Back of Leg

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“Only those who risk going too far, can possibly find out how far one can go.”

— T.S. Elliot
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Learning Objectives

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

• Enumerate the contents of superficial fascia of back of leg
• Write a short note on small saphenous vein
• Describe cutaneous innervation in the back of leg
• Write a short note on sural nerve
• Enumerate the boundaries of posterior compartment of leg
• Enumerate the fascial compartments in back of leg & their contents
• Write a short note on flexor retinaculum of leg- its attachments & structures passing underneath
• Describe the origin, insertion nerve supply and actions of superficial muscles of the posterior compartment of leg
Introduction - Back of Leg / Calf

- Powerful superficial antigravity muscles
  - (gastrocnemius, soleus)

- Muscles are large in size
- Inserted into the heel
- Raise the heel during walking
Superficial fascia of Back of leg

- Contains **superficial veins** -
  - small saphenous vein with its tributaries
  - part of course of great saphenous vein
- **Cutaneous nerves in the back of leg** -
  1. Saphenous nerve
  2. Posterior division of medial cutaneous nerve of thigh
  3. Posterior cutaneous nerve of thigh
  4. Sural nerve
  5. Lateral cutaneous nerve of calf
  6. Peroneal / Sural communicating nerve
Short saphenous Vein

**Formation:**
- On dorsum of foot
- By union of lateral end of dorsal venous arch with lateral marginal vein

**Course:**
- Passes behind lateral malleolus (*with sural nerve*)
- Lateral to Tendo- Achilles
- Ascends in subcutaneous fat on the back of leg along midline of calf
- Reaches lower part of popliteal fossa
- Pierces deep fascia
- Drains into popliteal vein
- Communicates with great saphenous through several channels
Short saphenous vein contd........

- **Termination:**
  - Drains into popliteal vein

- **Drainage Territory:**
  - Lateral border of foot
  - Heel
  - Back of leg

- **Relations:**
  - Accompanied by sural nerve
Great Saphenous vein (Recap)

**Formation:**
- On dorsum of foot
- By union of medial end of dorsal venous arch with medial marginal vein

**Course:**
- Passes in front of medial malleolus
- Enters back of leg
- In lower 1/3rd leg - obliquely across medial surface of tibia
- In upper 2/3rd – along medial border of tibia
- Reaches posteromedial knee
- In thigh – inclines forwards
- Reaches saphenous opening
Cutaneous Innervation of Back of Leg

- Region of skin – 3 vertical areas
- Each by 2 nerves
  - **Medial area** –
    - Posterior branch of medial cutaneous nerve of thigh
    - Saphenous nerve
  - **Central area** –
    - Posterior cutaneous nerve of thigh
    - Sural nerve
  - **Lateral area** –
    - Lateral cutaneous nerve of calf
    - Peroneal communicating nerve
Saphenous nerve
(L3,L4 – posterior division of femoral nerve)

• Originates in femoral triangle
• Descends, pierces fascia on medial knee between Sartorius & gracilis
• Accompanies GSV

Distribution:

Medial side of leg

Medial border of foot upto the ball of great toe
Posterior division of medial cutaneous nerve of thigh
(L2, L3 – branch of anterior division of femoral nerve)

Skin of uppermost part of medial area of calf
Posterior cutaneous nerve of thigh
(S1, S2, S3 – a branch of sacral plexus)

• Descends along small saphenous vein

• Supplies skin of upper half of calf (the back of leg)
Sural nerve
(L5, S1, S2 - branch of tibial nerve in popliteal fossa)

• Descends between the two heads of gastrocnemius
• Accompanies small saphenous vein
• Peroneal communicating nerve joins it 5 cm above heel
• Passes behind lateral malleolus
• Runs forwards towards lateral border of foot
• Ends near lateral side of little toe
Lateral cutaneous nerve of calf
(L4,L5,S1-branch of common peroneal nerve in popliteal fossa)

- Supplies skin of upper 2/3rd of lateral part of leg (in front & back)
Peroneal / Sural communicating nerve
(L5,S1,S2-branch of common peroneal nerve)

• Origin from common peroneal nerve
• Descends in back of leg
• Joins sural nerve 5cm above heel
Calcanean branches of tibial nerve
(S1, S2 – medial calcanean branches of tibial nerve)

- Given off from the tibial nerve close to heel
- Branches pierce the flexor retinaculum
- Supply the skin of
  - Heel
  - Medial side of sole of foot
Deep fascia of leg

- Downward continuation of popliteal fascia
- Attached to medial border of tibia
- Surrounds the calf, peroneal compartment then extensor compartment
- Attached to anterior border of tibia
- Attached to lower end of fibula (where it is subcutaneous)
- Forms intermuscular septae
- Posterior intermuscular septum separates lateral from posterior compartment
Compartments of Leg

- Anterior compartment
- Lateral compartment
- **Posterior compartment**
Boundaries
Boundaries of posterior compartment of leg

**ANTERIORLY:** Tibia, interosseous membrane, fibula, posterior intermuscular septum

**POSTERIORLY:** Deep fascia of leg
Deep fascia and modifications in leg
The posterior compartment is divided into 3 subdivisions—by 2 strong fascial septa which are:

- Superficial transverse septum
- Deep transverse septum
Superficial transverse fascial septum

- Separates superficial & deep muscles of back of leg
- Encloses posterior tibial vessels & tibial nerve

**ATTACHMENTS:**

Above - soleal line of tibia & back of fibula
Below - continuous with flexor & peroneal retinacula
Medially – medial border of tibia
Laterally – posterior border of fibula
Deep transverse septum
Separates tibialis posterior from long flexors of toes

ATTACHMENTS:
Above- Interosseus membrane
Below- superficial fascial septum
Medially – vertical ridge on posterior surface of tibia
Laterally- Medial crest of fibula
Flexor retinaculum

• ATTACHMENTS:

Anteriorly-
posterior border & tip of medial malleolus

Posteriorly & laterally-
medial tubercle of calcaneum
Structures passing deep to flexor retinaculum  
(Medial to Lateral)

- a) Tendon of Tibialis Posterior
- b) Tendon of Flexor Digitorum Longus
- c) Posterior Tibial artery with its branches & accompanying veins
- d) Tibial nerve & its terminal branches
- e) Tendon of Flexor Hallucis Longus

Each tendon is surrounded by its own synovial sheath

FR is Pierced by medial calcanean vessels & nerves close to calcaneum

Lower part of deep surface gives origin to abductor hallucis muscle
Muscles of Back of Leg
**Muscles of Back of leg**

**Superficial**
1. Gastrocnemius - Top gear muscle
2. Soleus - Bottom gear muscle
3. Plantaris - Rudimentary muscle

**Deep**
1. Popliteus - Unlocks the knee joint
2. Flexor digitorum longus
3. Flexor Hallucis longus
4. Tibialis posterior (Deepest)

Large Gastrosoleus due to erect posture

Divorced tendon of gastrocnemius - long plantar ligament
Divorced distal part of soleus - FDB

Tendo Calcaneus - strongest tendon

Soleus acts as peripheral heart
Gastrocnemius
(Muscle of top gear)

- Large muscle
- Superficial to soleus
- Has 2 heads
  - Medial head
  - Lateral head
- 2 heads of gastrocnemius & soleus-combine to form- **Triceps Surae**
Origin:

Medial Head: tendinous origin from-
1. Medial condyle behind adductor tubercle
2. Adjoining popliteal surface
3. Capsule of knee joint

Lateral Head: tendinous origin from-
   a. Lateral surface of lateral condyle
   b. Lateral supracondylar line
   c. Capsule of knee joint

Insertion:

tendon joins tendon of soleus – forms

Tendo - Achilles which is
Inserted on middle 1/3rd of posterior surface of calcaneum
Soleus
(Muscle of bottom gear)

- **Soleus** is the Latin word for a flat sort of sandal
- Sole shaped muscle
- Deep to gastrocnemius
- Multipennate muscle (power)
**Origin:**

Dome shaped origin from:

1. **FIBULA**
   - Back of head
   - Upper 1/4th of posterior surface

2. **TIBIA**
   - Soleal line
   - Middle 1/3rd of medial border

3. **SOLEAL ARCH**

**Insertion:**

tendon joins tendon of gastrocnemius – forms

**Tendo – Achilles** which is

Inserted on middle 1/3rd of posterior surface of calcaneum
**Tendo Achilles**

- Thickest and strongest tendon
- 15 cm long

**Begins:**
- Middle of leg
- Receives fibres of soleus on deeper aspect almost upto its end
Naming of Tendo Achilles?
Soleus- peripheral heart

- Muscles of calf play an important role in circulation
- Contraction helps in venous return
- Specially soleus- *peripheral heart*

Large valveless venous sinuses in soleus
Blood in sinuses pushed upwards on muscle contraction
When the muscle relaxes the sinuses suck in blood through perforating veins
**Plantaris**
*(vestigial muscle - short belly, long tendon)*

**Origin:**
1. Lower part of lateral supracondylar line of femur
2. Oblique popliteal ligament

**Insertion:**
- Tendon lies between gastrocnemius & soleus
- Inserted on posterior surface of calcaneum, medial to tendo-calcaneus
# Superficial muscles- nerve supply & actions

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<th>Muscles</th>
<th>Nerve Supply</th>
<th>Actions</th>
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<td><strong>Gastrocnemius</strong></td>
<td>Tibial nerve (S1,S2)</td>
<td>Gastrocnemius &amp; soleus – Strong plantar flexors of foot</td>
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<td>Help in walking &amp; running</td>
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<td>Gastrocnemius- also flexor of knee</td>
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<tr>
<td><strong>Soleus</strong></td>
<td>Tibial nerve (S1,S2)</td>
<td>Soleus- more powerful <em>(initiates movement – 1st gear muscle)</em></td>
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<tr>
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<td>Gastrocnemius- faster acting <em>(provides speed – top gear)</em></td>
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<td><strong>Plantaris</strong></td>
<td>Tibial nerve (S1,S2)</td>
<td>Rudimentary muscle</td>
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<td>Accessory to gastrocnemius</td>
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<td>Importance- transplantation of its tendon for tendon repair</td>
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The woods are lovely, dark and deep. But I have promises to keep, and miles to go before I sleep.

~ Robert Frost