Chapter 24
Recipient Vessels for Lower Extremity Free Flap Reconstruction

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Wounds in the lower extremity may not be amenable to coverage with local tissue. In these instances, free tissue transfer is needed. Finding suitable recipient blood vessels for a microsurgical anastomosis is critical to success. Arterial inflow may be limited because of trauma or atherosclerotic disease. An angiogram can serve as a vascular roadmap for assessing recipient vessels. In general, when large vessels are used as recipient sites, a side branch of the main vessel can be used in an end-to-end fashion. If there are no available side branches, an end-to-side or end-to-end anastomosis to the main vessels may be performed. A thorough vascular exam must be done prior to sacrificing a large artery in the leg. In the lower leg, the tibial vessels are often used in an end-to-end or end-to-side fashion, depending on the overall vascular status.

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At times, an injured artery may be used for inflow. In this instance, the injured vessel is identified and dissected proximally out of the zone of injury until a fully patent vessel is identified. This allows for end-to-end anastomosis without concern for additional loss of distal flow. Likewise, deep venous thrombosis can cause challenges in establishing flap outflow. If this is encountered throughout the leg, free tissue transfer is not possible. Ideally, this condition would be identified preoperatively so that anticoagulation could precede any free flap attempts. In the setting of trauma, superficial veins are often thrombosed, further complicating outflow options. Most major leg arteries are accompanied by two venae comitantes, which are ideal for the venous anastomoses.

Overview of the Medial Thigh

Complex defects of the medial thigh may at times require free tissue transfer. There are numerous recipient vessel options, including the common femoral and superficial femoral vessels. Smaller branches for microsurgical anastomosis include the deep inferior epigastric system and the medial circumflex femoral vessels.

Overview of the Lateral Thigh and Lateral Circumflex Femoral Vessels

Complex defects of the lateral thigh and hip may infrequently require free tissue transfer. The lateral circumflex femoral system is ideal as a recipient site for flap transfer (Fig. 24.1). Also, the descending branch of the lateral circumflex femoral system may be used as an arterial/venous graft.

Overview of the Distal Thigh and Knee

Complex defects involving the knee are somewhat rare, but they are often associated with bony defects, so free tissue

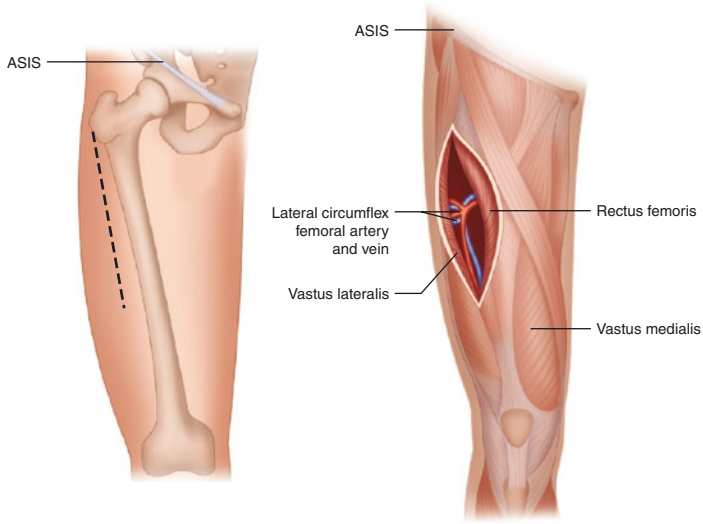

FIGURE 24.1 Preparation of the lateral circumflex femoral vessels. The lateral circumflex femoral vessel system is ideal for microsurgical anastomosis. There are multiple branches that may be used as the primary inflow and outflow. (**a**) An incision is made along a line between the anterior superior iliac spine (ASIS) and the superior lateral aspect of the patella. This is the typical location of the interval between the rectus femoris and the vastus lateralis. (**b**) Once the rectus femoris and vastus lateralis muscles have been separated, the descending branch of the lateral circumflex femoral vessels is seen. The exposure can proceed more proximally to allow for increased vessel size

transfer may be required when local options are not available. There are several options for microsurgical recipient vessels in and around the knee, including the descending branch of the lateral circumflex femoral vessels, the superficial femoral artery, the descending genicular vessels, the popliteal vessels and associated branches, and the anterior or posterior tibial vessels in the lower leg (Fig. 24.2). The decision about which set of vessels to use is usually dependent on patient positioning and concomitant injuries, which may have compromised remote areas.

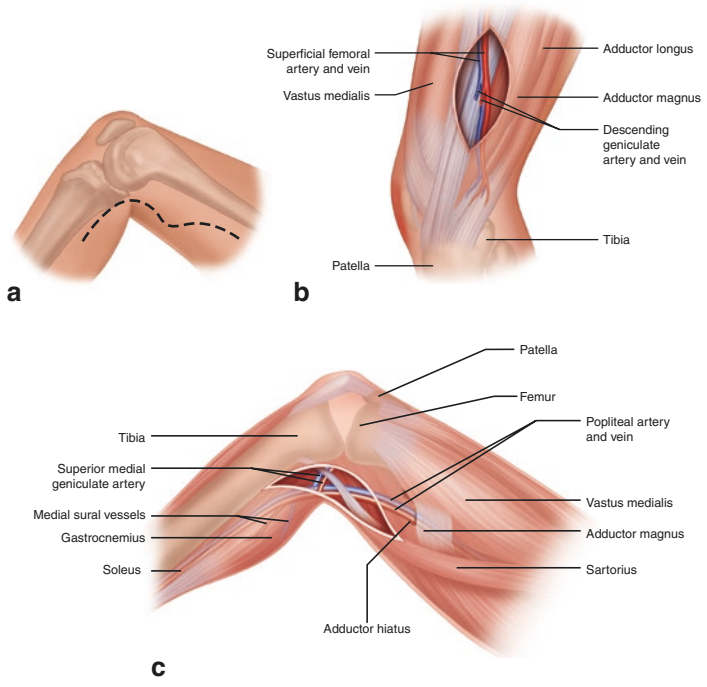

FIGURE 24.2 Preparation of vessels around the knee. (**a**) For this right leg, the hip is externally rotated so that the medial knee is seen. An incision line that starts on the anterior-medial thigh and runs towards the medial-posterior knee is useful for access to superficial femoral vessels and the popliteal vessels. (**b**) A skin incision has been made in the distal aspect of the medial thigh. The dissection has continued down to the interval between the adductor muscles and the vastus medialis. The sartorius muscle has been reflected from medial to lateral. The superficial femoral vessels are seen, in addition to the takeoff of the descending geniculate vessels. Just distal to the takeoff of the geniculate vessels, the superficial femoral artery will dive into the adductor hiatus. (**c**) The posterior-medial thigh skin has been opened to allow for visualization of the popliteal vessels as they exit the adductor hiatus. The superior medial geniculate vessels are seen branching from the popliteal vessels. Distal to this, the medial sural vessels are seen branching from the popliteal vessels. If branches are not available, an end-to-side anastomosis to the popliteal vessels can be performed. The tendons of the sartorius muscle and the hamstring muscles can be seen attaching to the tibia

Overview of the Anterior Lower Leg

Complex wounds of the lower leg are frequently anterior, given the proximity of the tibia bone to the skin. High-energy wounds often require free tissue transfer because of a lack of local flap options. The anterior tibial and posterior tibial vessels are common recipient vessels for free tissue transfer (Fig. 24.3). When dissecting out the anterior tibial vessels, extension of the knee and internal rotation of the leg may be helpful. The dorsalis pedis artery, which is the distal continuation of the anterior tibial artery, also may be used as a recipient vessel. The dorsalis pedis artery can be easily palpated on the proximal aspect of the dorsal foot prior to tourniquet inflation. In some circumstances, the recipient vessels may be distal to the zone of injury. This approach should be used with caution, as intact venous outflow may be limited.

Overview of the Medial Lower Leg

The posterior tibial vessels are the major recipient vessels in the medial leg. The leg can be externally rotated to aid in dissection of the vessels. Additionally, a surgical bump may be placed under the thigh to allow the muscles of the posterior compartment to fall away from the tibia and the underlying posterior tibial vessels. The easiest location for identification of the vessels is just posterior to the medial malleolus at the ankle in the superficial subcutaneous plane (Fig. 24.4). As the vessels are dissected more proximally, their course becomes deeper.

During dissection, care should be taken to avoid injury to the small and great saphenous veins in order to preserve back-up flap venous outflow options. Additionally, the saphenous veins may need to be harvested as vein grafts if surgical dissection finds that the zone of injury to the posterior tibial vessels is extensive.

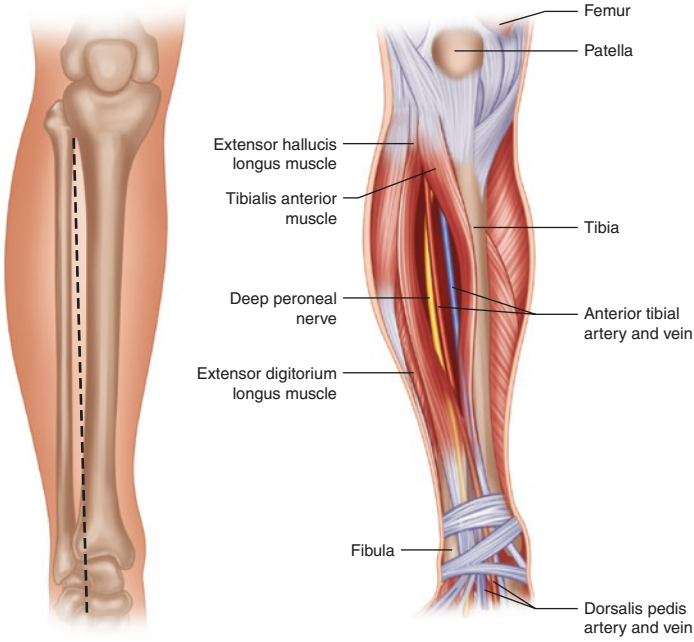

FIGURE 24.3 Preparation of the anterior tibial and dorsalis pedis vessels. (**a**) An incision that starts just lateral to the edge of the tibia and crosses the midline of the leg as it runs distally toward the central portion of the dorsal foot is useful for access to the anterior tibial and dorsalis pedis vessels. (**b**) The anterior tibial vessels course between the extensor hallucis longus muscle laterally and the tibialis anterior muscle medially after passing anteriorly through the interosseous membrane between the tibia and fibula. The deep peroneal nerve courses with the vessels. Distally, the anterior tibial vessels can be seen branching into the dorsalis pedis artery and veins at the ankle just distal to the extensor retinaculum. The dorsalis pedis vessels are positioned between the extensor tendons in the foot

Distal to the ankle, after passing under the flexor retinaculum, the posterior tibial artery branches into the medial and lateral planar vessels that supply the plantar foot. These vessels also may be used as recipient vessels for free tissue transfer in the treatment of distal ankle and foot wounds.

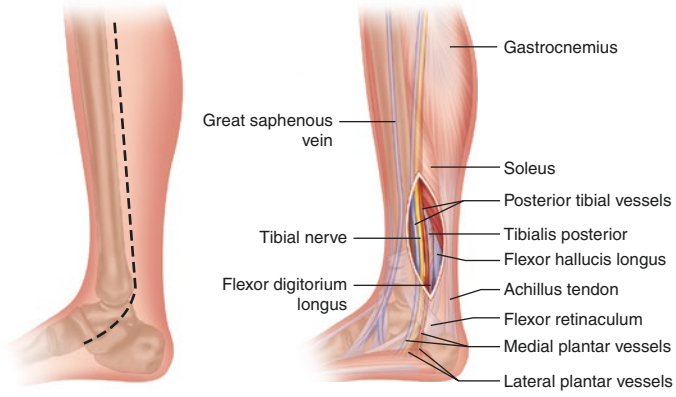

FIGURE 24.4 Preparation of the posterior tibial and plantar vessels. The image shows the medial aspect of a right lower leg. (**a**) An incision line that starts 1–2 cm posterior to the tibia in the proximal leg and runs between the medial malleolus and the Achilles tendon in the distal leg is used to gain access to the posterior tibial vessels. (**b**) A skin incision has been made along the distal lower leg to first identify the posterior tibial vessels and tibial nerve at the ankle, where the neurovascular structures are found superficially, just under the skin. If more proximal access to the vessels is needed, the dissection must proceed deep to the flexor digitorum longus, gastrocnemius, and soleus muscles. The posterior tibial vessels and nerve can then be found coursing along the posterior surface of the deep posterior leg muscles. In the distal ankle, the posterior tibial vessels and nerve can be seen passing through the tarsal tunnel before branching into the medial and lateral plantar arteries and nerves to supply the plantar foot. The roof of the tarsal tunnel, or the flexor retinaculum, can be seen attaching to the distal tibia

Suggested Reading

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