

# Example of human anatomy case study

[Health & Medicine](#), [Stress](#)



- Question: Identify the muscles in the anterior compartment of the leg

The leg is divided into three compartments by tough fasciae to hold the muscles and proper functioning of these muscles during their contraction.

These compartments also contain nerves and vessels. The three main compartments are anterior (extensor), lateral (fibular) and posterior (flexor).

The anterior compartment (Extensor compartment) contains muscles which are used for extension (dorsiflexion) of the foot as these muscles have origin in the leg and are inserted in the bones of foot crossing the ankle joint anteriorly.

“ When acting from below they pull the body forward on the fixed foot while walking” (Gray’s 1411-1428). The muscles are Tibialis anterior,

extensor digitorum longus, extensor hallucis longus and Fibularis (Peroneus

Tertius). The vessels of the anterior compartment are Anterior Tibial artery

and anterior Tibial vein. Anterior Tibial artery is one of the two main branches of the popliteal artery that runs in the anterior compartment supplying all

the muscles and becoming Dorsalis pedis artery after it enters the foot. The

nerve of the anterior compartment is deep fibular (Peroneal nerve) that is a branch of common fibular nerve. It supplies all muscles of the extensor

compartment. At the ankle, it divides into lateral and medial branches

- Question: What in the configuration of the anterior compartment makes

this region particularly liable to an increase in intracompartmental pressure?

The anterior compartment of the leg is particularly liable to increased

compartmental pressure as it is the least expansile of the three, surrounded

by bones and tough fascia. A person doing sudden and excessive exercise e.

g. walking, running has increased use of the unaccustomed muscles in the

anterior compartment leading to their swelling. The swelling leads to

compression of blood supply as well as nerve supply of the compartment muscles which leads to damage and necrosis of the compartment muscles. The most vulnerable of the muscle is Tibialis anterior.

- Identify the major nerves and blood vessels in the compartment (Anterior compartment)

The major blood vessel of the anterior compartment is Anterior Tibial artery which supplies all muscles of the anterior compartment while the major nerve of the compartment is Deep Fibular (Peroneal) nerve. Damage to deep Fibular nerve results in the inability to dorsiflex the foot

- Question: How would you test for involvement of the deep Peroneal nerve, keeping in mind that dorsiflexion of foot and toes may be severely interfered with by anoxia (lack of oxygen) of the muscles in the compartment, and that loss of muscle action therefore does not necessarily imply nerve involvement?

Deep Peroneal nerve divides into two terminal branches after leaving the anterior compartment in the foot. The lateral branch supplies extensor digitorum brevis and extensor hallucis brevis. The medial branch supply sensory supply to the first web (Lateral to the big toe). In case of increase in pressure in anterior compartment when the muscles of the anterior compartment might not be able to perform their normal dorsiflexion, the integrity of the deep Peroneal nerve can be checked by checking the sensory innervation of the nerve (first web of the foot). Intact sensations here mean the nerve itself is not damaged in the leg, and the loss of muscle action is due to anoxia (lack of oxygen). It can also be check by checking the muscles supplied by deep peritoneal nerve which lie outside the anterior

compartment i. e. extensor hallucis brevis

- What area of the skin would you test for sensory loss (Deep Peroneal nerve)?

Deep Peroneal nerve after entering the foot divides into a lateral branch and medial branches. The lateral branch supply extensor digitorum brevis and extensor hallucis brevis muscles while the medial branch supplies sensations to first web space of the foot by dividing into two branches supplying adjacent sides of the space. The clinical importance of intact sensations here in compartment syndrome is discussed above

- Question: What vessel in the posterior compartment contributes to collateral circulation with anterior compartment vessels?

In anterior compartment syndrome, the pulses of Anterior Tibial and Dorsalis pedis artery might still be felt in spite of the fact they are actually compressed by the increased pressure. This is due to the Collateral circulation in the lower part of the leg (ankle). The collateral circulation is provided by the two main arteries of the other two compartments of the leg, i. e. Posterior Tibial artery from the posterior compartment and peroneal artery from the peroneal compartment. The Posterior Tibial artery, which is the main artery of posterior compartment, gives perforating, branches to extensor digitorum longus. The perforating branches of the peroneal artery also contribute to the extensor digitorum longus muscle. Thus Extensor digitorum longus is supplied by all three main arteries of the leg. The extensor hallucis longus also gets a contribution from perforation branches of peroneal artery. This circulation helps the blood supply to the anterior compartment muscles during increased pressures in its compartment such as

exercise

- Where do you feel the pulse of the anterior Tibial artery?

Anterior Tibial artery is one of the two terminal branches of the popliteal artery. It supplies the anterior compartment of the leg and continues at the ankle as Dorsalis pedis artery in the dorsum of the foot. In the distal portion of the leg, it lies anteriorly to the Tibia. The pulsations of anterior Tibial artery can be felt at the anterior aspect of ankle joint, midway between the malleoli between the tendon of Extensor hallucis longus muscles medially and the tendons of Extensor digitorum longus laterally.

- Where would you palpate the pulse of the Dorsalis pedis artery?

The Dorsalis pedis artery is the direct continuation of Anterior Tibial artery which begins at the ankle. It supplies the anterior aspect of foot and anastomoses with planter arterial arch. Its pulsations can be felt on the dorsum of the foot lateral to the tendon of extensor hallucis longus and medial to extensor digitorum longus, over Navicular and Cuneiform bones

- Diagnosis and discussion :( Anterior compartment syndrome)

The compartment syndromes refer to increased pressure in a closed compartment of the body leading to compression of structures contained in (e. g., Muscles, vessels, nerves) ultimately leading to damage to them. There are many types of compartment syndromes depending on the specific compartment involved e. g. intracranial compartment syndrome. Most commonly the compartment syndrome occurs in extremities and amongst them the anterior compartment syndrome is the most common. Anterior compartment is a tough compartment due to the surrounding bones and fascia and sudden exercise e. g. running or jogging leads to excessive use of

the anterior compartment muscles leads to their swelling and subsequent increased pressure leads to damage to blood supply (Anterior Tibial artery) and Nerve supply (deep fibular nerve). Patient starts feeling pain and reduced dorsiflexion of the foot. There are swelling and tenderness over the anterior aspect of the leg. If the symptoms persist despite rest and analgesics, a surgical approach may be the best option. A fasciotomy, which is giving an incision to the tough anterior fascia, is done relieving the pressure in the compartment and saving the muscles, vessels and nerves. Amongst the three muscles of anterior compartment, Tibialis anterior is most vulnerable to the compression injury. The reason is its blood supply which is only by the Anterior Tibial artery. The Extensor hallucis longus gets contribution also from perforating branches of Peroneal artery and hence less involved. The extensor digitorum longus is the least affected one as it gets an additional contribution from the third artery of the leg, which is the posterior Tibial artery.

## **Works Cited**

Gray's Anatomy CHAPTER 83, 1411-1428, Fortieth Edition