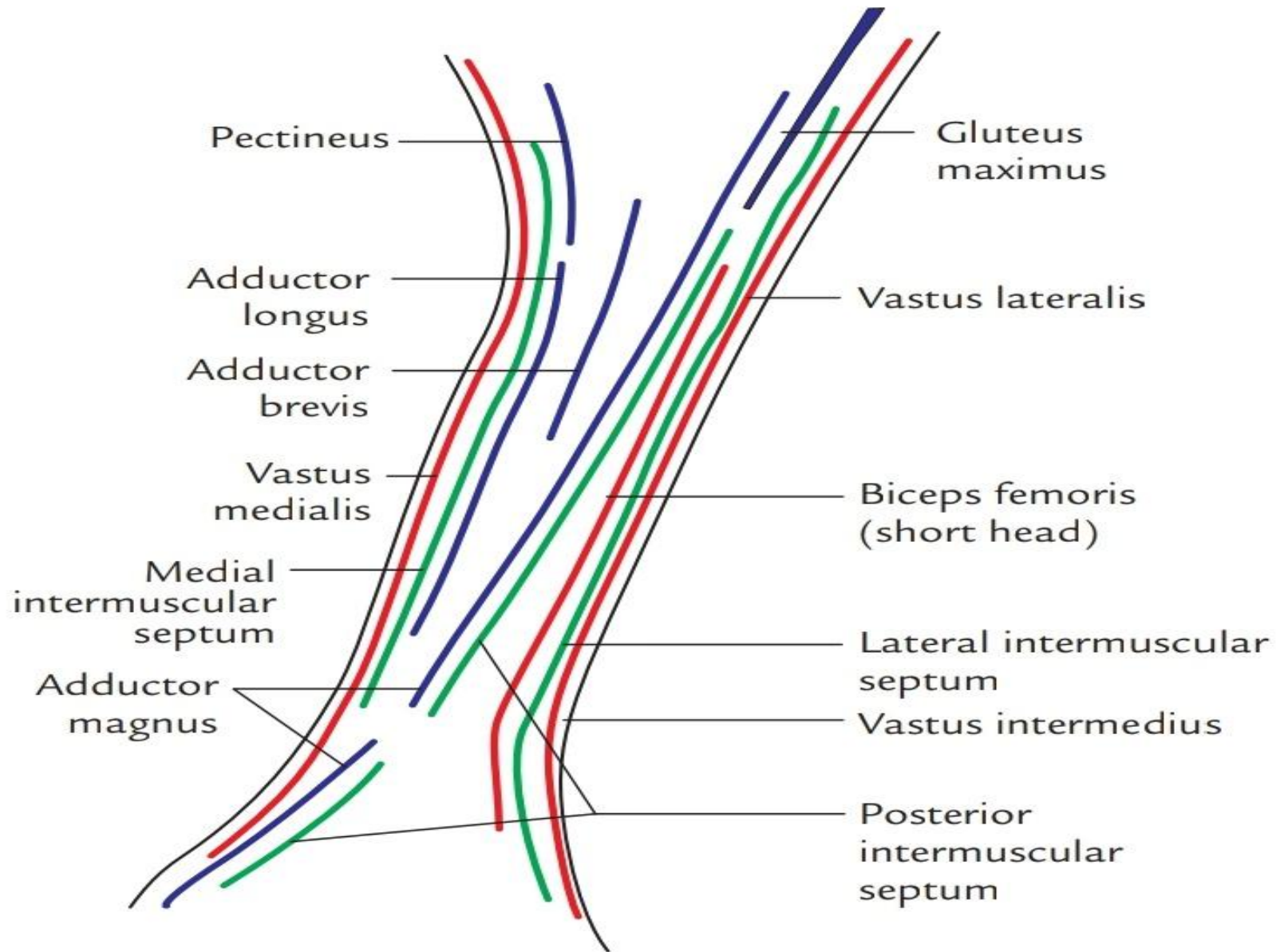
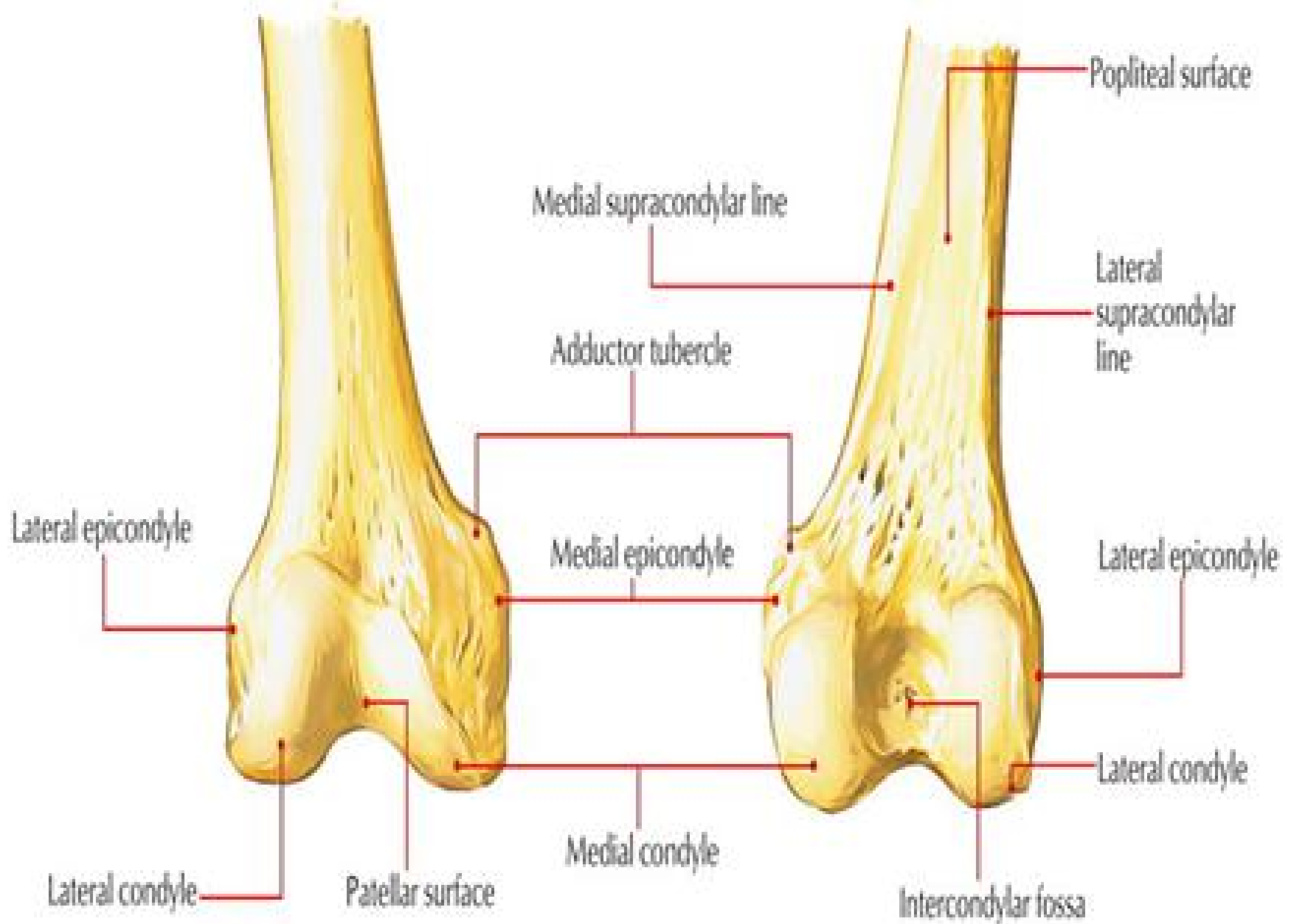


Fig. 21.10 Structures attached to the linea aspera (magnified view).

LOWER END:

- Broadly expanded.
- To provide good bearing surface for transmitting the body weight to the upper end of tibia.
- Has two articular surfaces: patellar and tibial articular surface
- Consists of two thick masses of bone called medial and lateral condyles separated from each other by intercondylar fossa.



MEDIAL CONDYLE:

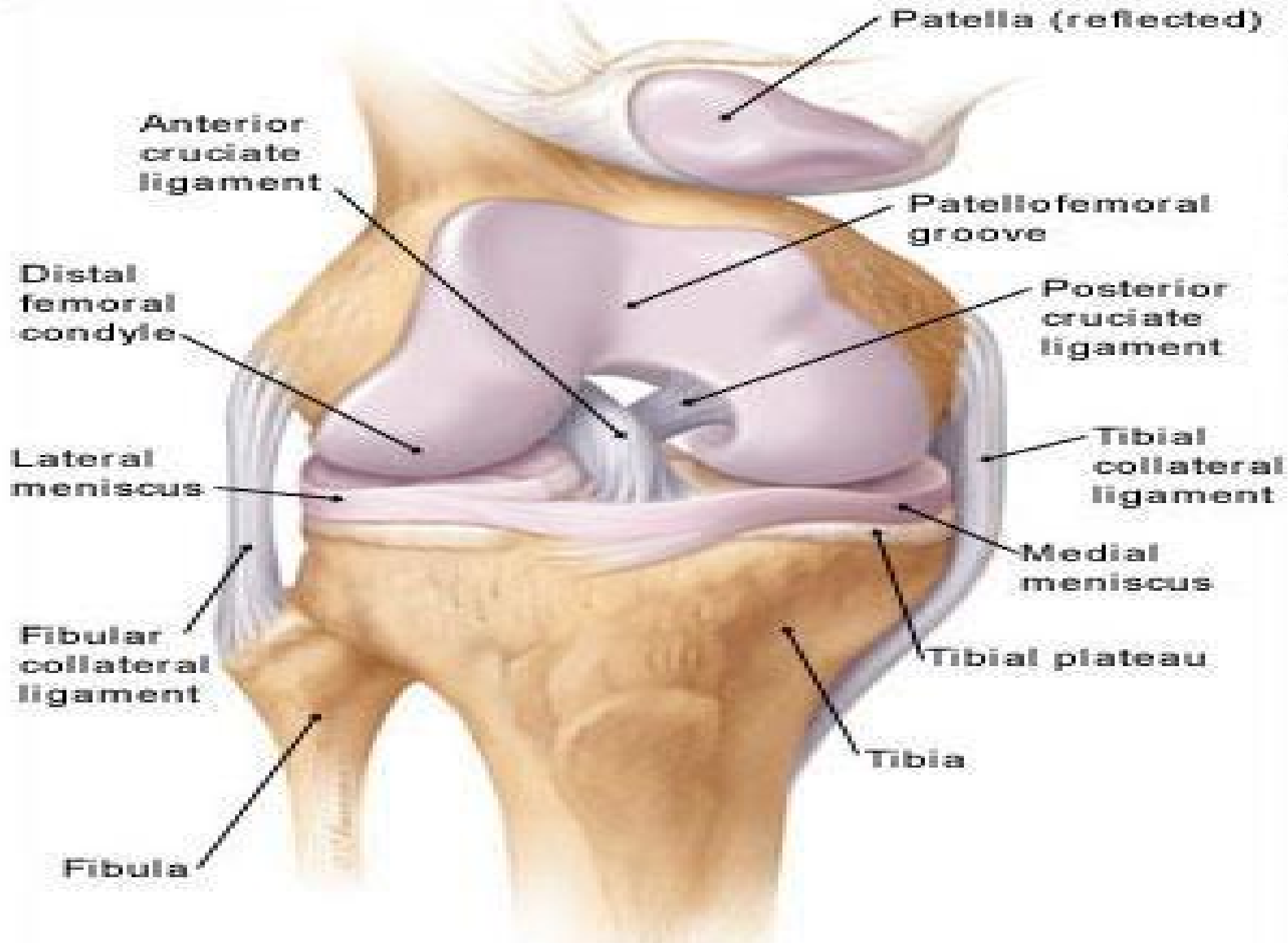
- More prominent.
- **Adductor tubercle**: small projection at the uppermost part of medial condyle. **Adductor magnus** is inserted on the tubercle.
- **Medial epicondyle**: a low rounded elevation on the medial aspect and lies below and a little in front of adductor tubercle. It gives attachment to **medial collateral ligament of knee**.
- Its lateral surface forms the medial wall of intercondylar fossa.

LATERAL CONDYLE:

- Smaller but stronger than medial condyle.
- Lateral epicondyle: a low rounded elevation on lateral aspect. It gives attachment to **lateral collateral ligament of knee**.
- There is a groove between the epicondyle and articular margin.
- Popliteus arises from anterior part of the groove while its posterior part lodges the tendon of the muscle in full flexion of knee.
- Its medial surface forms lateral wall of intercondylar fossa.

INTERCONDYLAR FOSSA/ NOTCH:

- It is a deep notch, which separates two condyles posteriorly.
- It is limited posteriorly above by intercondylar line.
- It presents medial and lateral walls and floor.
- Medial wall of the fossa provides attachments to the upper end of **posterior cruciate ligament** in its anteroinferior part.
- Lateral wall of the fossa provides attachment to the upper end of **anterior cruciate ligament** in its posterosuperior part.



MNEMONIC:

- L – Lateral condyle provides attachment to:
- A - Anterior cruciate ligament.
- M - Medial condyle provides attachment to:
- P – Posterior cruciate ligament.

ARTICULAR SURFACE:

- Articular surface has the shape of inverted 'V'.
- It is divided into 2 parts:
 - a) Upper patellar surface: for articulation with patella.
 - b) Lower tibial surface: for articulation with condyles of tibia.

Side View



PATELLAR SURFACE:

- Forms the upper part of articular surface and articulates with patella.
- It extends over the anterior surface of both condyles but more on the lateral condyle.
- It is separated from the tibial surface by two faint grooves, each of which is related to respective meniscus during full extension of knee.

TIBIAL SURFACE:

- Forms the posterior and inferior parts of the articular surface of each condyle.
- It is convex.
- Divided into medial and lateral parts by intercondylar fossa.
- Above and in front the two parts are continuous with the patellar surface.
- The tibial articular surfaces articulate with the condyles of tibia with semilunar cartilages intervening