MEDICAL EDUCATION RESOURCE

Popliteal Fossa: A-Z

Introduction

- The **popliteal fossa** is a **shallow, diamond-shaped depression** at the back of the knee joint, best felt when the joint is **semi-flexed**.
- It corresponds to the **cubital fossa** of the upper limb.
- It serves as a **major passage** for neurovascular structures between the thigh and leg

  Volume 2, BD Chaurasia's Human …

  .

Surface Landmarks

1. **Lateral and medial condyles of femur and tibia** can be palpated on the sides and front of the knee.
2. **Head of fibula** — prominent bony point just below the posterolateral tibial condyle.
3. **Common peroneal nerve** — palpable against the **neck of fibula**, medial to the tendon of **biceps femoris**.
4. **Fibular collateral ligament** — feels like a **rounded cord** above fibular head when the knee is flexed.
5. **Tendons around knee**:

- Medially: rounded **semitendinosus** over flat **semimembranosus**, with **adductor magnus** anteriorly.
- Laterally: **biceps femoris tendon** anterior to **iliotibial tract**.

6. **Popliteal artery pulsation** — felt deep in the mid-fossa.
7. **Two heads of gastrocnemius** form the **lower boundaries** merging into the calf

Volume 2, BD Chaurasia's Human …

.

Dissection Steps

- Make **horizontal incisions**: one across the back of the thigh (upper 2/3 junction) and one across the back of the leg (lower 1/3 junction).
- Connect with a **vertical midline incision**; reflect the skin and fascia.
- Identify **cutaneous nerves** (posterior cutaneous nerve of thigh, medial cutaneous nerve, sural nerve) and **short saphenous vein**.
- Clean the **deep fascia** to expose the **boundaries and contents**.
- Trace:
  - **Tibial nerve** in the midline (gives articular, cutaneous, and muscular branches).
  - **Common peroneal nerve** medial to **biceps femoris**.
  - **Popliteal vein** deep to tibial nerve and **popliteal artery** as the deepest structure

Volume 2, BD Chaurasia’s Human …

.

Location

- Lies **posterior to the knee joint**, between the **lower femur** and **upper tibia**, forming a **diamond-shaped hollow**

  Volume 2, BD Chaurasia’s Human …

  .

Boundaries

- **Superolateral** ? *Biceps femoris*
- **Superomedial** ? *Semitendinosus* and *semimembranosus* (with sartorius, gracilis, adductor magnus).
- **Inferolateral** ? *Lateral head of gastrocnemius* and *plantaris*.
- **Inferomedial** ? *Medial head of gastrocnemius*.

Roof:

- Formed by **deep fascia (popliteal fascia)**.
- **Superficial fascia** contains the **small saphenous vein**, **posterior cutaneous nerve of thigh**, **medial cutaneous nerve branches**, and **sural communicating nerve**.

Floor:

- From above downwards:
    - *Popliteal surface of femur*
    - *Posterior capsule of knee joint*
    - *Oblique popliteal ligament*
    - *Popliteus fascia and muscle*

      Volume 2, BD Chaurasia’s Human …

      .

Contents

1. **Popliteal artery** and its branches.
2. **Popliteal vein** and its tributaries.
3. **Tibial nerve** and its branches.
4. **Common peroneal nerve** and branches.
5. **Posterior cutaneous nerve of thigh**.
6. **Genicular branch of obturator nerve**.
7. **Popliteal lymph nodes** and **fat** surrounding all structures.

Arrangement (superficial to deep):

- **Tibial nerve** (most superficial)

- **Popliteal vein** (middle)
- **Popliteal artery** (deepest)

In the upper part: medial to lateral ? Artery, Vein, Nerve (A-V-N)
Middle part: posterior to anterior ? Nerve, Vein, Artery (N-V-A)
Lower part: medial to lateral ? Nerve, Vein, Artery (N-V-A)

Volume 2, BD Chaurasia's Human …

.

Popliteal Artery

- Continuation of the **femoral artery** beyond the **adductor hiatus**.
- Lies **deepest** in the fossa.
- Ends at the **lower border of popliteus**, dividing into **anterior and posterior tibial arteries**.
- **Relations:**
  - *Anterior*: popliteal surface of femur, knee capsule, popliteus fascia.
  - *Posterior*: popliteal vein, tibial nerve.
  - *Medial*: semimembranosus and medial condyle.
  - *Lateral*: biceps femoris, plantaris, lateral head of gastrocnemius.
- **Branches:**

- Muscular (to hamstrings and gastrocnemius)
- Cutaneous
- Genicular (superior, inferior, and middle) — form the **genicular anastomosis** around the knee

Volume 2, BD Chaurasia's Human …

.

Clinical Anatomy

- **Blood pressure** of the lower limb is recorded from the **popliteal artery**.
- In **coarctation of aorta**, popliteal pressure is **lower** than brachial.
- The **popliteal artery** is prone to **aneurysm** due to its fixed position against the femur.
- **Pulsations** may compress the **tendon of adductor magnus**, causing arterial narrowing.
- **Collateral circulation** through **profunda femoris** prevents gangrene if occlusion occurs.
- The **popliteal vein** receives the **small saphenous vein** and may develop **deep vein thrombosis (DVT)**.
- **Tibial nerve** can be compressed in **popliteal entrapment syndrome**

.

Popliteal Vein

- **Origin:** At the **lower border of the popliteus** by the union of the **anterior and posterior tibial veins**.
- **Course:**
    - Lies **medial** to the popliteal artery in the lower part.
    - Lies **posterior** to the artery in the middle part.
    - Lies **posterolateral** to the artery in the upper part.
- **Termination:** Continues as the **femoral vein** at the opening of adductor magnus.
- **Tributaries:**
    1. **Small saphenous vein** (chief tributary).
    2. **Veins corresponding to branches of the popliteal artery.**
- **Clinical Note:** May become dilated in **deep vein thrombosis (DVT)**; inflammation here can cause calf pain and swelling

  Volume 2, BD Chaurasia's Human …

  .

Tibial Nerve in Popliteal Fossa

- **Root value:** Ventral divisions of ventral rami of **L4, L5, S1, S2, S3**.

- **Origin:** Larger terminal branch of the **sciatic nerve**.
- **Course:** Lies **superficial to popliteal vessels**, extending from the **superior angle to the lower border of popliteus**.
- **Branches:**
    - **Muscular:** To gastrocnemius, soleus, plantaris, and popliteus.
    - **Cutaneous: Medial sural cutaneous nerve** (joins lateral sural branch ? sural nerve).
    - **Articular:** 3 branches to the knee joint.
- **Clinical Note:** Compression in **popliteal entrapment syndrome** may cause weakness of plantar flexion or sole sensation loss

  Volume 2, BD Chaurasia's Human …

  .

Common Peroneal (Fibular) Nerve

- **Root value:** Dorsal divisions of ventral rami **L4, L5, S1, S2**.
- **Course:**
    - Descends along **medial border of biceps femoris**.
    - Winds around **neck of fibula**, lying subcutaneously and **very vulnerable to injury**.
- **Branches:**

- **Lateral sural cutaneous nerve** (cutaneous).
- **Communicating branch** to sural nerve.
- **Deep and superficial peroneal nerves** (terminal branches).

- **Clinical Note:**
  - Most **frequently injured nerve** in the lower limb.
  - **Injury at fibular neck** causes **foot drop** (loss of dorsiflexion and eversion).
  - Sensory loss over the **lateral leg and dorsum of foot**

    Volume 2, BD Chaurasia's Human …

    .

Posterior Cutaneous Nerve of Thigh

- **Origin:** From the sacral plexus (**S1–S3**).
- **Course:**
  - Enters fossa superficial to **hamstring tendons**.
  - Gives **inferior cluneal** (to buttock) and **perineal** branches.
  - Supplies skin over **posterior thigh and popliteal region**.
- **Clinical Note:** May be stretched or compressed in prolonged sitting, causing posterior thigh tingling.

Genicular Branch of Obturator Nerve

- **Origin:** From the **posterior division of obturator nerve**.
- **Course:**
  - Crosses **popliteal artery** to reach the **posterior capsule of knee joint**.
  - Communicates with **tibial articular branches**.
- **Function:** Sensory supply to **posterior knee joint capsule** and **cruciate ligaments**.

Popliteal Lymph Nodes

- **Number:** Usually **6 or 7**.
- **Location:** Along the **small saphenous vein** and **popliteal vessels** within the fat of the fossa.
- **Afferents:**
  - From **lateral side of foot**, **heel**, and **posterior leg**.
- **Efferents:**
  - Drain into the **deep inguinal lymph nodes**.
- **Clinical Note:**
  - Enlarged in **infections or ulcers** on the lateral side of the foot or posterior leg.

- Palpable behind the knee when inflamed ("**popliteal lymphadenitis**")

Volume 2, BD Chaurasia's Human …

.

Clinical Anatomy

- **Popliteal Vein Thrombosis:** Causes calf tenderness, swelling, and risk of pulmonary embolism.
- **Common Peroneal Nerve Injury:** Leads to **painless foot drop**, weakness of dorsiflexion and eversion, with normal inversion and plantar flexion.
- **Tibial Nerve Lesion:** Loss of plantar flexion and sole sensation.
- **Enlarged Popliteal Lymph Nodes:** Occur in **lateral foot infections**; lymph drains along **short saphenous vein** to popliteal nodes

Anastomoses Around the Knee Joint

Overview

- The knee joint is richly supplied by a **genicular arterial network** formed mainly by branches of the **popliteal artery**, with contributions from the **femoral, profunda femoris, and anterior tibial arteries**.
- These anastomoses ensure continuous blood flow during knee movements and provide **collateral circulation** when the femoral or popliteal artery is compressed or ligated.

---

1. Genicular Anastomosis (Main Arterial Network)

This is a **rich vascular plexus** surrounding the front and sides of the knee joint.

Formed by:

- **From Popliteal Artery:**
  - Superior medial genicular artery
  - Superior lateral genicular artery
  - Inferior medial genicular artery
  - Inferior lateral genicular artery
  - Middle genicular artery (pierces the capsule; does *not* take part in surface anastomosis)
- **From Descending Branches of Femoral and Profunda Femoris Arteries:**
  - **Descending genicular artery** (from femoral artery).
  - **Descending branch of lateral circumflex femoral artery** (from profunda femoris).
- **From Below:**
  - **Anterior tibial recurrent artery** (from anterior tibial artery).
  - **Posterior tibial recurrent artery** (from posterior tibial artery).

---

2. Course and Distribution

- **Around the Patella:**
  The genicular branches form the **patellar network**, lying in the superficial fascia around the patella and ligamentum patellae.

- **Around the Femoral and Tibial Condyles:**
  The superior and inferior genicular arteries interconnect along the medial and lateral borders of the joint.

- **Within the Joint:**
  The middle genicular artery pierces the posterior capsule to supply the **cruciate ligaments** and **synovial membrane**.

---

3. Trochanteric and Cruciate Continuity

- The **genicular network** below continues upward with the **cruciate anastomosis** (in upper thigh) and downward with **recurrent tibial arteries** — forming a complete collateral channel between the **femoral** and **tibial** systems.

---

4. Clinical Anatomy

- **Collateral Circulation:**
  When the **femoral artery is ligated** above the adductor hiatus, blood still reaches the popliteal artery via:
  - Descending branch of lateral circumflex femoral
  - Descending genicular
  - Genicular branches of popliteal artery

- **Aneurysm:**
  The popliteal artery's fixed position behind the knee makes it prone to aneurysm; the

genicular network helps maintain distal perfusion if the main artery is compressed.

- **Palpation Site:**
  The **popliteal artery** pulsation can be felt deep in the fossa while the knee is flexed.

Mnemonic for Major Contributors

“Four Poplites Descend Anteriorly” ?

- **Four** = 4 genicular branches of popliteal artery (2 superior, 2 inferior)
- **Poplites** = Popliteal artery (main source)
- **Descend** = Descending genicular (from femoral) and Descending branch of lateral circumflex femoral
- **Anteriorly** = Anterior and posterior tibial recurrent arteries

---

Key Points to Remember

- Total **six main arteries** form the external anastomotic ring:
  1. Superior medial genicular
  2. Superior lateral genicular
  3. Inferior medial genicular
  4. Inferior lateral genicular
  5. Descending genicular (femoral)
  6. Descending branch of lateral circumflex femoral

- The **middle genicular** is deep and supplies intra-articular structures.

- This network maintains blood supply to the leg even when knee flexion compresses the popliteal artery.

Mnemonic — Arrangement of Structures in Popliteal Fossa

To remember the **arrangement of artery (A), vein (V), and nerve (N)** in different parts of the fossa:

- **Upper part (medial to lateral):**
  A V N ? *Artery, Vein, Nerve*

- **Middle part (posterior to anterior):**
  N V A ? *Nerve, Vein, Artery*

- **Lower part (medial to lateral):**
  N V A ? *Nerve, Vein, Artery*
