

Muscles:

The muscles to be managed in a transtibial amputation are located in the four anatomic compartments of the lower limb.

1. Anterior compartment

1. Anterior Tibialis (AT), Extensor Hallucis Longus (EHL), and Extensor Digitorum Longus (EDL)
2. The anterior compartment muscles are transected at the level of the tibial bone cut early in the operation. The anterior tibial vessels and the deep peroneal nerve are located at the depth of the anterior compartment, just anterior to the syndesmotomic membrane.

2. Lateral Compartment

1. Peroneus Longus (PL) and Peroneal Brevis (PB).
2. These muscles are transected at the same level as the anterior compartment muscles, at the level of the tibial bone cut.

3. Deep Posterior Compartment

1. Posterior Tibialis (PT), Flexor Hallucis Longus (FHL), and Flexor Digitorum Longus (FDL).
2. These muscles are carefully isolated, and the posterior tibial vessels and peroneal vessels dissected free before transection. After dissecting down the back of the tibia and fibula to remove the foot, the deep posterior compartment is carefully lifted off of the soleus. Care is taken to keep the muscular investing fascia with the soleus. Care is also taken to find and clamp the small perforating vessels that go from the posterior tibial and peroneal vessels down into the soleus, so that these perforating vessels do not retract down below the fascia and cause bleeding that may be difficult to control.
3. After separating out the posterior tibial vessels, the tibial nerve, and the peroneal vessels – the PT, FHL, and FDL are transected at or just distal to the level of the tibial bone cut.

4. Superficial Posterior Compartment

1. Soleus, Gastrocnemius
2. These two muscles make up the muscular padding of the long posterior flap.
3. Care is taken not to separate the skin and subcutaneous tissue away from the fascia of the superficial posterior compartment, as this may compromise vascular flow to the skin and impair healing.
4. It is important to understand that these muscles get their vascular supply from very different sources. Soleus originates below the knee joint in the tibia, and get its vascular supply from pedicles from popliteal, peroneal, and posterior tibial arteries. The majority of the blood supply is below the trifurcation of the vessels.
5. The gastrocnemius originates above the knee joint on the distal femur, and gets its blood supply proximally from branches off of the popliteal artery, above the trifurcation.
6. Occasionally the soleus can have poor arterial perfusion while the gastrocnemius has excellent perfusion. In other instances, the soleus has large venous channels and is very edematous and swollen. In these types of cases, the soleus muscle can be resected up near its origin preserving the gastrocnemius muscle. The posterior myofascialcutaneous flap can survive very well with only the gastrocnemius muscle, if its fascia is carefully preserved.

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