The Fibula

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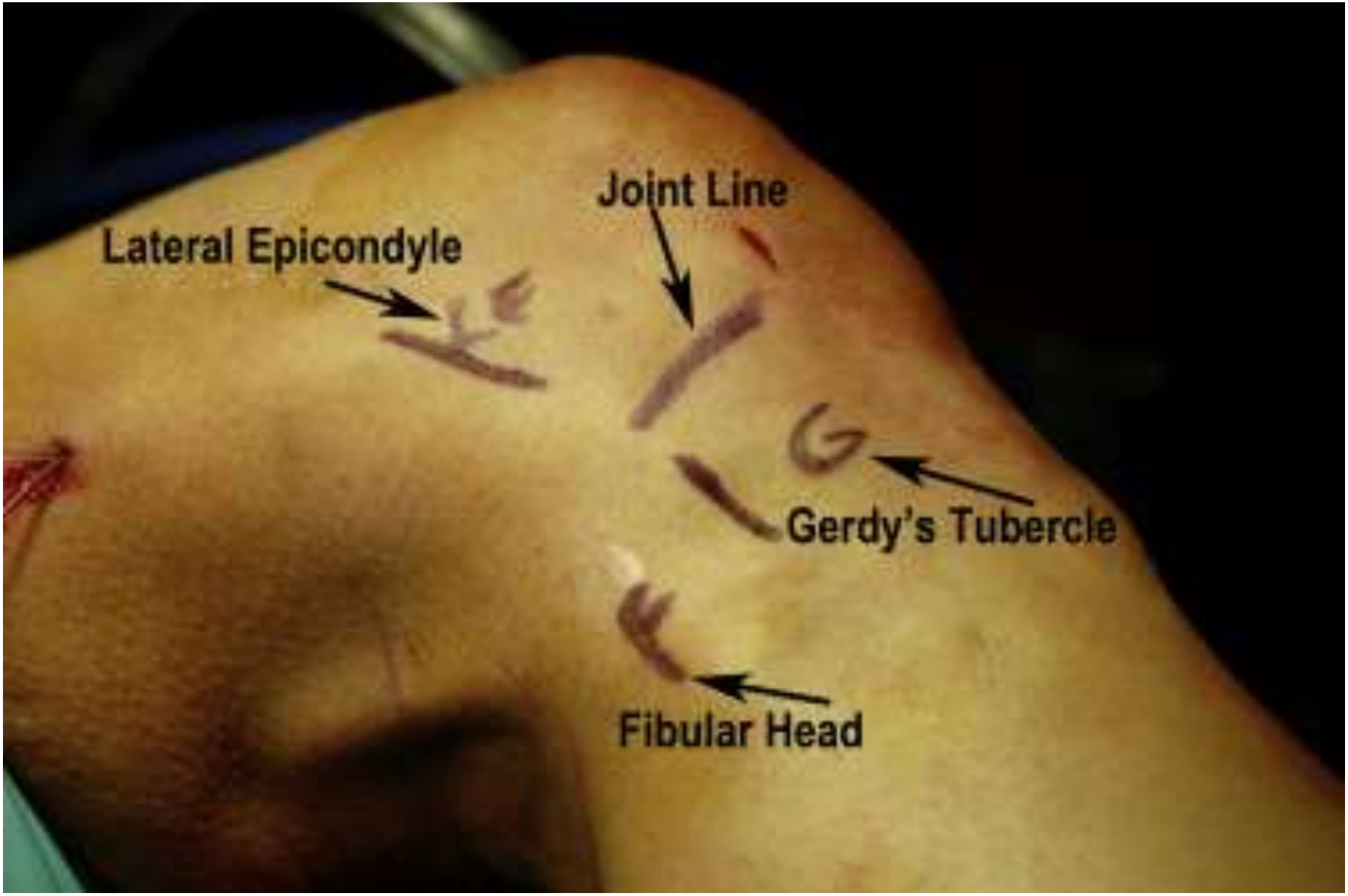
The Fibula

- **The Fibula** is the lateral bone of the leg and is homologous with the **ulna** of the forearm.
  - In Latin, the term fibula means “pin”; therefore the lateral bone of leg is rightly referred to as fibula because it’s a long pin-like bone.
- It’s a long thin postaxial bone of the leg and will not take part in the transmission of the body weight.
- Its main function is to act as an attachment for muscles, and not as a weight-bearer.

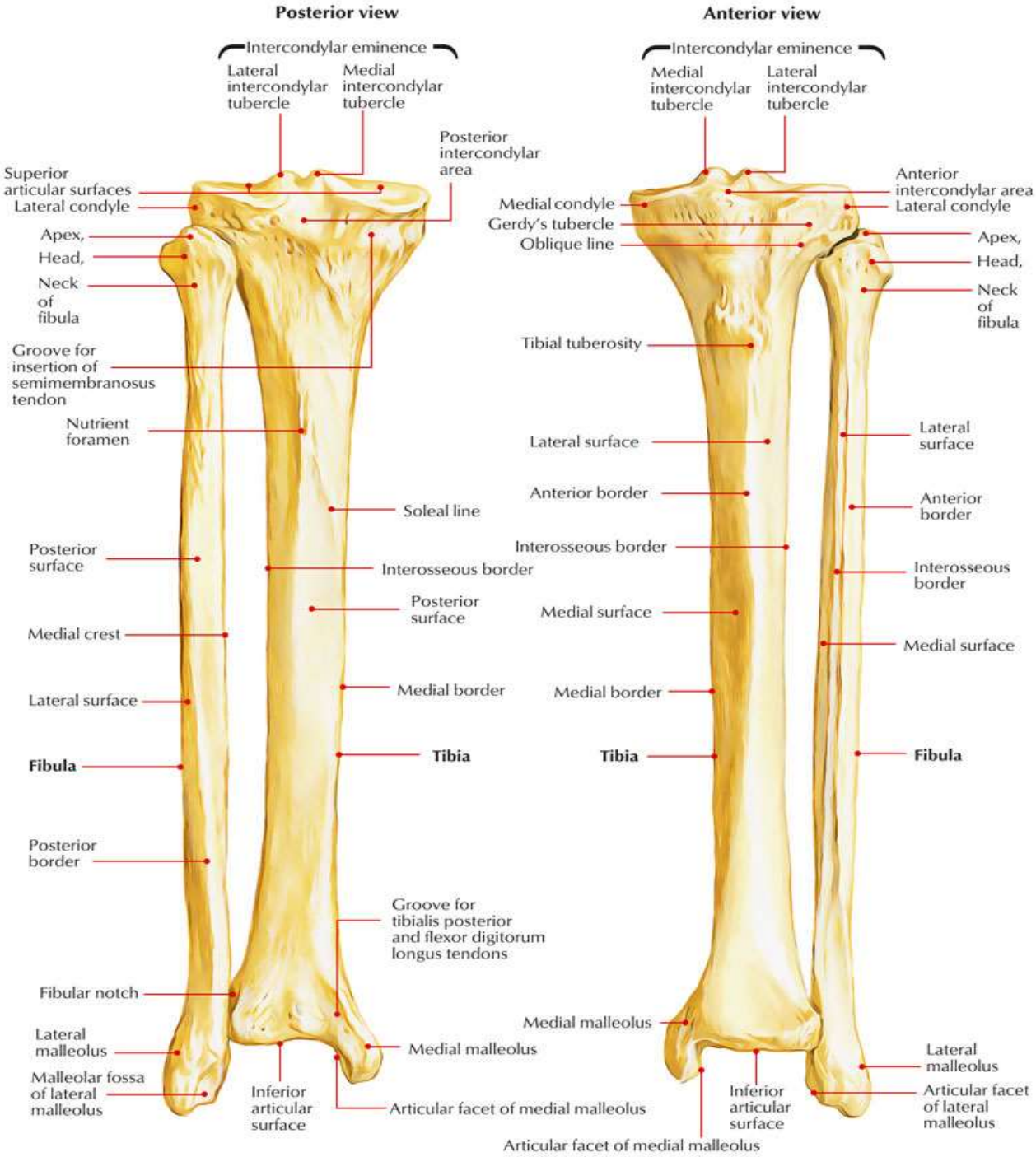

Joint Line
Lateral Epicondyle
Gerdy's Tubercle
Fibular Head

LATERAL

MEDIAL

Articulations of the fibula

- It has three main articulations:
- **Proximal tibiofibular joint** – articulates with the lateral condyle of the tibia.
- **Distal tibiofibular joint** – articulates with the fibular notch of the tibia.
- **Ankle joint** – articulates with the talus bone of the foot.


Posterior view
Intercondylar eminence
Lateral intercondylar tubercle
Medial intercondylar tubercle
Posterior intercondylar area
Superior articular surfaces
Lateral condyle
Apex,
Head,
Neck of fibula
Groove for insertion of semimembranosus tendon
Nutrient foramen
Soleal line
Posterior surface
Interosseous border
Posterior surface
Medial crest
Medial border
Lateral surface
Tibia
Fibula
Posterior border
Groove for tibialis posterior and flexor digitorum longus tendons
Fibular notch
Lateral malleolus
Medial malleolus
Malleolar fossa of lateral malleolus
Inferior articular surface
Articular facet of medial malleolus
Anterior view
Intercondylar eminence
Medial intercondylar tubercle
Lateral intercondylar tubercle
Anterior intercondylar area
Medial condyle
Lateral condyle
Gerdy's tubercle
Oblique line
Apex,
Head,
Neck of fibula
Tibial tuberosity
Lateral surface
Lateral surface
Anterior border
Anterior border
Interosseous border
Interosseous border
Medial surface
Medial surface
Medial border
Tibia
Fibula
Medial malleolus
Lateral malleolus
Inferior articular surface
Articular facet of lateral malleolus
Articular facet of medial malleolus

The fibula

Bony Landmarks

- **Proximal:**
- At the proximal end, the fibula has an enlarged head, which contains a facet for articulation with the **lateral condyle** of the tibia. On the posterior and lateral surface of the fibular neck, the **common (peroneal)fibular** nerve can be found.
- **Shaft:**
- The fibular shaft has **three** surfaces:
  - anterior, lateral and posterior.
  - The leg is split into three compartments, and each surface faces its respective compartment e.g anterior surface faces the anterior compartment of the leg.
- **Distal:**
- Distally, the lateral surface continues inferiorly, and is called the **lateral malleolus.** The lateral malleolus is more prominent than the medial malleolus, and can be palpated at the ankle on the lateral side of the leg

The fibula
PARTS

- The upper end (head):
  - It is round and presents a circular articular facet.
  - An upward projection posterolateral to this facet is termed styloid process.
- The shaft:
  - It has anterior, interosseous, and posterior borders; and medial, lateral, and posterior surfaces. Nonetheless, only interosseous border is clear cut; other edges and surfaces are vague.
- The lower end:
  - It is flattened and bears a triangular articular facet on its medial surface for articulation with all the talus.
  - Behind and below this is really a roughened fossa termed **malleolar fossa**.

SIDE DECISION AND ANATOMICAL POSITION

- The side of fibula can be set by holding it vertically in such a way that:
  - Its round end termed head is directed upward.
  - Its comparatively flattened end is pointed downward.
  - A triangular articular facet on its lower end faces medially.
  - A depression at the lower end (malleolar fossa) is located behind and below the triangular articular facet at this end.

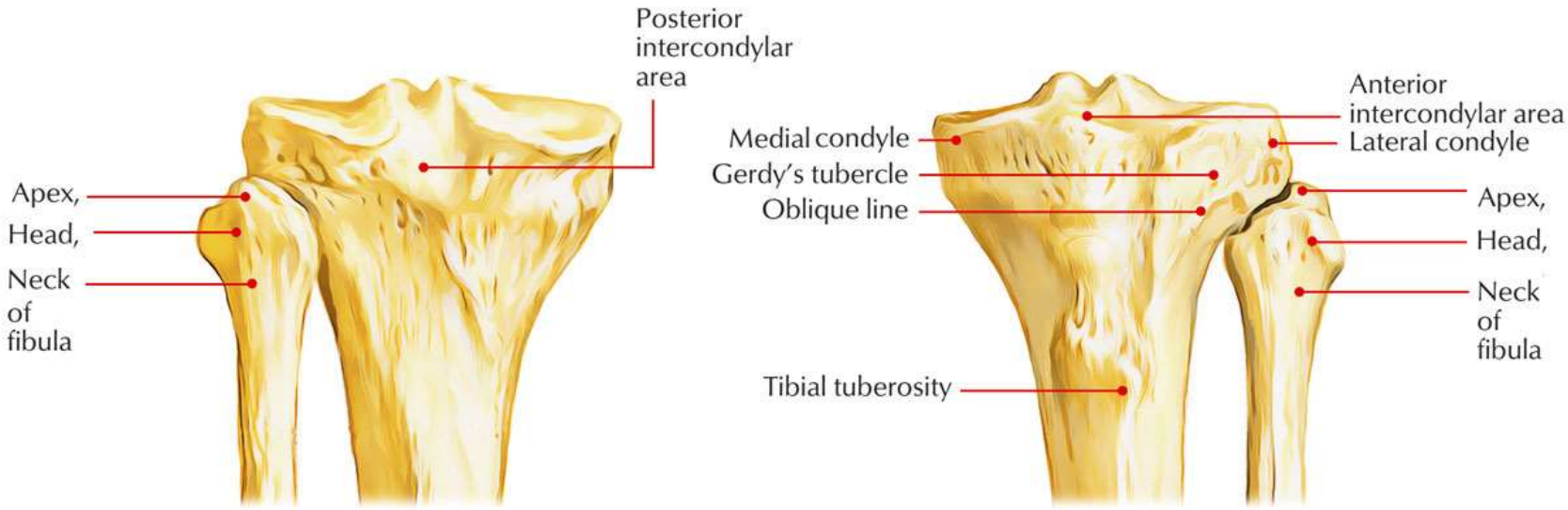
UPPER END of the Fibula

- It is slightly expanded in all directions. The superior surface bears a circular articular facet which articulates with the **lateral condyle** of the **tibia**.
- The apex of the head or the styloid process projects upwards from its posterolateral aspect.
- The constriction immediately below the head is known as the neck of the fibula.

Head of the fibula

- **Head** is round and bulky. It presents the following 3 features:
  - An oval or circular articular facet on its superior aspect for articulation together with the lateral condyle of the tibia.
  - A styloid process posterolateral to the articular facet which gives connection to the fibular collateral ligament.
  - A sloping surface in front of the styloid process for C-shaped insertion of **biceps femoris**.

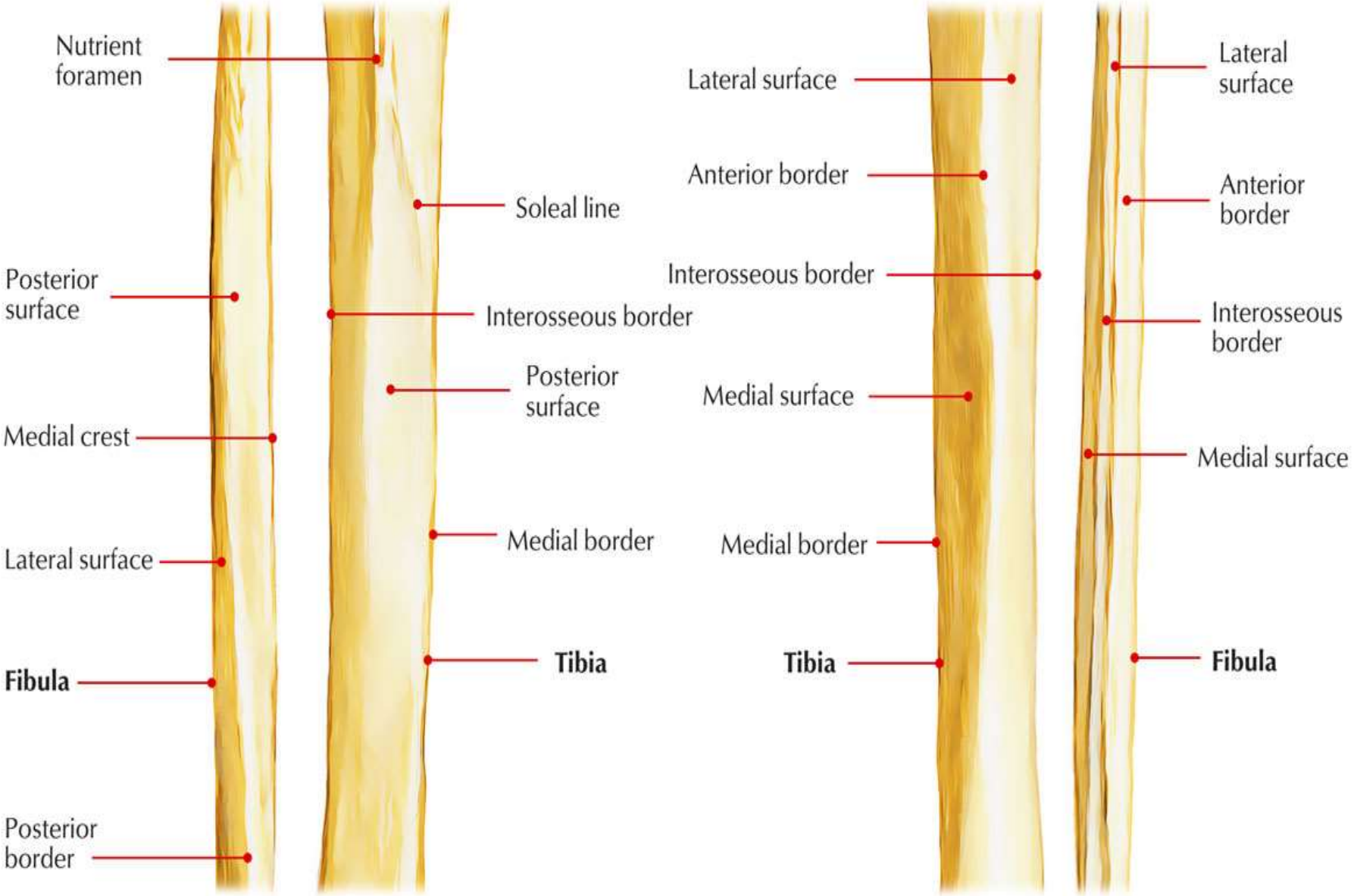
Head of the fibula



Neck of the fibula

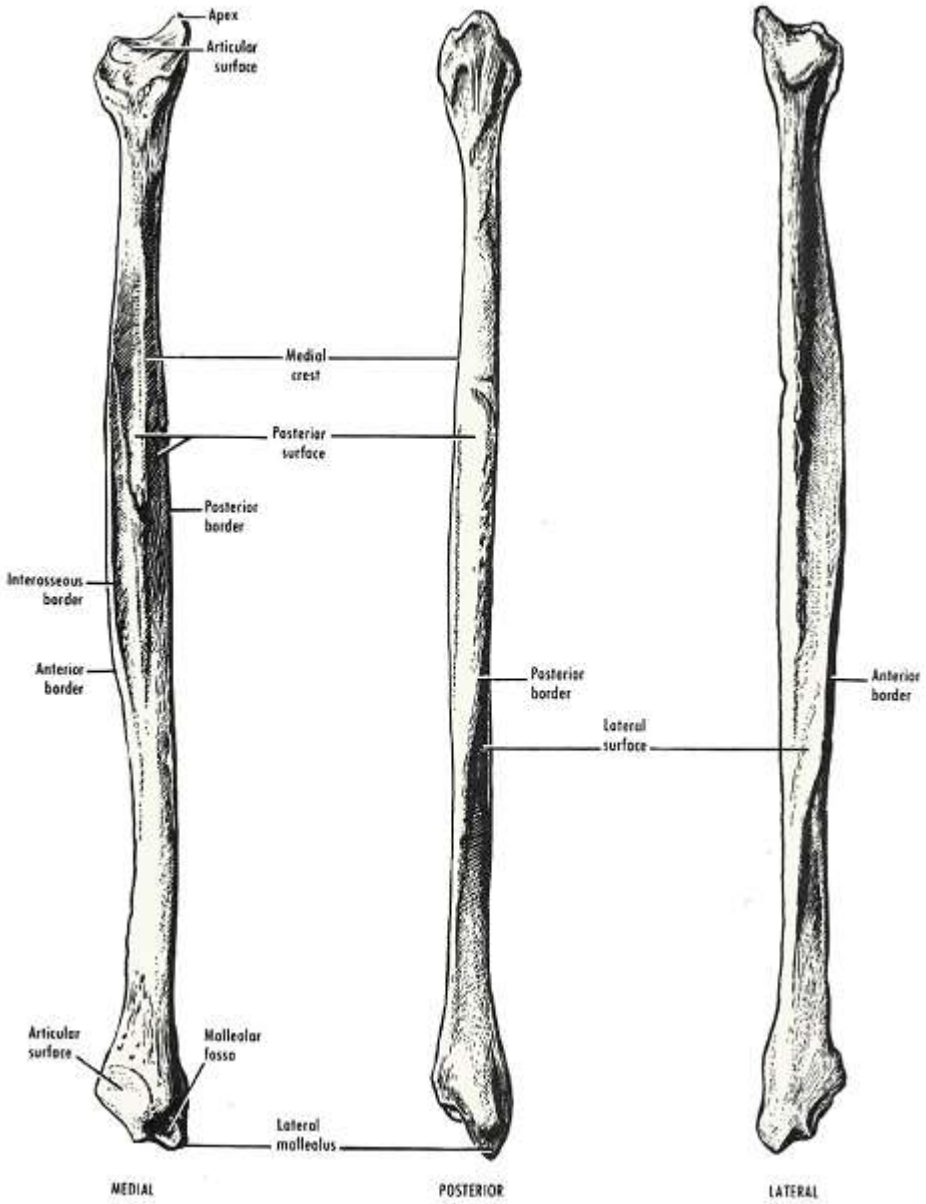
- **Neck** It's a constriction below the head, linking it with the shaft.
- The **common peroneal nerve** is associated with the posterolateral aspect of neck and **anterior tibial artery** on its medial aspect.

SHAFT of the fibula



Shaft of the fibula

- The shaft shows considerable variation in its form because it is moulded by the muscles attached to it.
- It is long, slightly twisted.
- It has three borders
  - Anterior ,
  - Posterior ,
  - Interosseous ;
- Three surfaces:
  - Medial ,
  - Lateral ,
  - Posterior .


Apex
Articular surface
Medial crest
Posterior surface
Posterior border
Interosseous border
Anterior border
Articular surface
Malleolar fossa
Lateral malleolus
MEDIAL
Posterior border
Lateral surface
POSTERIOR
Anterior border
LATERAL

Borders
of the Shaft of the fibula

- All 3 borders are very sharp but not very straight and the fibula shows slight torsion.
- The medial border is sometimes called the medial crest in posterior surface.
- The fibula has 4th introsseous border found in the middle of the medial surface.

Anterior border

- The anterior border begins just below the anterior aspect of the head.
- At its lower end it divides to enclose an elongated triangular area which is continuous with the lateral surface of the lateral malleolus.
  - It gives connection to the anterior intermuscular septum of the leg in its upper three-fourth.

Posterior Border

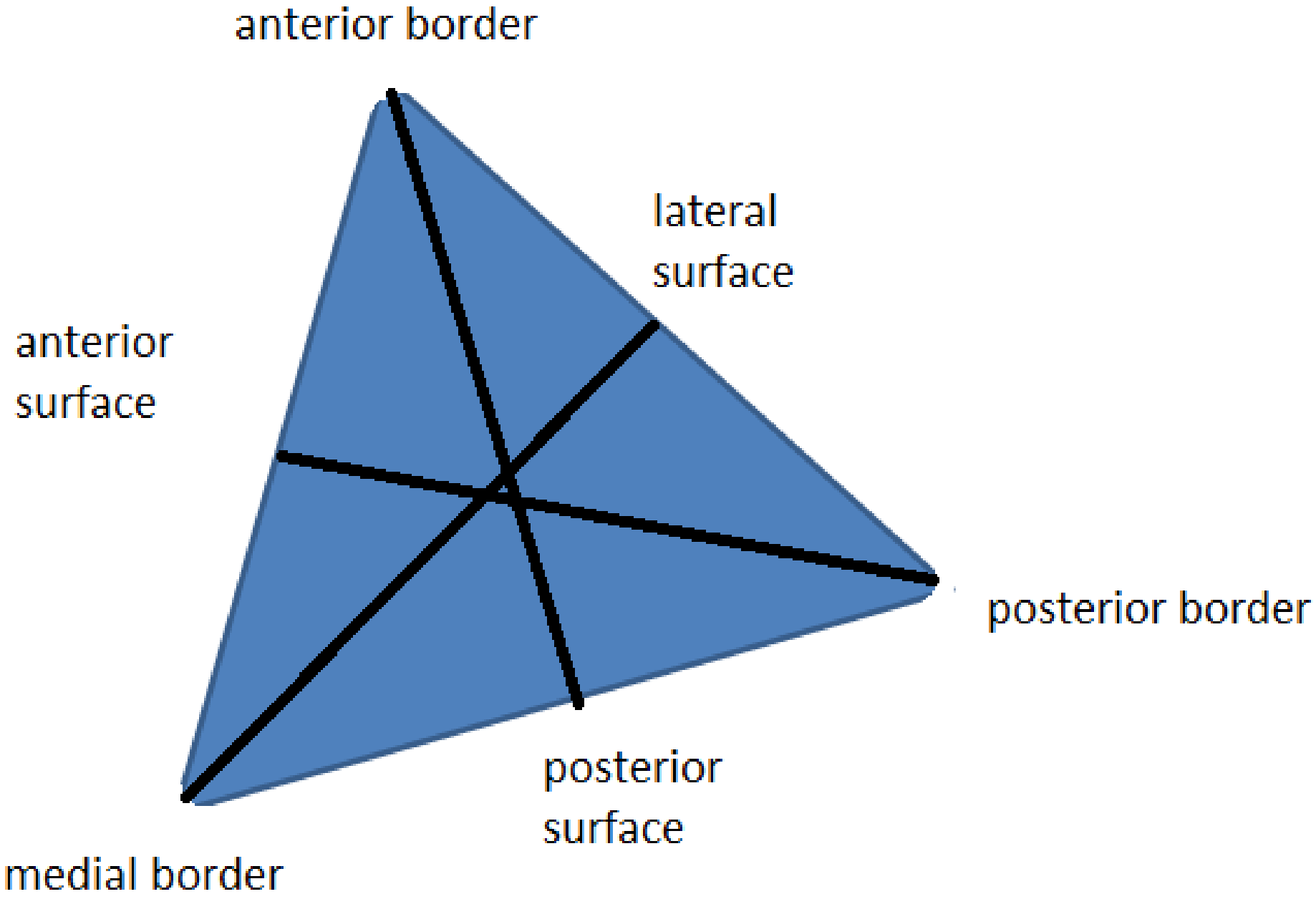
- The posterior border is rounded.
- Its upper end lies in line with the styloid process. Below, the border is continuous with the medial margin of the groove on the back of the lateral malleolus.
- It goes from the posterior aspect of head to the lateral margin of groove on the posterior surface of the lateral malleolus.
- Posterior intermuscular septum of the leg is connected to its upper three fourth.

Interosseous or medial Border

- The interosseous or medial border lies just medial to the anterior border, but on a more posterior plane.
- It terminates below at the upper end of a roughened area above the talar facet of the lateral malleolus.
- In its upper two-thirds, the interosseous border lies very close to the anterior border and may be indistinguishable from it.
- Interosseous membrane is connected along its entire length with the exception of at the upper end to make a gap for the passage of anterior tibial vessels.

Surfaces

- The medial surface (Extensor) lies between the anterior and interosseous borders.
- In its upper two-thirds, it is veiy narrow, measuring 1 mm or less.
- The lateral (Peroneal) surface lies between the anterior and posterior borders. It is twisted backwards in its lower part .
- The posterior (Flexor)surface is the largest of the three surfaces. It lies between the interosseous and posterior borders. In its upper two-thirds, it is divided into two parts by a vertical ridge called the medial crest.


anterior border
lateral surface
anterior surface
posterior border
posterior surface
medial border

Medial (Extensor) Surface

- It's narrow and is located between the anterior and interosseous edges.
- It gives origin to **extensor digitorum longus** in upper three-fourth (entire width of its upper fourth and anterior half of its middle 2-fourth).
- **Extensor hallucis longus** originates from the posterior half of the middle two-fourth medial to the extensor digitorum longus.
- Its lower quarter gives origin to the peroneus tertius.

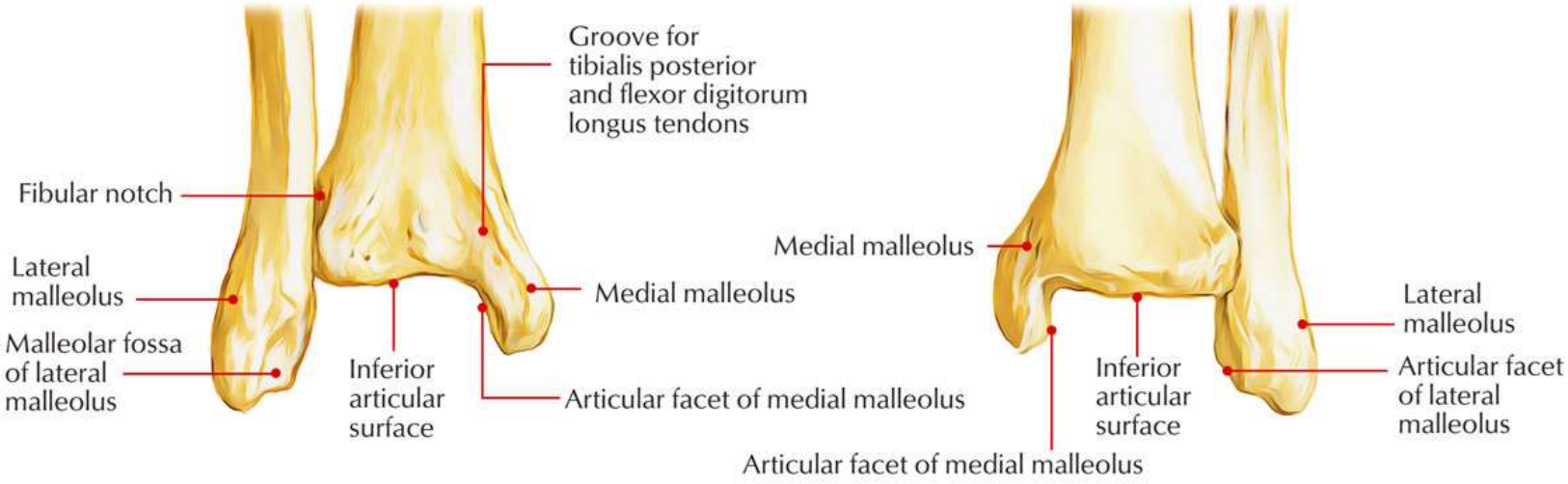
Lateral (Peroneal) Surface

- It is located between the anterior and posterior border.
- Peroneus longus originates from the upper two-third (whole width of upper one-third and the posterior half of the middle one-third).
- **Peroneus brevis** originates from the anterior half of its middle one-third and entire width of its lower one-third.

Posterior (Flexor) Surface

- It's wide-ranging and is located between the interosseous and posterior edges.
- Its upper two-third is split into medial concave and flattened lateral parts by a sharp vertical ridge medial crest.
- **Fascia** covering the **tibialis posterior** is connected to the medial crest.
- Medial concave part gives origin to tibialis posterior.
- Lateral flattened part gives origin to the soleus in upper quarter and to the **flexor hallucis longus** in lower three-fourth.
- **Peroneal artery** descends along medial crest.
- Nutrient artery, a branch of the **peroneal artery**, enters the nutrient foramen present just above the middle of the posterior surface.

LOWER END


Groove for
tibialis posterior
and flexor digitorum
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Fibular notch
Lateral
malleolus
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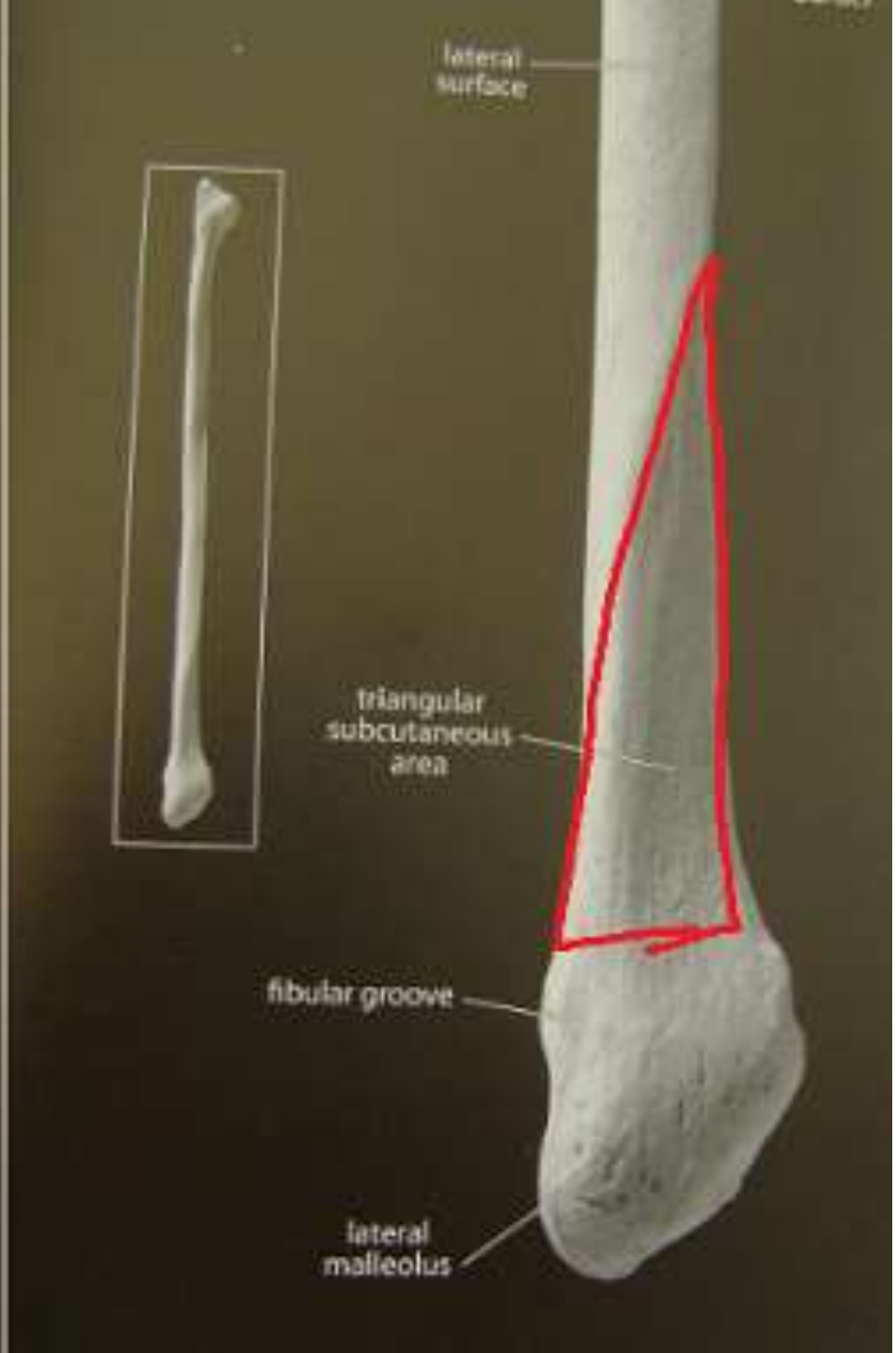
Articular facet of medial malleolus

Right fibula — lateral view

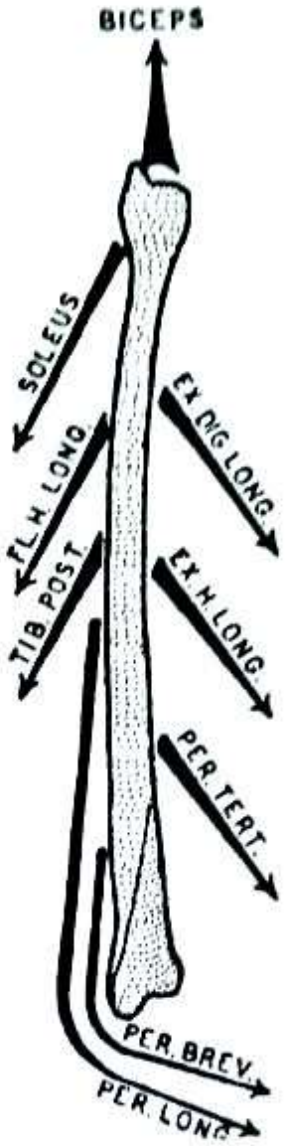


Lower End of Fibula

- The lower end of fibula is enlarged anteroposteriorly to form lateral malleolus, which presents 4 surfaces anterior, posterior, medial, and lateral.
- Anterior surface is rough and round. It gives connection to the anterior talofibular ligament. A notch at its lower border gives connection to the calcaneofibular ligament.
- Posterior surface presents a groove, which lodges tendons of peroneus brevis and peroneus longus, the latter being superficial to the former.
- Medial surface presents a triangular articular surface in front and a depression (malleolar fossa) below and behind it.
- Lateral surface is triangular and subcutaneous.

Malleolar fossa

- The upper part of malleolar fossa gives connection to
  - The **posterior tibiofibular ligament**.
  - Its lower part to the posterior talofibular ligament.



The posterior surface gives origion to **three** *muscles*

1. **Soleus**
3. **Flexor hallucis longus**
2. **Tibialis posterior**

The anterior part of the medial surface gives origin to **three** *muscles*

1. **Extensor digitorum longus**
3. **Extensor hallucis lonugs**
2. **Peroneus tertius**

The lateral surface gives origin to **two** *muscles*

2. **Peroneus brevis**
1. **Peroneus longus**

- One muscle the biceps femoris is inserted in the head of fibula
- All the other muscles take origin from the fibula.

Three muscles arise from anterior part of the medial Surface of Fibula

- **Extensor digitorum longus- from the the upper 3/4th of the medial surface.**
- **Peroneus tertius-from the From the lower 1/4th of medial surface.**
- **Extensor hallucis longus – From the middle 2/4(1/2) of the medial surface**

Two muscles arise from the lateral surface of fibula

- **The peroneus longus: from its upper 2/3rd of lateral surface.**
- **The peroneus brevis: from the lower 1/3rd of lateral surface.**

Three muscles arise from the posterior surface of Fibula

- **Tibialis Posterior – from the medial side of the posterior surface.**
- **Soleus – from the back of the head & Upper one third of the posterior surface.**
- **Flexor hallucis longus – from the lateral side of the posterior surface.**

Remember the following facts about the fibula

A. Three structures are related to its upper end: a muscle, a nerve, & a ligament.

1. **The biceps is inserted in the head of fibula**
2. **The lateral popliteal nerve, can be palpated against posterolateral aspect of the head.**
3. **The lateral ligament of the knee, attached to a flattened impression on the lateral aspect of the head.**

B. The lower part of the fibula has two triangular areas:

1. **One immediately above the medial surface of the lateral malleolus.**
2. **One immediately above the lateral surface of the lateral malleolus (which is subcutaneous)**

C. The subcutaneous part of the fibula are:

1. **The head at about the level of the tuberosity of the tibia.**
2. **The lateral malleolus.**
3. **The triangular area at the lower 1/3rd of the lateral surface of the shaft.**

The **fabella**

The **fabella** (Latin for little bean) (or flabella) is a small sesamoid bone found in some mammals embedded in the tendon of the lateral head of the gastrocnemius muscle behind the lateral condyle of the femur.

OSSIFICATION

- The fibula ossifies from 3 centers:
- 1 primary and two secondary.

  - 1. Primary center appears in the middle of the shaft: at the age of eighth week of Intrauterine life.
  - 2. Secondary centers:
    - For the upper end: Appearance: 3-4 years.
      - Fusion with all the shaft: 20 years.
    - For the lower end: Appearance: 1-2 years.
      - Fusion with all the shaft: 18 years.

CLINICAL SIGNIFICANCE

- **BONE GRAFTS**
- Since the fibula doesn't take part in the transmission of body weight, it's a common source of bone for grafting.
- The upper and lower ends of the fibula are subcutaneous and palpable.
- The **common peroneal nerve** can be rolled against the neck of the fibula. This nerve is commonly injured here.
- In the first stage of Pott's fracture, the lower end of the fibula is fractured spirally.
- Though it does not bear any weight, the lateral malleolus and the ligaments attached to it are very important in maintaining stability at the the **ankle joint**.

FIBULAR FRACTURE

- The fibula is often fractured, 2 to 5 cm proximal to the distal end of the lateral malleolus. It's commonly related to 'fracture dislocation of the **ankle joint**'.

Clinical Relevance: Fractures of the Fibula

- At the ankle, the lateral malleolus of the fibula is prone to fracture. There are two main ways in which this occurs.
- The first way is by forced **external rotation** of the ankle. This force of the talus against the bone causes a **spiral** fracture of the lateral malleolus.
- The other, less common way, by the foot being twisted outwards (called **eversion**). Again, the talus presses against the lateral malleolus, and this time causes a **transverse**fracture.

Fracture of the Fibula