MEDICAL EDUCATION RESOURCE

Front of Leg with Dorsum of Foot; Lateral and Medial Sides of Leg

Front of Leg with Dorsum of Foot

Introduction

- The front of the leg extends from the knee to the ankle, lying between the **tibial crest medially** and **anterior border of fibula laterally**.
- It corresponds to the **anterior compartment of the leg**, which contains muscles responsible for **dorsiflexion of the foot** and **extension of toes**.
- Skin is **thin and adherent** over the shin due to little subcutaneous fat; over the dorsum of foot, it is **loose and mobile**.
- The area is supplied mainly by **deep peroneal nerve** and **anterior tibial artery**.
- Common pathological involvement includes **shin pain, anterior compartment syndrome, and foot drop** (due to nerve lesion).

Surface Landmarks

- **Tibial crest (shin)** – prominent ridge felt from tibial tuberosity to the medial malleolus.
- **Tibial tuberosity** – below the patella; insertion of ligamentum patellae.
- **Head of fibula** – palpable on the lateral side just below the knee joint.
- **Anterior border of fibula** – less distinct than tibia, can be traced distally.

- **Medial malleolus** – subcutaneous prominence on medial side of ankle.
- **Lateral malleolus** – slightly posterior and lower than medial malleolus.
- **Tendons on front of ankle (from medial to lateral):**
    - *Tibialis anterior*
    - *Extensor hallucis longus*
    - *Extensor digitorum longus*
    - *Peroneus tertius*
      Mnemonic: **"Tom Has Dirty Pants"** (TA, EHL, EDL, PT).
- **Dorsalis pedis artery** – palpable lateral to the tendon of *extensor hallucis longus*.
- **Superficial veins and nerves** can be seen in lean individuals under the skin, especially during extension of the toes.

Superficial Fascia

- Contains **cutaneous veins, nerves, and lymphatics**.
- **Anteriorly:** very thin and closely adherent to skin over the shin (tibia).
- **Laterally and over dorsum of foot:** loose, allowing free movement of skin.
- **No deep fat pads** like in sole; this helps easy movement of tendons.
- **Lymphatics** drain into **superficial inguinal nodes medially** and **popliteal nodes laterally**.

Superficial Veins

- **Great (long) saphenous vein:**
  - Begins from the **medial end of dorsal venous arch** of the foot.
  - Ascends **in front of the medial malleolus** and along **medial border of tibia**.
  - Joins the **femoral vein** through the **saphenous opening** in the thigh.
- **Small (short) saphenous vein:**
  - Begins from the **lateral end of dorsal venous arch**.
  - Passes **behind the lateral malleolus**, ascends in the **posterior leg**, and drains into the **popliteal vein**.
- **Dorsal venous arch:**
  - Lies across the dorsum of the foot, forming the main communication between medial and lateral veins.
- These veins have **valves** to prevent backflow and play a role in **venous return during walking**.

Cutaneous Nerves

- **Saphenous nerve:**
  - Continuation of the femoral nerve; supplies skin along the **medial leg and medial side of foot up to great toe**.
- **Superficial peroneal (musculocutaneous) nerve:**

    - Supplies **lower two-thirds of anterolateral leg** and **most of dorsum of foot** (except first web space).

- **Deep peroneal nerve:**
    - Supplies **first interdigital cleft (first web space)**.
- **Sural nerve:**
    - Supplies **posterolateral side of leg** and **lateral border of foot**.
- **Common peroneal nerve (upper part of leg):**
    - Winds around neck of fibula, can be palpated superficially—vulnerable to injury.

Dissection

- **Position:** cadaver supine, leg slightly rotated medially.
- **Incisions:**
    - A midline incision from **tibial tuberosity to ankle joint**.
    - Two transverse incisions across the upper and lower ends of leg.
- **Reflections:**
    - Skin reflected laterally and medially to expose superficial fascia.
    - Identify **superficial veins** (great and small saphenous) and **cutaneous nerves** (saphenous, superficial peroneal, sural).

    - Trace them upward to their origins or downward to branches.

- Preserve the **dorsal venous arch** and note its communication with saphenous veins.

Deep Fascia

- The deep fascia of leg is a **dense fibrous sheath** that encloses the muscles.
- Over the anterior surface of tibia, it is **firmly attached** to the subcutaneous bone, giving the skin its tight adherence.
- Continuous above with the **fascia lata of the thigh**, and below with the **deep fascia of the foot**.
- Gives off **intermuscular septa**:
    - **Anterior intermuscular septum** ? separates *anterior* and *lateral* compartments.
    - **Posterior intermuscular septum** ? separates *lateral* and *posterior* compartments.
- Forms the **interosseous membrane** between tibia and fibula along with the bones, adding compartmental strength.
- Thickened distally to form **retinacula** (bands that hold tendons close to ankle).
- Functions:
    - Prevents **bowstringing** of tendons during dorsiflexion.
    - Maintains **compartmental pressure**, aiding venous return.
    - Provides **attachments** for underlying muscles.

Superior Extensor Retinaculum

- A **strong, transverse fibrous band** just above the ankle joint.
- Extends between:
  - **Lower part of anterior border of fibula** (laterally), and
  - **Anterior border of tibia** (medially).
- Blends with the **deep fascia of leg** above and **ankle capsule** below.
- **Contents passing deep to it (medial ? lateral):**
  - *Tibialis anterior tendon*
  - *Extensor hallucis longus tendon*
  - *Anterior tibial artery with deep peroneal nerve*
  - *Extensor digitorum longus tendon*
  - *Peroneus tertius tendon*
    Mnemonic: **“Tom Has A Nurse Dog Pet”** (TA, EHL, Artery/Nerve, EDL, PT).
- Each tendon is surrounded by a **synovial sheath** to reduce friction.

Inferior Extensor Retinaculum

- **Y-shaped band** of deep fascia over the front of ankle and dorsum of foot.
- **Attachment:**

- *Stem (base of Y)* ? attached laterally to the **upper surface of calcaneum (anterior part)**.
- *Upper limb* ? passes medially and upward to **medial malleolus**.
- *Lower limb* ? passes medially and downward to blend with **plantar aponeurosis and first cuneiform**.

- **Structures passing deep to limbs of Y (medial ? lateral):**
  - *Upper limb*: tibialis anterior, extensor hallucis longus, anterior tibial vessels and deep peroneal nerve.
  - *Lower limb*: extensor digitorum longus and peroneus tertius.
- Function ? binds tendons securely during **ankle movements**, preventing displacement.

Dissection

- Continue from previous step (after exposing superficial fascia).
- Carefully remove remaining fascia to demonstrate **thickening of deep fascia near ankle** .
- Identify **superior and inferior extensor retinacula** as fibrous bands crossing the tendons.
- Trace the **tendons of tibialis anterior, extensor hallucis longus, and extensor digitorum longus** under these retinacula.
- Display **synovial sheaths** of tendons — particularly the sheath of tibialis anterior extending high up the leg.

- Observe the passage of **deep peroneal nerve** and **anterior tibial vessels** between the tendons.
- On dorsum of foot, identify **extensor digitorum brevis** deep to the tendons of EDL.

Clinical Anatomy

- **Foot Drop:**
  - Caused by injury to **deep peroneal nerve** or paralysis of *anterior compartment muscles*.
  - Results in inability to dorsiflex the foot; toes drag during walking (high-stepping gait).
- **Compartment Syndrome (Anterior Tibial Compartment):**
  - Tight deep fascia and septa prevent expansion of swollen muscles.
  - Results in **pain, paresthesia, pallor, paralysis, pulselessness**.
  - Surgical **fasciotomy** may be needed to relieve pressure.
- **Shin Splints:**
  - Painful inflammation due to overuse or micro-trauma of *tibialis anterior origin*.
  - Common in runners and military recruits.
- **Tendonitis:**

- Friction beneath retinacula may cause inflammation of synovial sheaths (especially of *EHL*).

- **Palpation Point:**
  - **Dorsalis pedis artery** can be felt lateral to tendon of *EHL*—absence indicates peripheral arterial disease.

Muscles of Front of Leg

- Lie between **tibia medially** and **anterior intermuscular septum laterally**.
- Enclosed by **deep fascia** and supplied by **deep peroneal nerve**.
- Chief action ? **dorsiflexion of foot** at ankle and **extension of toes**.
- From medial to lateral the tendons at ankle are:
  Tibialis anterior ? Extensor hallucis longus ? Anterior tibial artery + Deep peroneal nerve ? Extensor digitorum longus ? Peroneus tertius.

Muscles of Anterior Compartment of the Leg

1. Tibialis Anterior

- **Origin:** Upper two-thirds of lateral surface of tibia, interosseous membrane, and fascia.
- **Insertion:** Medial cuneiform and base of 1st metatarsal.
- **Nerve:** Deep peroneal nerve (L4, L5).
- **Action:** Dorsiflexes ankle and inverts foot.

- **Clinical note:** Tendon prominent in dorsiflexion; strain causes *shin splints*.

2. Extensor Hallucis Longus (EHL)

- **Origin:** Middle two-fourths of anterior surface of fibula and interosseous membrane.
- **Insertion:** Dorsum of base of distal phalanx of great toe.
- **Nerve:** Deep peroneal nerve (L5, S1).
- **Action:** Extends great toe, dorsiflexes foot.
- **Surface landmark:** Tendon forms medial boundary of *first web space*; dorsalis pedis artery lies lateral to it.

3. Extensor Digitorum Longus (EDL)

- **Origin:** Upper three-fourths of anterior surface of fibula, lateral condyle of tibia, interosseous membrane.
- **Insertion:** Dorsal digital expansions of lateral four toes.
- **Nerve:** Deep peroneal nerve (L5, S1).
- **Action:** Extends toes and dorsiflexes foot.
- **Special note:** Divides into 4 tendons on dorsum of foot; forms *extensor expansions*.

4. Peroneus (Fibularis) Tertius

- **Origin:** Lower one-fourth of anterior fibula and interosseous membrane.
- **Insertion:** Dorsum of base of 5th metatarsal.

- **Nerve:** Deep peroneal nerve (L5, S1).
- **Action:** Dorsiflexes and everts foot.
- **Clinical importance:** Often fused partly with EDL; absent in about 10–15% of people.

Anterior Tibial Artery

- **Origin:** From **popliteal artery** at lower border of *popliteus*.
- **Course:**
    - Passes through **interosseous membrane** to anterior compartment.
    - Descends on anterior surface of membrane between *tibialis anterior* (medial) and *EDL* (lateral).
    - Accompanied by **two venae comitantes** and **deep peroneal nerve** (nerve crosses artery from lateral to medial near ankle).
    - Becomes **dorsalis pedis artery** in front of ankle joint midway between malleoli.
- **Branches:**
    1. Posterior tibial recurrent
    2. Anterior tibial recurrent
    3. Muscular branches
    4. Anterior medial and lateral malleolar arteries

- **Termination:** As **dorsalis pedis artery**.
- **Clinical relevance:** Pulse felt between *EHL* and *EDL* tendons; absence suggests peripheral arterial obstruction.

Deep Peroneal Nerve

- **Origin:** Terminal branch of **common peroneal nerve** in lateral compartment.
- **Course:**
  - Pierces *anterior intermuscular septum* to enter anterior compartment.
  - Descends with **anterior tibial artery** on interosseous membrane.
  - At ankle ? lies **lateral to anterior tibial artery**, then passes beneath *inferior extensor retinaculum* to dorsum of foot.
  - Divides into **medial and lateral terminal branches**.
- **Branches:**
  - **Muscular:** To *tibialis anterior*, *EHL*, *EDL*, and *peroneus tertius*.
  - **Articular:** To ankle and tarsal joints.
  - **Cutaneous:** Supplies skin of **first interdigital cleft** (between great and 2nd toe).
- **Applied anatomy:** Injury causes **foot drop** due to paralysis of dorsiflexors; sensory loss in first web space.

Dissection

- Reflect deep fascia and identify the **four muscles** of the anterior compartment.
- Note position of **anterior tibial artery** and **deep peroneal nerve** between *TA* and *EDL*.
- Trace the artery through interosseous membrane and observe its continuation as **dorsalis pedis artery**.
- Follow the **deep peroneal nerve** beneath the retinacula and on dorsum of foot; identify its terminal branches and their supply.
- Demonstrate **extensor digitorum brevis** beneath tendons on dorsum.
- Preserve **synovial sheaths** of tendons around the ankle for reference.

Clinical Anatomy

- **Foot Drop:**
  - Due to injury or compression of *common or deep peroneal nerve*.
  - Loss of dorsiflexion ? toes drag while walking; patient lifts leg high (steppage gait).
- **Anterior Compartment Syndrome:**
  - Tight fascia limits expansion of swollen muscles, compressing artery and nerve.
  - Presents with pain, paresthesia, pallor, pulselessness, paralysis.
  - Treated by **fasciotomy**.
- **Tibialis Anterior Strain (Shin Splints):**

- Overuse injury with pain along tibial crest.

- **Arterial Palpation:**
  - Dorsalis pedis artery pulse between tendons of *EHL* and *EDL*.

- **Nerve Testing:**
  - Ask patient to dorsiflex foot and extend great toe; weakness = deep peroneal lesion.

Dorsum of Foot

- The **dorsum** forms the **upper surface** of the foot, continuous above with the front of the leg.

- **Skin:**
  - Thin, hairless, and freely mobile except where bound down over tendons.
  - More sensitive than skin of the sole.

- **Superficial fascia:**
  - Contains **dorsal venous arch**, **superficial nerves**, and **lymphatics**.
  - **Dorsal venous arch:** main venous network just distal to ankle joint, connects to:
    - *Medial side* ? Great saphenous vein.
    - *Lateral side* ? Small saphenous vein.

- **Deep fascia:**
    - Thin and continuous with inferior extensor retinaculum; encloses **extensor digitorum brevis** and **extensor hallucis brevis**.
- **Muscles:**
    - *Extensor digitorum brevis (EDB)* ? beneath long extensor tendons, divides into 4 slips to toes 2–4.
    - *Extensor hallucis brevis (EHB)* ? medial part, to base of proximal phalanx of great toe.
- **Nerve supply:** Deep peroneal nerve (lateral terminal branch).
- **Arterial supply:** Dorsalis pedis artery and its branches.

Dorsalis Pedis Artery (Dorsal Artery of the Foot)

- **Origin:** Continuation of **anterior tibial artery** beyond the ankle joint.
- **Course:**
    - Runs forward from midpoint between **malleoli** to **proximal end of first intermetatarsal space**.
    - Lies **on capsule of ankle joint**, then on **tarsal bones and ligaments**, covered only by skin and fascia.
    - **Lateral to tendon of extensor hallucis longus** and **medial to tendon of extensor digitorum longus to 2nd toe**.

- Crossed superficially by the **inferior extensor retinaculum** and **medial branch of deep peroneal nerve**.

- **Branches:**

1. **Lateral tarsal artery** – passes laterally beneath *extensor digitorum brevis*.
2. **Medial tarsal arteries** – small branches to medial tarsal region.
3. **Arcuate artery** – runs laterally across bases of metatarsals, gives off 2nd–4th dorsal metatarsal arteries.
4. **First dorsal metatarsal artery** – to great and second toes.
5. **Deep plantar artery** – passes between first and second metatarsals to join *lateral plantar artery*, completing the **plantar arch**.

- **Relations:**

  - Accompanied by venae comitantes.
  - Crossed superficially by tendons and fascia but no strong muscular cover ? easy for pulse palpation.

Dissection

- Make a **longitudinal incision** on dorsum of foot from ankle to base of toes.
- Reflect skin laterally and medially to expose the **superficial fascia**.
- Identify the **dorsal venous arch**, **great and small saphenous veins**, and **superficial cutaneous nerves** (superficial peroneal branches).

- Remove superficial fascia to expose:
    - **Tendons of extensor hallucis longus** and **extensor digitorum longus**,
    - **Extensor digitorum brevis**, and
    - **Dorsalis pedis artery** beneath them.
- Trace the **dorsalis pedis artery** distally, noting its branches.
- Demonstrate **deep peroneal nerve** on lateral side of artery, dividing into its terminal branches near first intermetatarsal space.
- Show the **deep plantar branch** piercing the first dorsal interosseous space to plantar aspect.

Clinical Anatomy

- **Dorsalis Pedis Pulse:**
    - Palpated just lateral to tendon of *extensor hallucis longus*, midway between malleoli and first intermetatarsal space.
    - Absent or weak pulse indicates **peripheral arterial disease** or **atherosclerosis**.
- **Arterial Anastomosis:**
    - Deep plantar branch joins lateral plantar artery to form *plantar arch*, ensuring collateral supply even if posterior tibial artery is blocked.
- **Extensor Digitorum Brevis Hypertrophy:**

- May mimic a dorsal foot swelling.

- **Injury to Deep Peroneal Nerve:**
  - Leads to loss of sensation in *first web space* and weak extension of toes (EHB, EDB paralysis).

- **Arterial line:**
  - Dorsalis pedis artery is a preferred site for **arterial blood gas sampling** or continuous pressure monitoring in critical care.

Fascia and Muscles of Lateral Side of the Leg

- The **lateral compartment** of the leg lies between:
  - **Anterior intermuscular septum** (in front),
  - **Posterior intermuscular septum** (behind), and
  - **Deep fascia of leg** (superficially).
- Contains:
  - **Two muscles** ? *Peroneus (Fibularis) Longus* and *Peroneus Brevis*.
  - **Nerve supply** ? *Superficial peroneal nerve*.
  - **Blood supply** ? *Branches of peroneal artery* (from posterior compartment).
- The deep fascia over this region is thick and continues below to form **superior and inferior peroneal retinacula** around the lateral malleolus.

Peroneal Retinacula

1. Superior Peroneal Retinaculum

- A **fibrous band** extending from the **lateral malleolus to lateral surface of calcaneum**.
- **Function:** Binds tendons of *peroneus longus* and *peroneus brevis* behind the malleolus in a **common synovial sheath**.
- Prevents bowstringing of tendons during eversion.

2. Inferior Peroneal Retinaculum

- Lies below the lateral malleolus, extending from **calcaneum to the inferior extensor retinaculum**.
- *Peroneus brevis tendon* runs above it, *peroneus longus tendon* below it — each within its **own synovial sheath**.
- Continuous medially with *inferior extensor retinaculum* forming a fibrous sling over tendons.

Dissection (Lateral Compartment)

- Make an incision along the **posterior border of fibula** and reflect skin and superficial fascia.
- Identify **superficial peroneal nerve** emerging in lower third of leg.
- Expose and clean **peroneal muscles** lying superficial to fibula.
- Follow their tendons posterior to **lateral malleolus**, showing their course under **peroneal retinacula**.

- Demonstrate synovial sheaths and note the insertion sites of *peroneus longus* and *brevis* on foot.

Clinical Anatomy (Lateral Compartment)

- **Peroneal Tendon Subluxation:**
  - Caused by tearing of superior peroneal retinaculum ? tendons slip forward over malleolus.
- **Peroneal Muscle Weakness:**
  - Leads to loss of eversion; foot tends to invert excessively (ankle sprain).
- **Common Peroneal Nerve Palsy:**
  - Injury around *neck of fibula* ? paralysis of *lateral and anterior compartment muscles* ? **foot drop**.
- **Compartment Syndrome:**
  - Tight deep fascia may compress nerve and vessels ? pain, swelling, paresthesia.

Peroneal Muscles

1. Peroneus (Fibularis) Longus

- **Origin:** Head and upper two-thirds of lateral surface of fibula.
- **Insertion:** Base of 1st metatarsal and medial cuneiform (after passing through groove on cuboid).

- **Nerve:** Superficial peroneal nerve (L5, S1, S2).
- **Action:** Everts and plantarflexes foot; maintains *transverse arch*.
- **Special feature:** Tendon crosses sole obliquely within a fibrous tunnel.

2. Peroneus (Fibularis) Brevis

- **Origin:** Lower two-thirds of lateral surface of fibula.
- **Insertion:** Tuberosity on base of 5th metatarsal.
- **Nerve:** Superficial peroneal nerve (L5, S1, S2).
- **Action:** Everts foot and assists plantarflexion.
- **Clinical note:** Tendon commonly avulsed in ankle inversion injuries.

Clinical Anatomy (Peroneal Muscles)

- **Avulsion Fracture of 5th Metatarsal:**
  - Due to sudden violent contraction of *peroneus brevis*.
- **Sprain at Ankle:**
  - Overstretching or tearing of lateral ligaments often involves *peroneus longus/brevis* strain.
- **Pes Cavus (high-arched foot):**
  - May occur from imbalance between *peroneal* and *tibialis anterior/posterior* muscles.

Superficial Peroneal Nerve

- **Origin:** Terminal branch of *common peroneal nerve* in lateral compartment (near fibular neck).
- **Course:**
  - Descends between *peroneus longus* and *brevis* muscles.
  - Pierces deep fascia in lower third of leg to become **cutaneous**.
  - Divides into **medial and intermediate dorsal cutaneous branches** on dorsum of foot.
- **Distribution:**
  - *Muscular:* to *peroneus longus* and *brevis*.
  - *Cutaneous:* supplies most of dorsum of foot and toes (except first web space and lateral border).
  - *Articular:* to ankle joint.

Dissection (Superficial Peroneal Nerve)

- Identify nerve emerging through fascia about **7–10 cm above lateral malleolus**.
- Follow it distally as it divides into **two branches** spreading across dorsum of foot.
- Trace proximal part to its entry between peroneal muscles; demonstrate muscular branches.
- Preserve its **cutaneous distribution** over dorsal surface of toes.

Clinical Anatomy (Superficial Peroneal Nerve)

- **Injury:**
  - Causes sensory loss over *anterolateral leg* and *dorsum of foot*, with weakness of **foot eversion**.
- **Entrapment neuropathy:**
  - Pain and tingling over dorsum of foot due to compression as it pierces deep fascia.
- **Nerve testing:**
  - Ask patient to evert foot against resistance — weakness indicates lesion.

Medial Side of the Leg

- Lies between **crest of tibia** and **posterior border of tibia**.
- Covered by **thin skin** and **superficial fascia** containing *great saphenous vein* and *saphenous nerve*.
- **Structures:**
  - *Skin:* thin, adherent over tibial surface.
  - *Superficial fascia:* contains cutaneous veins and lymphatics.
  - *Deep fascia:* attached to anterior and medial margins of tibia; forms part of leg's fascial envelope.

- *Muscles deep to fascia:* mainly *flexor digitorum longus* posteriorly (not part of this dissection plane).

Dissection (Medial Side)

- Incision along medial border of tibia.
- Reflect skin to reveal **great saphenous vein** running anterior to *medial malleolus*.
- Identify **saphenous nerve** accompanying the vein.
- Note perforating veins connecting it to deep venous system.

Clinical Anatomy (Medial Side)

- **Varicose veins:**
  - Dilatation of great saphenous vein and its tributaries due to valve incompetence.
- **Venesection site:**
  - Great saphenous vein can be accessed anterior to medial malleolus for cannulation.
- **Saphenous nerve entrapment:**
  - Pain along medial leg and foot due to compression by tight fascia or trauma.
- **Shin abrasions:**
  - The subcutaneous position of tibia makes it prone to injury with minimal protection.

Mnemonics – Front of Leg and Dorsum of Foot

1. Structures Passing Deep to Superior Extensor Retinaculum (Medial ? Lateral):
? **“Tom Has A Nervous Dog Pet”**

- **T** ? *Tibialis anterior*
- **H** ? *Extensor hallucis longus*
- **A** ? *Anterior tibial artery*
- **N** ? *Deep peroneal nerve*
- **D** ? *Extensor digitorum longus*
- **P** ? *Peroneus tertius*

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2. Branches of Anterior Tibial Artery:
? **“Pretty Arteries Make Legs Alive”**

- **P** ? Posterior tibial recurrent
- **A** ? Anterior tibial recurrent
- **M** ? Muscular branches
- **L** ? Lateral malleolar
- **A** ? Anterior medial malleolar
  (Final continuation ? *Dorsalis pedis artery*)

3. Branches of Dorsalis Pedis Artery:
? **“Many Lovers Are Found Deep”**

- **M** ? Medial tarsal arteries
- **L** ? Lateral tarsal artery
- **A** ? Arcuate artery
- **F** ? First dorsal metatarsal artery
- **D** ? Deep plantar artery (joins plantar arch)

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4. Tendons on Front of Ankle (Medial ? Lateral):
? **“Tom Has Dirty Pants”**

- **T** ? *Tibialis anterior*
- **H** ? *Extensor hallucis longus*
- **D** ? *Extensor digitorum longus*
- **P** ? *Peroneus tertius*

(Dorsalis pedis artery lies between H and D.)

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5. Muscles of Anterior Compartment of Leg:
? **“The Extra Energetic Person”**

- **T** ? *Tibialis anterior*
- **E** ? *Extensor hallucis longus*

- **E** ? *Extensor digitorum longus*
- **P** ? *Peroneus tertius*

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6. Nerve Supply of Leg (Remember the Rule):
? **“Deep for Dorsiflexors, Superficial for Everters”**

- *Deep peroneal nerve* ? Anterior compartment (dorsiflexors).
- *Superficial peroneal nerve* ? Lateral compartment (everters).

Facts to Remember

- The **anterior compartment of leg** lies between the **lateral surface of tibia** and **anterior intermuscular septum**.
  It contains four muscles — *tibialis anterior, extensor hallucis longus, extensor digitorum longus,* and *peroneus tertius* — all supplied by the **deep peroneal nerve**.
- The **main artery** of this compartment is the **anterior tibial artery**, the direct continuation of the *popliteal artery* through the interosseous membrane.
- The **dorsalis pedis artery** is the **continuation of the anterior tibial artery** beyond the ankle joint; it supplies the dorsum of foot and contributes to the **plantar arch** through its *deep plantar branch*.
- The **deep peroneal nerve** supplies all anterior-compartment muscles and the **first interdigital cleft** of skin; its injury leads to **foot drop**.

- The **superficial peroneal nerve** innervates *peroneus longus* and *peroneus brevis* (lateral compartment) and provides cutaneous supply to **most of the dorsum of foot** except the first web space.

- The **peroneus longus** tendon crosses the sole obliquely and helps maintain the **transverse arch of foot**.

- The **great saphenous vein** passes **in front of the medial malleolus**, whereas the **small saphenous vein** passes **behind the lateral malleolus**.

- The **superior and inferior extensor retinacula** hold the long extensor tendons in place and prevent bow-stringing during dorsiflexion.

- **Pulse of dorsalis pedis artery** is felt lateral to the tendon of *extensor hallucis longus* in front of the ankle.

- The **tibial crest** (shin) is subcutaneous and commonly bruised; the skin here is thin and tightly adherent to the periosteum.

- **Eversion of foot** is produced by *peroneus longus* and *brevis*; **inversion** by *tibialis anterior* and *posterior*.

- **Anterior-compartment syndrome** results from increased pressure under the tough deep fascia, compressing the anterior tibial artery and deep peroneal nerve.

- **Shin splints** refer to pain along the tibia due to repetitive strain of *tibialis anterior* origin.

Clinicoanatomical Problem

Q. A patient presents with inability to dorsiflex the foot and loss of sensation in the first web space. Which nerve is likely injured? What deformity results from it?

Answer:

- The **deep peroneal nerve** is injured.
- This nerve supplies all the muscles of the **anterior compartment of the leg** — *tibialis anterior, extensor hallucis longus, extensor digitorum longus,* and *peroneus tertius*.
- Paralysis of these muscles leads to loss of **dorsiflexion of the ankle** and **extension of toes**.
- The foot assumes a **plantar-flexed and inverted position** because the unopposed action of *gastrocnemius, soleus,* and *tibialis posterior* pulls the foot downward and medially.
- The condition is called **foot drop**.
- **Sensory loss** occurs in the **first interdigital cleft** (between great and second toe), which is the cutaneous area supplied by the deep peroneal nerve.
- Common causes include:
    - Compression or trauma to the **common peroneal nerve** as it winds around the neck of fibula.
    - Prolonged squatting, tight plaster casts, or compartment syndrome of anterior leg.

Clinicoanatomical Problems (Additional)

1. Q. A long-distance runner complains of pain and tenderness along the anterior border of tibia after excessive training. What is the probable diagnosis and cause?
Answer:

- The condition is **Shin Splints (Tibial Stress Syndrome)**.
- Caused by **repetitive traction** on the periosteum at the origin of *tibialis anterior* and sometimes *extensor digitorum longus*.
- It leads to **inflammation of the periosteum** and pain along the tibial crest.
- Common in athletes, military recruits, and dancers.
- **Treatment:** Rest, ice, and correction of footwear and running technique.

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2. Q. Following a crush injury to the leg, the patient develops severe pain, pallor, and numbness over the dorsum of foot. What is the likely diagnosis?
Answer:

- The presentation suggests **Anterior Compartment Syndrome**.
- The **deep fascia** and **intermuscular septa** form tight compartments that resist expansion.
- Bleeding or swelling inside the anterior compartment increases pressure, compressing the **anterior tibial artery** and **deep peroneal nerve**.
- Results in pain, paresthesia, pallor, paralysis, and loss of pulse.
- **Treatment:** Immediate **fasciotomy** to decompress the compartment and prevent necrosis of muscles and nerves.

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3. Q. Why is the *dorsalis pedis artery* commonly palpated in clinical practice?
Answer:

- It is **superficially placed** and easily accessible, lying just lateral to the tendon of *extensor hallucis longus* in front of the ankle.
- It reflects the patency of the **anterior tibial artery** and is a vital indicator of **peripheral arterial circulation**.
- Absent or weak pulse indicates **peripheral arterial occlusive disease** or **diabetic microangiopathy**.

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4. Q. A person sustains a laceration over the dorsum of foot. The big toe cannot be extended. Which structure is likely cut?
Answer:

- The **tendon of extensor hallucis longus** is likely injured.
- The muscle originates from the fibula and extends the great toe.
- Injury leads to **loss of extension of the hallux** and weakness in dorsiflexion.

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5. Q. Why does injury to the *common peroneal nerve* at the neck of fibula cause both foot drop and loss of eversion?
Answer:

- The **common peroneal nerve** divides into:
    - *Deep peroneal nerve* ? supplies **dorsiflexors** (anterior compartment).
    - *Superficial peroneal nerve* ? supplies **everters** (lateral compartment).

- Injury before division leads to paralysis of both groups ? loss of **dorsiflexion (foot drop)** and **eversion**, producing an **inverted, plantarflexed foot**.

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6. Q. A fracture of the 5th metatarsal base occurs while playing football. Which muscle causes this avulsion and why?
Answer:

- The **peroneus brevis** tendon inserts at the base of 5th metatarsal.
- Sudden **inversion of the foot** causes violent contraction of *peroneus brevis*, pulling off the tuberosity ? **avulsion fracture**.
- Commonly seen in ankle sprain injuries.

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7. Q. During injection around the ankle, why must care be taken not to injure the superficial veins and nerves?
Answer:

- The **great saphenous vein** and **saphenous nerve** lie anterior to the *medial malleolus*, while the **small saphenous vein** and **sural nerve** lie posterior to the *lateral malleolus*.
- Accidental injury leads to **hematoma**, **nerve irritation**, and **persistent pain or numbness**.

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8. Q. A mountaineer suffers frostbite over the dorsum of foot. Which structure's location explains the early ischemic changes in this region?
Answer:

- The **dorsalis pedis artery** lies just beneath the thin skin and fascia, with minimal muscular cover.

- Hence, it is highly susceptible to **cold-induced vasospasm and thrombosis**, leading to ischemic necrosis of overlying tissues.

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9. Q. Why is the *lateral side of the leg* more prone to bruising and muscle injury during inversion sprains?
Answer:

- The **peroneal muscles** are stretched or torn when the foot inverts suddenly.
- The *superior peroneal retinaculum* may rupture, causing **tendon subluxation** over the lateral malleolus.
- The overlying skin is thin, and fascia is tight, predisposing to **localized hematoma**.

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10. Q. What is the clinical importance of the great saphenous vein on the medial side of leg?
Answer:

- It is used for **venous cutdown** and **coronary artery bypass grafting (CABG)** due to its length and accessibility.
- Lies anterior to *medial malleolus*, accompanied by *saphenous nerve*.
- Careful dissection is needed to avoid nerve injury during harvesting.