

# POSTERIOR LOWER LEG DISSECTION GUIDE

## Lower Extremity Lab 4

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1. With the cadaver in the prone position, begin by completing your dissection of the popliteal fossa. If you have already completed the dissection of the popliteal fossa then be sure to review all of the underlined structures before beginning the dissection of the POSTERIOR LEG. Identify the four borders of the popliteal fossa:
  - a. Superior-medial – semitendinosus/semimembranosus
  - b. Superior-lateral – biceps femoris
  - c. Inferior-medial – medial head of the gastrocnemius
  - d. Inferior-lateral – lateral head of the gastrocnemius
2. Again, take care not to disrupt the lesser saphenous vein, which travels up the lateral side of the lower leg, or the sural nerve. At this point, you should again see the femoral artery and vein passing through the hiatus of the adductor magnus to become the popliteal artery and vein. Notice that the lesser saphenous vein connects to the popliteal vein in a same way as was observed for the greater saphenous vein connecting to the femoral vein at the saphenous opening.
3. Trace the development of the sural nerve, *if possible*. In general, the common peroneal nerve will give off a lateral sural cutaneous branch and the tibial nerve will give off a medial sural cutaneous branch. These two branches will come together and form the sural nerve, which provides cutaneous sensation to the lateral aspect of the lower leg and foot. The most common modification to this “typical” development of the sural nerve is when the lateral and medial sural cutaneous nerves do not unite. Most often in these cases, the lateral sural sural cutaneous will travel distally down the lateral aspect of the lower leg with the lesser saphenous to become the sural nerve and provide cutaneous sensation to the lateral aspect of the foot.
4. Once the borders of the popliteal fossa, the sural nerve, and lesser saphenous vein have been identified, you should now remove all subcutaneous fat and lymphatic tissues so you can easily identify the popliteal artery and vein. Once the fossa is clean you should identify the artery and vein superiorly and then work inferiorly. The floor of the popliteal fossa is formed by the popliteal surface of the femur, the oblique popliteal ligament, and the popliteus muscle. Note at the inferior border of the popliteus muscle is the origin of the soleus muscle.
5. Returning to the popliteal artery, you should now identify the two superior and the two inferior genicular arteries. The four genicular arteries contribute to the anastomosis of the knee joint. The medial and lateral superior genicular arteries pass just superiorly to the medial and lateral femoral condyles. The medial and lateral inferior genicular arteries are hidden by the medial and lateral heads of the gastrocnemius. In order to expose the two inferior genicular arteries, use the scalpel to further split the medial and lateral muscle bellies of the gastrocnemius. Once split, the heads of the gastrocnemius can be retracted medially and laterally to allow you locate the inferior genicular arteries. Once the four genicular arteries have been located, follow the popliteal artery until it passes through the hiatus formed by the soleus muscle distally into the lower leg.

6. TO BEGIN YOUR DISSECTION OF THE POSTERIOR LEG, use the scalpel to cut the skin along the midline of the calf from lower border of the popliteal fossa distally to the calcaneus. Be cautious when cutting over the Achilles tendon as the fascia (termed the peritenon) is quite thin.
7. When removing the skin subcutaneous tissue over the lateral aspect of the posterior calf, take time to locate the lesser saphenous vein and the sural nerve. Once the skin has been removed observe the fascial layer over the posterior aspect of the lower leg.
8. Once the lesser saphenous vein and the sural nerve have been located, now cut and remove the fascia from the popliteal fossa to just proximal to the medial malleolus so that the flexor retinacula still remains intact.
9. Identify the three muscles located in the superficial posterior compartment and review the actions, origins, insertions, and innervations:
  - Gastrocnemius (medial & lateral head)
  - Soleus
  - Plantaris
10. Once the three superficial muscles have been identified, remove the peritenon from the Achilles' tendon and clean the soft tissue just inferior to the tendon. Once the Achilles' tendon region is clean, cut the tendon (***ON ONE SIDE ONLY***) at its midpoint or what is referred to as the “watershed” region (approximately 5 cm above the calcaneus insertion).
11. Once the tendon is cut use the proximal portion of the tendon as a handle and lift up the gastrocnemius and soleus muscles so you can observe the deep posterior compartment. In order to completely reflect the gastrocnemius and soleus proximally you may have to use your scalpel blade to reflect the facial tissue from the medial aspect of the tibial to completely free the soleus.
12. Observe the transverse intermuscular septum that forms the separation between the superficial and deep compartments. Note how the posterior tibial artery and the tibial nerve are “sandwiched” between the superficial and deep layers. In most cases, two veins travel with the posterior tibial artery.
13. Now remove the transverse intermuscular septum being careful not to disrupt the posterior tibial artery and the tibial nerve. Clean the tissues surrounding the tibial nerve and posterior tibial artery.
14. Identify the following structures and review the origins, insertions, actions, as well as innervations of the muscles in the deep posterior compartment:
  - Tibialis posterior
  - Flexor digitorum longus
  - Flexor hallucis longus
  - Peroneal artery
15. Once all three muscles have been identified, trace their tendons along with the artery and nerve distally to the flexor retinacula on the medial aspect of the ankle region.
16. Clean the soft tissues and fascia both above and below the flexor retinacula so that the three tendons as well as the nerve and vascular structures can be identified. Most of the time it will be necessary to trim and remove 1 to 2centimeters of the flexor retinacula distally in order to observe the tendons and nerves/arteries entering the plantar region of the foot.
17. The flexor retinacula forms four specific compartments:

- COMPARTMENT 1 - Contains the posterior tibialis tendon (most anterior)
  - COMPARTMENT 2 - Contains the flexor digitorum longus
  - COMPARTMENT 3 - Contains the tibial nerve and the posterior tibial artery and veins
  - COMPARTMENT 4 - Contains the flexor hallucis longus (tendon travels beneath the sustentaculum tali)
18. Follow the 3 tendons as well as the nerve and vessels as far as possible into the plantar aspect of the foot. Observe how the three tendons are encased in a yellowish material (tenosynovial sheath) as they pass through the retinacula. Also note how the tibial nerve as well as the posterior tibial artery divides into the medial and lateral plantar nerves and arteries as they pass through the flexor retinacula. Similar to carpal tunnel syndrome at the wrist, the tibial nerve can become entrapped in the region of the flexor retinacula, which is termed “tarsal tunnel syndrome”.

You should be able to identify the following structures on a cadaver or a skeleton.

1. Lateral sural cutaneous branch
2. Medial sural cutaneous branch
3. Popliteal artery and vein
4. Superior medial and lateral genicular arteries
5. Inferior medial and lateral genicular arteries
6. Lesser saphenous vein
7. Sural nerve
8. Medial head of gastrocnemius
9. Lateral head of gastrocnemius
10. Soleus
11. Plantaris
12. Transverse intermuscular septum
13. Posterior tibial artery
14. Tibial nerve
15. Tibialis posterior
16. Flexor digitorum longus
17. Flexor hallucis longus
18. Peroneal artery
19. Flexor retinacula
20. Medial plantar nerve and artery
21. Lateral plantar nerve and artery