Back of Leg

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If we are facing the right direction, all we have to do is keep on walking.

Buddhist Proverb
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Learning Objectives

By the end of this teaching session on Back of leg – II all the MBBS 1st year students must be able to:

• Enumerate the deep muscles of back of leg
• Describe the origin, insertion, nerve supply & actions of deep muscles of back of leg
• Describe locking and unlocking of knee joint
• Name the nerve and arteries of posterior compartment of leg
• Describe the origin, course relations & branches of tibial nerve
• Discuss the applied anatomy of structures in posterior compartment of leg
Deep Muscles of Back of Leg
Deep muscles of posterior compartment of leg
(Popliteus, Flexor digitorum longus, Flexor hallucis longus, Tibialis posterior)

1. Popliteus
2. Flexor digitorum longus
3. Flexor hallucis longus
4. Tibialis posterior
**Popliteus**

**Origin:**
- Lateral surface of lateral condyle of femur
- Outer margin of lateral meniscus

**Insertion:**
Posterior surface of tibial shaft
Above soleal line

**Actions:**
Unlocking of knee joint prior to flexion
Locking and Unlocking of knee- foot on the ground

**What locks the knee joint?**

- Articular surface geometry
- NOT Muscles

**What Unlocks the knee joint?**

- POPLITEUS

**MECHANISM- when foot is on the ground:**

**LOCKING:** Femur rotates *medially* on the tibia for LOCKING the knee joint at the end of extension

- Medial rotation of femur (MRF)

**UNLOCKING:** Femur rotates *Laterally* on the tibia for UNLOCKING the knee joint before flexion can be initiated/ prior to flexion

- At the end of extension – knee joint locked
Locking and Unlocking of knee-foot off the ground

What locks the knee joint?
Articular surface geometry

What Unlocks the knee joint?
POPLITEUS

MECHANISM- when foot is off the ground:

LOCKING: Tibia rotates laterally on the femur for LOCKING the knee joint at the end of extension

UNLOCKING: Tibia rotates Medially on the femur for UNLOCKING the knee joint before flexion can be initiated
**Flexor Digitorum Longus**

**Origin:**
- Posterior surface of tibia
- Upper 2/3rd of medial part below soleal line

*Ends in tendon that divides into 4 slips 1 for each of lateral 4 toes*

**Insertion:**
Plantar surface of base of distal phalanges of lateral 4 toes
Flexor Digitorum Longus contd......

- FDL tendon crosses Tibialis posterior in lower leg
- FDL tendon crosses tendon of FHL in sole
- Tendon of FDL receives insertion of flexor digitorum accessories (quadratus plantae)
- Digital slips of tendons give origin to 4 lumbrical muscles
Flexor Hallucis Longus

**Origin:**
1. Lower 3/4\textsuperscript{th} of posterior surface of fibula

**Insertion:**
Plantar surface of base of distal phalanx of great toe
1. Tendon related to posterior surface of lower end of tibia

3. Then between the two tubercles on the posterior surface of the body of the talus

4. Runs forward below sustentaculum tali

5. Passes deep to flexor retinaculum

6. In sole crossed by tendon of FDL

7. then distally on the plantar surface of the foot in the second layer of muscles (5) where it gives rise to the Knot of Henry, then into a synovial sheath within the flexor sheath of the great toe.
**Tibialis posterior**

**Origin:**
1. Posterior surface of tibia below soleal line, upper 2/3rd of lateral part
2. Posterior surface of fibula in front of medial crest
3. Posterior surface of interosseous membrane

**Insertion:**
- Tuberosity of navicular bone
- Other tarsal bones (except talus)
- 2nd, 3rd, 4th metatarsal bones
• Tendon passes behind medial malleolus-in a groove

• Beneath flexor retinaculum

• Terminal part supports the spring ligament
## Deep muscles- nerve supply & actions

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<th>Muscles</th>
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<td>Tibial nerve</td>
<td>Unlocking of locked knee prior to flexion</td>
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<tr>
<td>Flexor Digitorum Longus</td>
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<td>Flexes distal phalanges of lateral 4 toes, plantar flexion of ankle, supports longitudinal arches</td>
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<tr>
<td>Tibialis Posterior</td>
<td>Tibial nerve</td>
<td>Plantar flexion of ankle, inversion at subtalar joint, supports medial longitudinal arch</td>
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Posterior tibial artery

Beginning-
Lower border of popliteus, between tibia & fibula
Enters leg – deep to soleal arch
Descends medially – reaches medial ankle midway between medial malleolus and medial tubercle on calcaneum

Termination-
Deep to flexor retinaculum
Divides into medial & lateral plantar arteries
Posterior tibial artery- relations

SUPERFICIAL

In upper 2/3rd
Gastrocnemius, Soleus & superficial septum

In lower 1/3rd
Skin & fascia (2.5cm in front and parallel to tendo achilles)

At ankle
Flexor retinaculum

DEEP

In upper 2/3rd
Tibialis posterior

In lower 1/3rd
Flexor Digitorum longus

At ankle
Capsule of ankle joint (between FDL & FHL)
Branches

- Peroneal artery (largest branch)
- Muscular branches (to muscles of back)
- Nutrient artery to tibia
- Anastomotic branches
  - Circumflex fibular (around knee joint)
  - Malleolar (medial malleolus)
  - Communicating (5cm above ankle)
  - Calcanean (around heel)
- Terminal branches
  - Medial plantar
  - Lateral plantar
Peroneal artery
(largest branch of posterior tibial artery)

**Beginning**
- 2.5 cm below lower border of popliteus
- Descends laterally – along medial crest of fibula
- Passes behind inferior tibiofibular & ankle joints

**Termination**
- Divides into many calcanean branches
Branches of peroneal artery

- Muscular branches (to muscles of posterior & lateral compartment)
- Nutrient artery to fibula
- Anastomotic branches
  - Communicating (5 cm above ankle)
  - Perforating branch (pierces interosseus membrane 4 cm above ankle)
  - Lateral malleolar
  - Calcanean (around heel)
**Tibial nerve**
*(course in leg)*

Enters leg – deep to soleal arch

Descends medially – reaches medial ankle midway between medial malleolus and medial tubercle on calcaneum

**Termination**-
Deep to flexor retinaculum
Divides into medial & lateral plantar arteries
SUPERFICIAL

In upper 2/3rd
Gastrocnemius, Soleus & superficial septum

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Skin & fascia (2.5cm in front and parallel to tendo achilles)

At ankle
Flexor retinaculum

DEEP

In upper 2/3rd
Tibialis posterior

In lower 1/3rd
Flexor Digitorum longus

At ankle
Capsule of ankle joint (between FDL & FHL)
Tibial nerve – Branches in leg

**MUSCULAR:**
Muscles of posterior compartment superficial & deep (to popliteus & gastrocnemius in popliteal fossa)

**CUTANEOUS:**
Medial calcanean branches

**ARTICULAR:**
To the ankle joint

**TERMINAL:**
Medial & Lateral plantar nerves
Tibial nerve injury in the leg

DUE TO:
1. Fracture of tibia
2. Tight plasters
3. Compression under flexor retinaculum

SENSORY LOSS:

MOTOR LOSS:
• Superficial and deep muscles of calf
• Muscles of sole
Ankle jerk reflex

- Achilles tendon reflex is tested by tapping the calcaneal tendon to elicit plantar flexion at the ankle joint.
- Both afferent and efferent limbs of the reflex arc are carried in the tibial nerve (S1, S2).
- Ankle jerk reflex tests spinal nerves S1-S2.
Venous Thrombosis

• Sitting immobile for long periods like Long distance air travel
• Thrombosis of soleal venous sinuses
• May cause thromboembolism
Posterior tibial Pulse

LOCATION:

2 cm below and behind the medial malleolus

Felt against Calcaneum
Achilles Tendon Rupture

- most common initial symptom of Achilles tendon rupture is a sudden snap at the lower calf, intense pain, and inability to point the foot downward.
What is Fabella?

- Latin word *faba* means bean and '-ella' is a Latin diminutive suffix...thus fabella means a *little bean*.
- small sesamoid bone found embedded in the tendon of the lateral head of the gastrocnemius muscle behind the lateral condyle of the femur
Tarsal Tunnel syndrome

Tarsal tunnel syndrome causes burning pain with pins and needles or numbness in the heel and arch of the foot.
Sural nerve & Plantaris Tendon Graft

Nerve grafting
Replacement of an area of defective nerve with a segment from a sound one

The plantaris tendon is an extremely tensile structure used for flexor tendon replacement in hand surgery. Removal has no effect on normal limb function. Absent in 9% of the population.
• Muscles that help to plantar flex the foot at ankle joint
• Muscles that flex the toes
• Muscle that brings about unlocking of knee joint
• Posterior tibial artery........
• Tibial nerve........
• Structures deep to flexor retinaculum.....TDANH
The hardest walk is walking alone, but it’s also the walk that makes you the strongest.