MED439
KING SAUD UNIVERSITY

Popliteal fossa, back of the leg and sole of the foot

Musculoskeletal Block - Lecture 15

Objective:

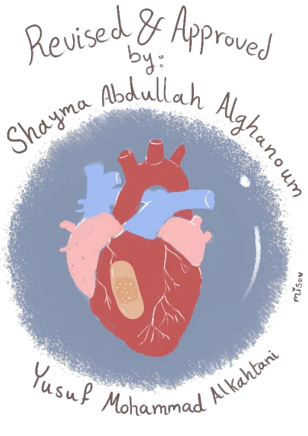
✓ The location, boundaries & contents of the popliteal fossa

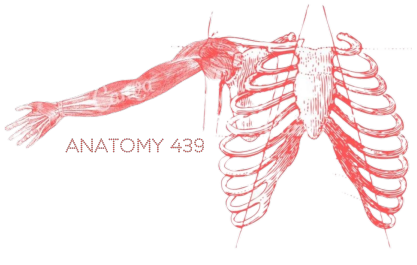
✓ The contents of posterior fascial compartment of Leg.

✓ The structures hold by retinacula at ankle.

✓ Layers forming in the sole of foot & bone forming the arches of the foot.

Color index:
Important
In male's slides only
In female's slides only
Extra information, explanation





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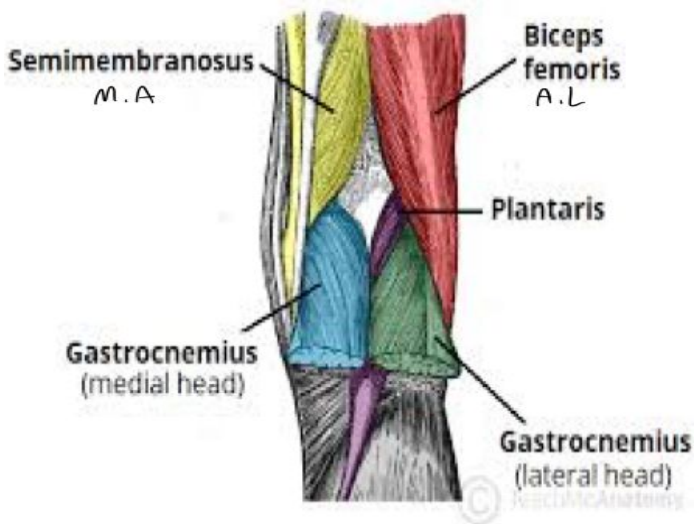
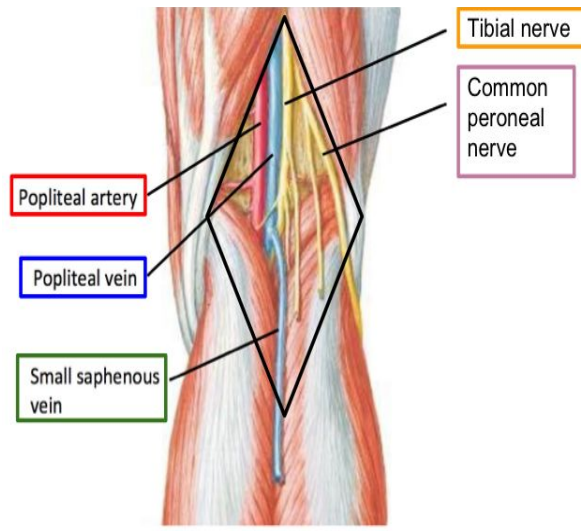
Popliteal Fossa: It Is a diamond-shaped intermuscular space at the back of the knee

Boundaries





Laterally	Medially	Roof	Floor	From medial to lateral
above biceps femoris. **Below** lateral head of gastrocnemius & plantaris	**above** semimembranosus & semitendinosus. **Below** medial head of gastrocnemius	1-Skin 2-superficial fascia and deep fascia of the thigh.	1-popliteal surface of femur 2-posterior ligament of knee joint 3-popliteus muscle.	1- Popliteal vessels 2- Small saphenous vein 3- Tibial nerve. 4-Common peroneal nerve. 5-Posterior cut. nerve of thigh. 6-Connective tissue & popliteal lymph nodes. The deepest structure is popliteal artery.*

CONTENTS OF THE POSTERIOR FASCIAL COMPARTMENT OF THE LEG

The transverse intermuscular septum of the leg is a septum divides the muscles of the posterior compartment into superficial and deep groups.

Transverse section

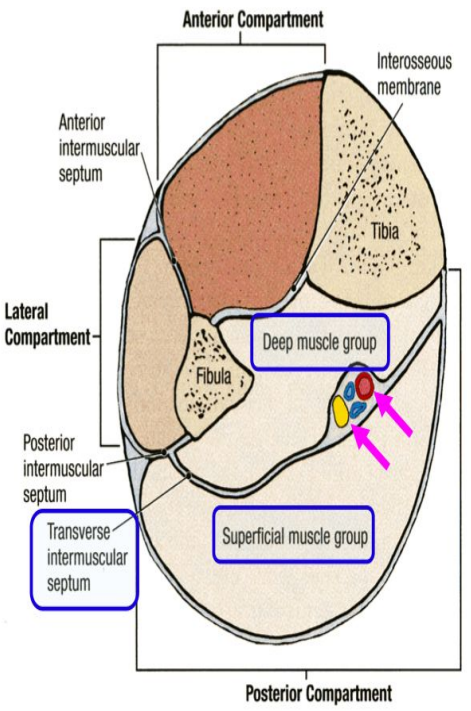
Contents

Superficial group of muscles
1. Gastrocnemius
2. Plantaris
3. Soleus

Deep group of muscles
1. Popliteus
2. Flexor digitorum longus
3. Tibialis posterior
4. Flexor hallucis longus

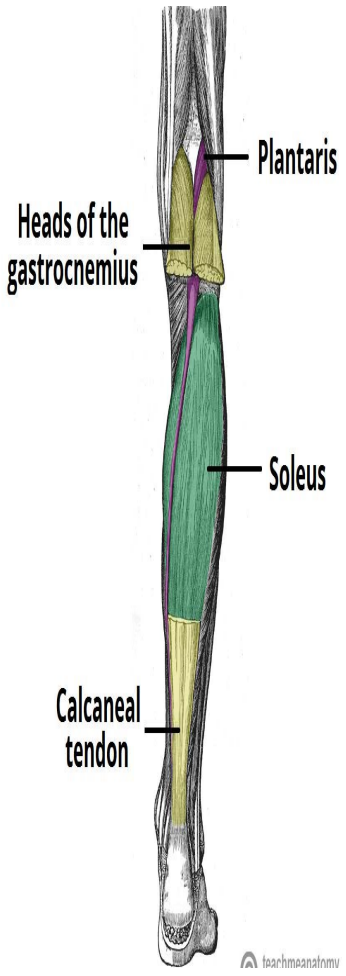
Posterior tibial artery
It is one of the terminal branches of the popliteal artery.

Tibial nerve
It is the larger terminal branch of the sciatic nerve in the lower ⅓ of the back of the thigh



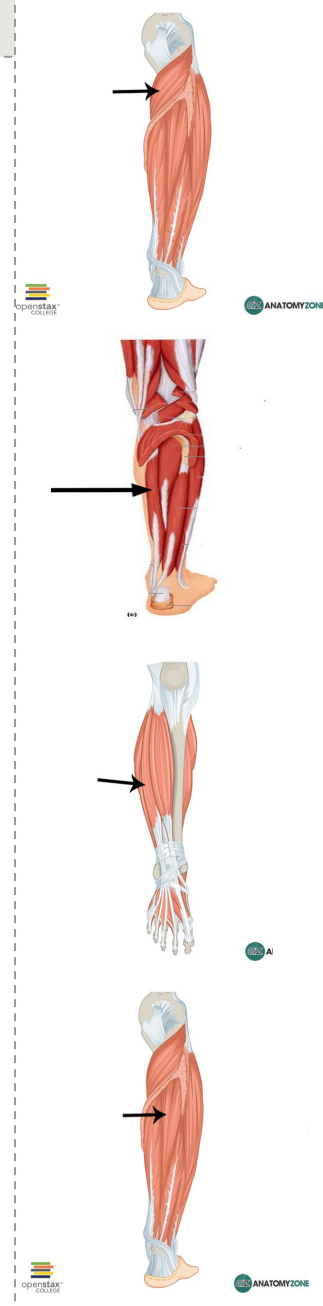
Superficial Group Muscle

Muscle	Origin	Insertion	Action	Nerve
Gastrocnemius	Lateral head from lateral condyle of femure medial head from above medial condyle	Posterior surface of calcaneum via tendo calcaneus	Plantar flexes foot at ankel joint flexes knee joint	**Tibial Nerve**
Plantaris	Lateral supeacondylar ridge of femur	Posterior surface of caclcaneum		
Soleus	Shafts of tibia and fibula	Posterior surface of calcaneum via tendo calcaneus	Together with gastrocnemius and plantaris is powerful plantar flexor of ankle joint , provides main propulsive force in walking and running	



deep group

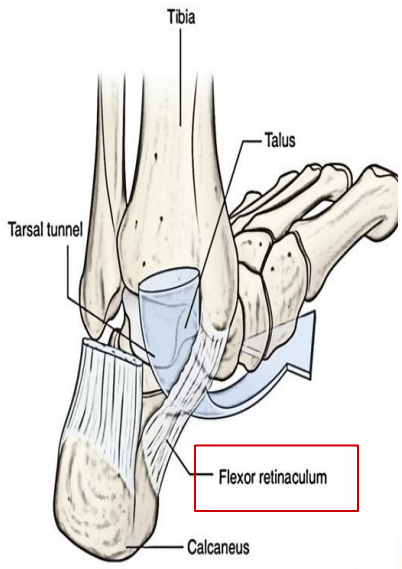
Muscle	Origin	Insertion	Action	Nerve
Popliteus	Groove on Lateral surface of lateral condyle of femur (Intracapsular)	Post surface of shaft of tibia above soleal line	Flexes knee joint: Unlocks knee joint by lateral rotation of femur on tibia(or slight medial rotation of leg which accompanies the flexion)	**Tibial Nerve**
Flexor digitrorum longus	Posterior surface of shaft tibia	Bases of distal of phalanges of lateral 4 toes	Flexes distal phalanges of lateral four toes; plantar Flexes foot at ankle joint; Supports medial and lateral longitudinal arches	
Flexor hallucis longus	Posterior surface of shaft of fibula	Base of distal phalanx of big toe	Flexes distal phalanx of big toe; plantar flexes foot at ankle joint; supports medial longitudinal	
Tibialis posterior	Posterior surface of shafts of tibia and fibula and interosseous membrane	Tuberosity of navicular bone and other neighboring tarsal bones.	Plantar flexes foot at lateral four toes; plantar ankle joint; inverts foot at Flexes foot at ankle joint; subtalar and transverse tarsal supports lateral longitudinal arches	



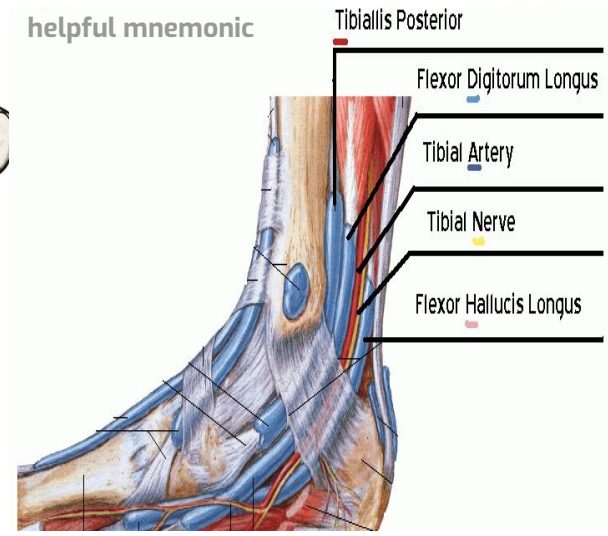
flexor retinaculum: Extend from the back of **medial malleolus of tibia** to **medial side of calcinum**

Structures that passes deep to it:

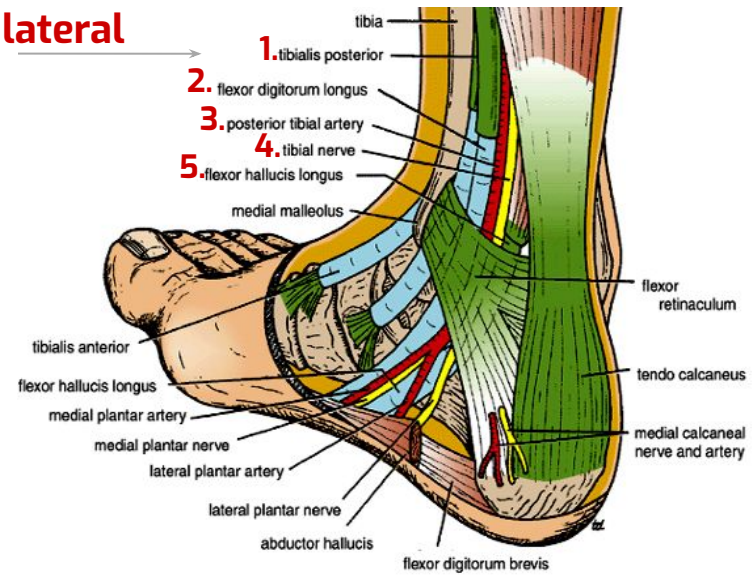
Tom Does A Very Nice Head



helpful mnemonic



From medial to lateral



ˆall the tendons are surrounded by synovial sheath.

1. **the skin** of the sole of the foot is **thick and hairless.**

2. it shows a **few flexure creases** at the site of the skin movement. **(تجاعيد باطن القدم اقل من تجاعيد باطن اليد بسبب قلة حركة باطن القدم)**

3. **Sweating glands** are present in large numbers.

Sole of the foot

1st layer (more superficial layer)	**1.** abductor hallucis. **2.** flexor digitorum brevis. **3.** abductor digiti minimi.
2nd layer	**1.** Quadratus plantae. **2.** Lumbricals. **3.** Flexor digitorum longus tendon. **4.** Flexor hallucis longus tendon.
3rd layer	**1.** Flexor hallucis brevis. **2.** Adductor hallucis. **3.** Flexor digiti minimi brevis.
4th layer (deepest layer)	**1.** Interossei; (3 plantar & 4 dorsal). **2.** Peroneus longus tendon. **3.** Tibialis posterior tendon.

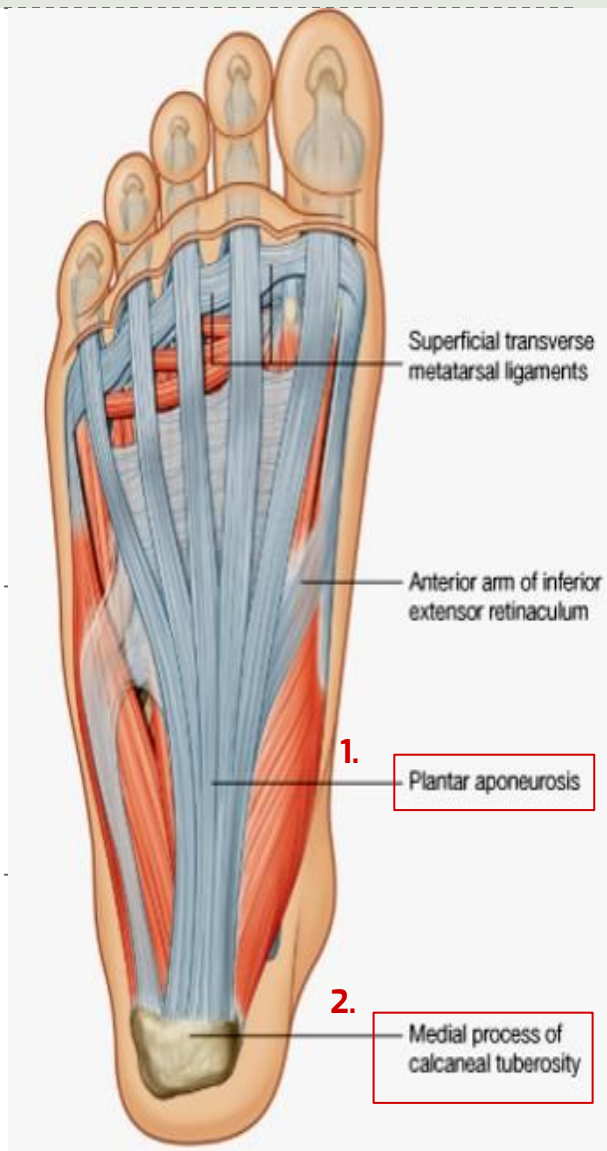
The muscles of the sole are conveniently described in **four layers from** superficial to deep.

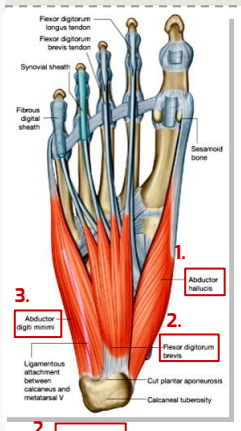
Deep fascia of the sole

1. The **plantar aponeurosis** is a triangular **thickening of the deep fascia** that protects the underlying nerves, blood vessels, and muscles.

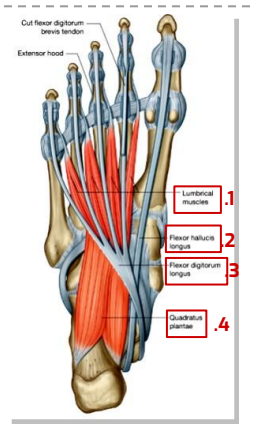
2. Its **apex** is attached to the **medial and lateral tubercles of the calcaneum**.

3. The **base** of the aponeurosis divides into **five slips** that pass into the **toes**.

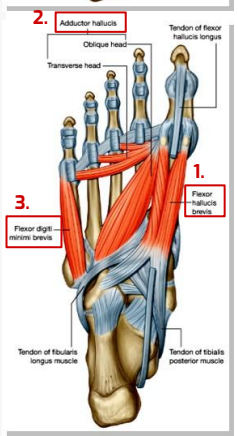




1st layer



2nd layer



3st layer

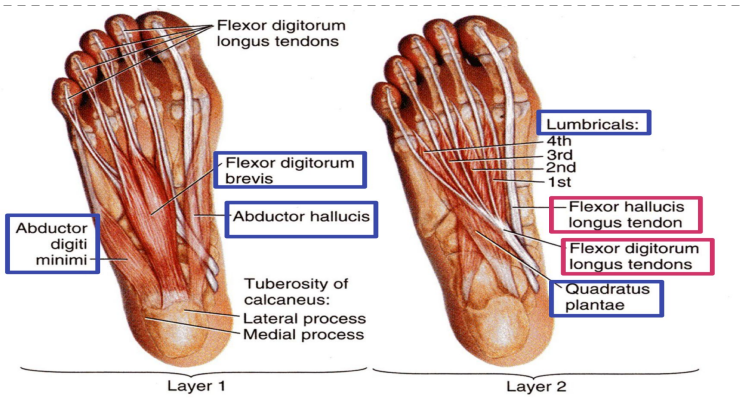
4st layer

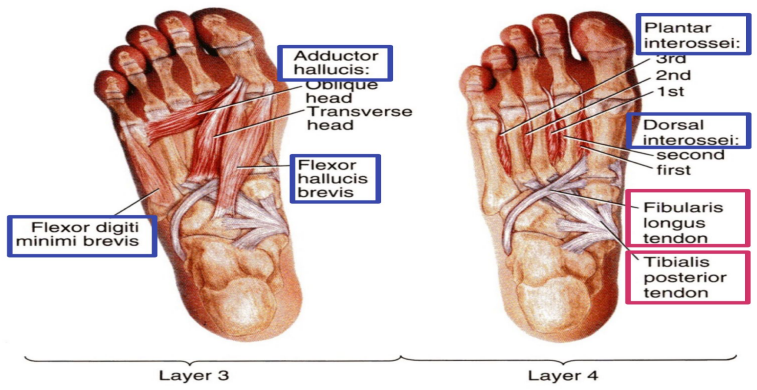
The function of small muscles of sole of Foot:

Unlike the small muscles of the hand, the sole muscles have few delicate functions and are chiefly concerned with **supporting the arches of the foot**.

They control **movements of individual** toes,
this function is rarely used in most people.

(usually we don't hold anything by our foot so no need for this function)



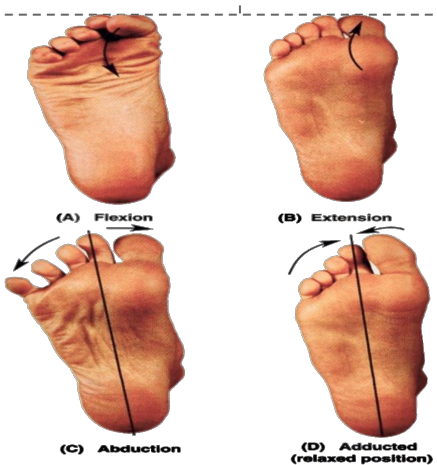


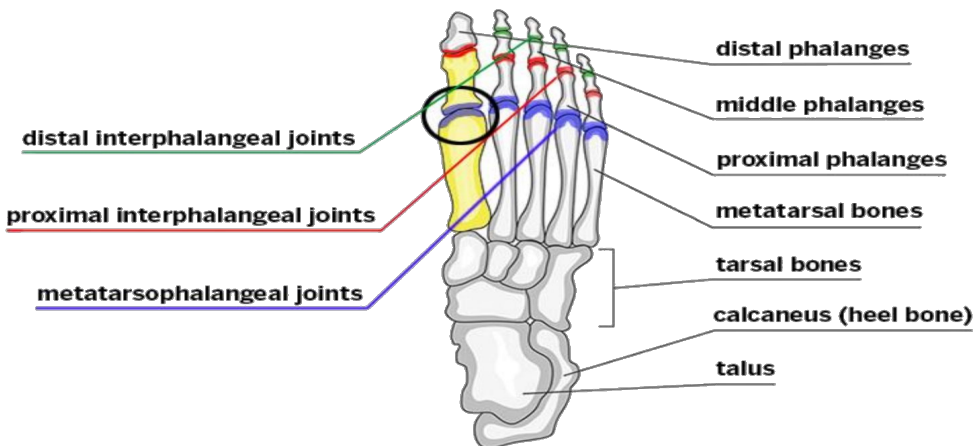
Metatarsophalangeal joints

Movement	Muscles*
Flexion (A)	• **Flexor digitorum brevis** • **Lumbricals.** • **Interossei.** • **Flexor hallucis brevis.** • **Flexor hallucis longus.** • Flexor digiti minimi brevis. • Flexor digitorum longus.
Extension (B)	• **Extensor hallucis longus.** • **Extensor digitorum longus.** • **Extensor digitorum brevis.**
Abduction (C)	• **Abductor hallucis.** • **Abductor digiti minimi.** • **Dorsal interossei.**
Adduction (D)	• **Adductor hallucis.** • **Plantar interossei.**

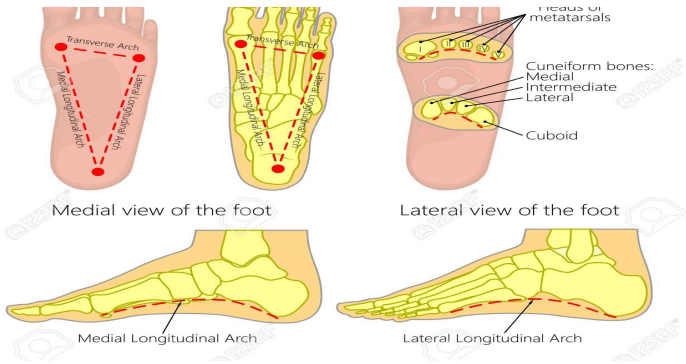
Interphalangeal joints

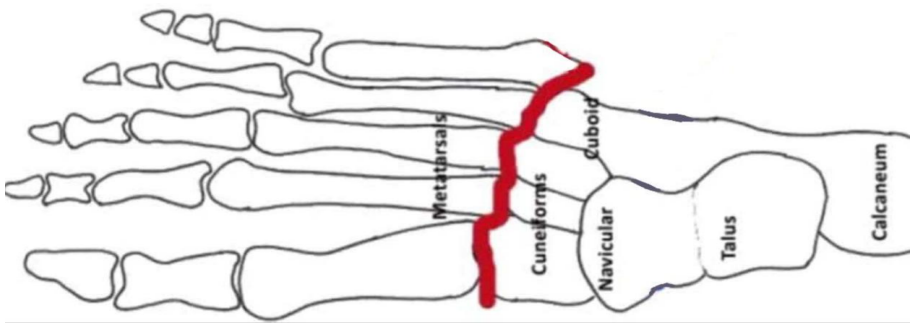
Movement	Muscles*
Flexion (A)	• **Flexor hallucis longus.** • **Flexor digitorum longus.** • **Flexor digitorum brevis.** • Quadratus plantae.
Extension (B)	• **Extensor hallucis longus.** • **Extensor digitorum longus.** • **Extensor digitorum brevis.**





Arches of foot

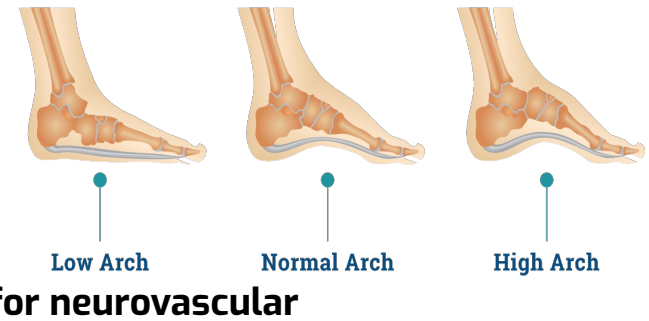




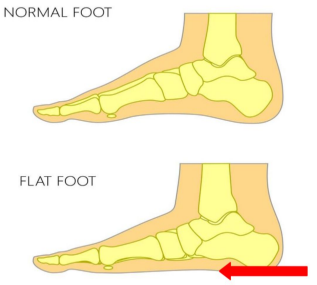
Medial longitudinal arches	Lateral longitudinal arch	Transverse arch
Is formed of **calcaneum**, **talus**, **navicular**, **3 cuneiform bones**, and **3 medial metatarsal bones**.	Is formed of **calcaneum**, **cuboid** & **lateral 4th & 5th metatarsal bones**.	Lies at the level of **tarso-metatarsal joints**, formed of **bases of metatarsal bones**, **cuboid** & **3 cuneiform bones**.

Function of the arches

- **Weight bearing.**
- **Act as shock absorber.**
- **Support walking & running.**
- **Provide potential space for neurovascular bundle of the sole.**



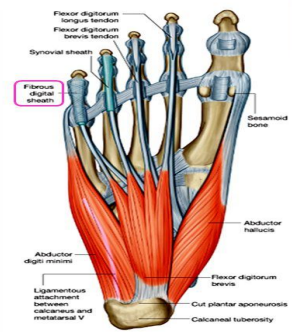
-In a young child (up to 3 years),the foot appears to be **flat** because of presence of a **large amount of subcutaneous fat** on the sole of foot.(flat foot of adults is abnormal)



Fibrous flexor sheaths

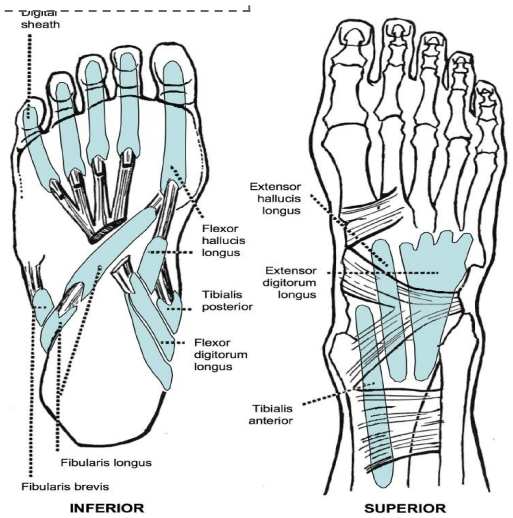
The inferior surface of each toe, from the **head** of the **metatarsal bone** to the **base** of the **distal phalanx,** is provided with a strong **fibrous sheath,** which is attached to the sides of the phalanges.

The fibrous sheath, together with the inferior surfaces of the phalanges and the interphalangeal joints, forms a **blind tunnel** in which lie the **flexor tendons of the toes**. (these tendons pass under the sheath)



Synovial flexor sheaths

Surround the tendons of the **flexor hallucis longus** and the **flexor digitorum longus**.



MCQs

Q1: The nerve supply of soleus muscle is ?

A.median nerve
B.tibial nerve
C.axillary nerve
D.femoral nerve

Q2: which one of the muscle found in deep group ?

A.Gastrocnemius
B.Soleus
C.Plantaris
D.Popliteus

Q3: which one is The origin of Flexor digitorum longus ?

A.Posterior surface of shafts of tibia and fibula
B.Posterior surface of shaft fibula
C.anterior surface of shaft tibia
D. Posterior surface of shaft tibia

Q4: The Boundaries of Popliteal Fossa is Laterally above ?

A.plantaris
B.head of gastrocnemius
C.biceps femoris.

Q5: flexor retinaculum of the foot is extend from ?

A. Back of lateral malleolus of tibia.
B. Back of medial malleolus of tibia.
C. front of medial malleolus of tibia.
D. Front of lateral malleolus of tibia.

Q6: which of the following is true about the sole of foot ?

A. sweating glands in small no.
B. the skin is thin.
C. the skin is hairless.
D. shows lots of flexure creases.

Q7: which one of the following layers is composed of adductor hallucis ?
A. 1st layer.
B. 2nd layer.
C. 3rd layer.
D. 4th layer.

Q8: How many splits that the base of the aponeurosis of the sole divide ?

A. 5 splits.
B. 4 splits.
C. 2 splits.
D. 3 splits.

Q9: plantar interossei muscle responsible for ?

A.flexion
B.Adduction
C.Extension
D.abduction

Q10: Transverse arch is lies at the level of ?

A.Tarso-metatarsal joints
B.Metatarsophalangeal joints
C.Interphalangeal joints
D.intermetatarsal joints

Q11: the lateral longitudinal arch is formed of ?
A. Carpometacarpal joints
B. Calcaneum , cuboid & the lateral 2 metatarsals
C All the tarsals except cuboid
D. tarsometatarsal joints

Q12: quadratus plantae muscle responsible for?

A.flexion
B.Adduction
C.Extension
D.abduction

1)B 7)C
2)D 8)A
3)D 9)B
4)C 10)A
5)B 11)B
6)C 12)A

SAQs

1. Mention the structures that passing deep to flexor retinaculum in the foot. “remember the mnemonic”

2. Mention three functions for the foot arches?

2.Act as a.Shock absorber
3.Gives additional space for the neurovascular bundle
1.slide (4)
2:
1.Weight bearing

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