

FIBULA FLAP

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FLAP TERRITORY

This flap includes a segment of the fibular bone with or without the overlying skin island on the peroneal/ lateral aspect of the calf.

VASCULAR ANATOMY

The peroneal artery and vein lie on the medial surface of the fibula, posterior to the interosseus membrane, making dissection relatively difficult. At the bifurcation (anterior tibial and peroneal arteries), the vessels start posterior to and at some distance away from the bone before moving diagonally downwards to a position closer to the bone.

There are some important points related to the vascularity of the leg and its variants.

Peronea arteria magna – a dominant peroneal artery has reciprocally small

tibial vessels. This condition may be ipsilateral as other leg may be satisfactory. This is rather rare.

Low bifurcation – the pedicle would be short (and vein grafts may be necessary).

The skin island may be supplied by perforators from the posterior tibial system traversing the soleus and thus separate from the peroneal artery system. It is a misconception from the pre-perforator flap era that including a cuff of soleus/ flexor hallucis longus (FHL) will improve the reliability of the skin island. Although it requires more dissection, tracing the perforators to the pedicle will optimize reliability. Including unnecessary muscle has adverse implications, in particular reducing the maximum tolerable ischaemic time.

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FLAP HARVEST

Preoperatively, if the pedal pulses (dorsalis pedis and posterior tibial) are palpable and strong then this is usually sufficient as a screening test. In selected patients such as the elderly, arteriopath and post traumatic cases, an angiogram may be useful.

Bend the knee to a 40-60 degree angle and mark the top and bottom of the fibula bone. It is conventional to leave some bone at both ends to preserve the common peroneal nerve (~4cm above) and the ankle joint (6cm below) respectively. Mark the posterior edge of the fibula which is the axis of the skin island.

Mark an elliptical skin island centred on the axis along the posterior edge of the fibula **Figures 1, 2** and at the junction of the middle and lower thirds of the fibula.

Incise the anterior skin edge down through the fascia to the muscle (usually the

peroneals) and elevate the flap subfascially from anterior to posterior until you reach the posterior lateral intermuscular septum situated posterior to the peroneal muscles. You should then be able to see the skin perforators. **Figure 3**

Incising to the fascia and elevating for a distance supra-fascially **Figure 4** helps protect the sural nerve and short saphenous vein posteriorly as well as the peroneal tendons anteriorly by not exposing them.

Adjust your posterior incision if necessary and incise down to muscle (gastrocnemius/soleus). Now elevate this posterior flap (sub)fascially in an anterior direction to meet the same septum and the perforators seen before. Perforators that run through the posterior muscles are more likely to arise from a system separate from the peroneal system and will not reliably supply the skin island. The muscles can

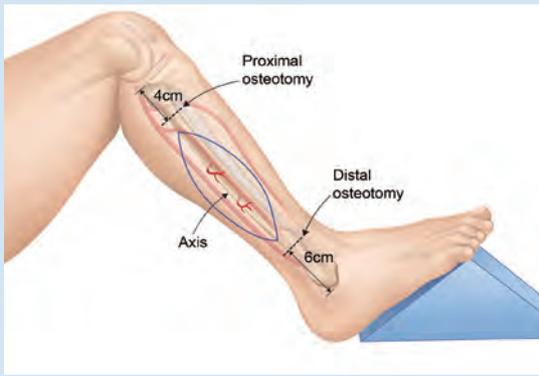


Figure 1
Design of the fibula flap

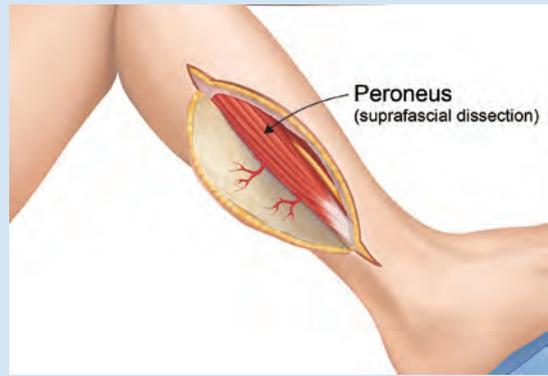


Figure 4
Suprafascial dissection to protect the sural nerve

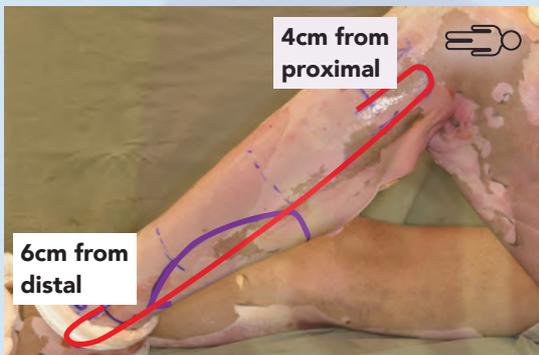


Figure 2
Design of the fibula flap, posterior border of fibula (red colour)



Figure 5
Dissect the peroneal muscles away from the lateral surface of the fibula

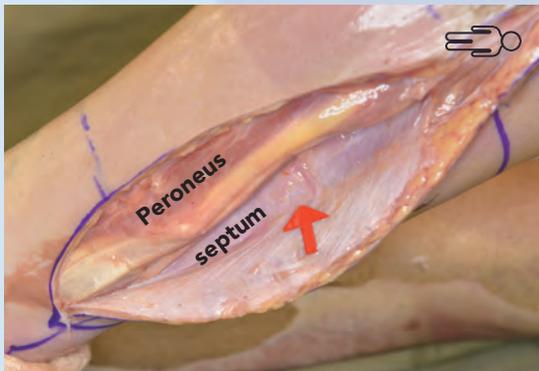


Figure 3
Perforator (indicated above) running in the intermuscular septum

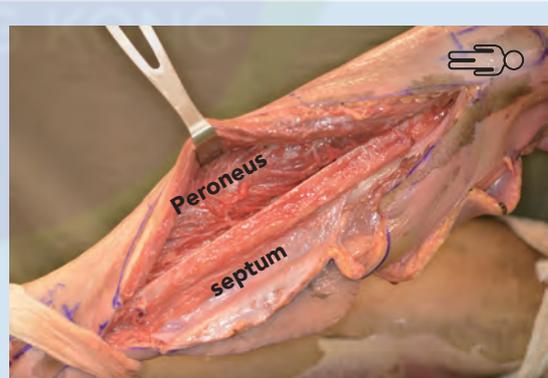


Figure 6
Leaving a thin layer of muscle to ensure that the periosteum remains intact

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be separated from the septum with gentle blunt dissection.

Dissect the peroneal muscles away from the lateral surface of the fibula in an anterior direction **Figures 5, 6** leaving a thin layer of muscle to ensure that the periosteum remains intact. When you reach the anterior edge of the fibula, incise the membrane (anterior intermuscular septum) all the way down to the ankle. You can also divide the muscles (extensor hallucis longus and extensor digitorum longus) and interosseus membrane (IOM) at this point if you are able to see them. **Figure 8**

Cut the distal fibula at your selected level. After you do so, note the proximity of the peroneal vessels and ligate or divide them.

If you have identified the common peroneal nerve, you can also cut the proximal fibula at this time to facilitate mobilization of the bone.

Return to the posterior aspect of the fibula and divide the muscle attachments here (flexor hallucis longus and tibialis posterior). **Figure 7** The peroneal vessels will be seen under this muscle layer. If you haven't already divided the IOM then return to the anterior fibula and divide it.

Divide the proximal fibula, if not already done (taking an extra segment can help to improve access to the proximal peroneal vessels), and trace the vessels to the bifurcation. **Figure 9**

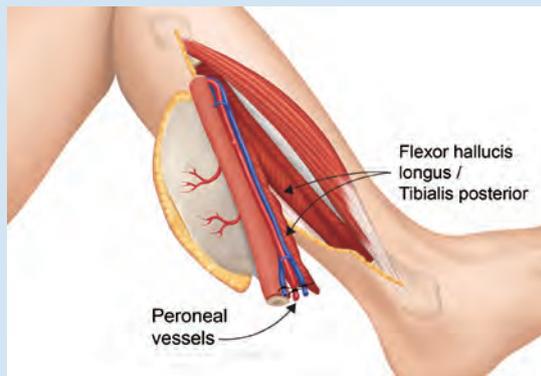


Figure 7

Divide the FHL/PT from the posterior aspect of the fibula

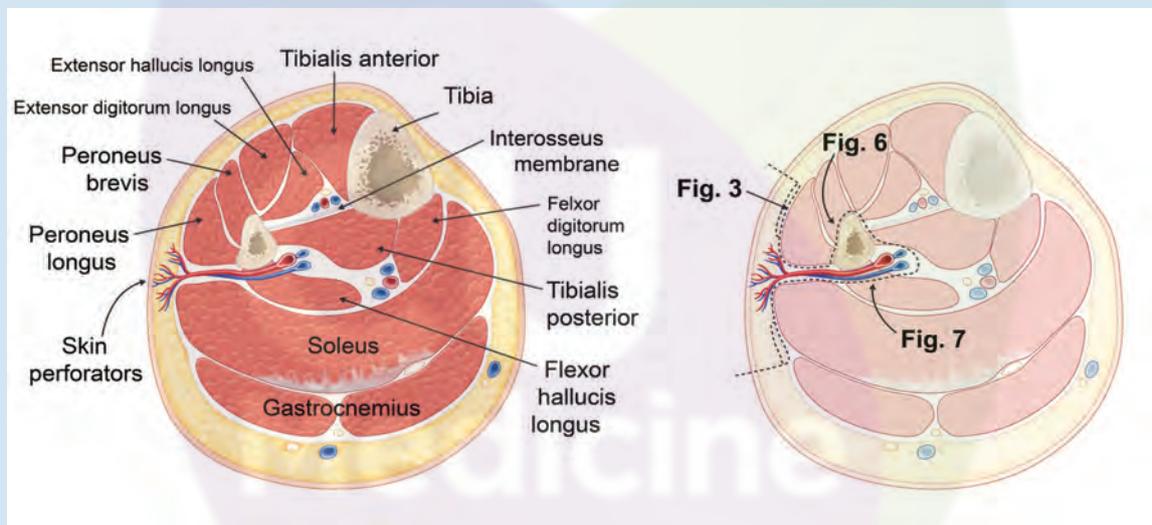


Figure 8

Cross section of the leg

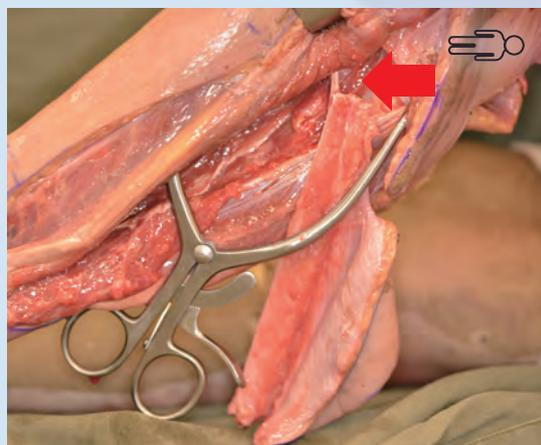


Figure 9

Both the proximal and distal fibula divided and the peroneal vessel exposed (indicated above)

KEY POINTS

1. The peroneal artery and vein supply the fibula bone and the overlying skin island.
2. The presence of pedal pulses (DP and PT) is usually sufficient as a screening test. An angiogram is rarely necessary.
3. It is conventional to leave 4 cm of bone superiorly to preserve the common peroneal nerve and 6 cm bone above the ankle joint.
4. The axis of the flap is located at the posterior edge of the fibula.
5. Identify the skin perforators at the posterior lateral intermuscular septum.
6. Leave a thin layer of peroneal muscle on the lateral surface of the fibula to ensure the periosteum remains intact.
7. Dividing the proximal fibula facilitates access to the proximal peroneal vessels.

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