

MEDIAL SURAL ARTERY PERFORATOR FLAP

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FLAP TERRITORY

The medial sural artery perforator (MSAP) fasciocutaneous flap was first described by Cavadas (2001) as a refinement of the medial gastrocnemius flap. The territory approximates to the medial half of the upper third of the posterior calf, an area of about 8x12 cm. It can be extended anteriorly to 2/3rd of the distance from the midline to the anterior tibial margin. It is a useful alternative to the radial forearm flap providing thin hairless tissue with relatively little donor site morbidity particularly when compared to the posterior tibial artery flap.

Caution should be exercised in patients with peripheral vascular disease or diabetes mellitus. An analogous lateral sural artery perforator flap can be raised in most patients as an alternative.

VASCULAR ANATOMY

The MSA usually arises from the popliteal artery (from a common sural trunk in up to 30%). After a few centimeters, the vessel enters and runs through the medial belly of the gastrocnemius muscle and some branches 'perforate' through to the skin. The MSA usually divides into lateral and medial branches, this usually occurs in the substance of the muscle (85%). Some surgeons prefer to use the lateral (nearer the midline) row of perforators on the basis that it is usually dominant. Muscle devascularisation is not a major concern as there are other vascular supplies to the muscle apart from the MSA. **Figure 1**

There are usually 2-4 perforators of about 1 mm diameter that are concentrated at an area 4.5 cm from the midline and 8-12 cm from the popliteal fossa crease. The

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first perforator is usually 8 cm along a line drawn from the middle of the popliteal crease to the medial malleolus. Markings should be made with the patient lying on their back and the knee flexed to 90 degrees. Note that frog-legging (external rotation of the hip) distorts the skin and vessel positions. **Figures 2, 3**

The artery is about 2 mm in diameter at its origin. Depending on the perforator chosen and amount of retrograde dissection, the pedicle ranges from 9-16 cm.

The posterior cutaneous nerve of the thigh can be also harvested in instances where a sensate flap is required.

FLAP HARVEST

Preoperative examination with a handheld doppler ultrasound probe or duplex

ultrasound helps to locate the perforators. Some surgeons approximate this to the intersection of the lines from the popliteal crease to the medial malleolus and medial femoral epicondyle to the lateral malleolus. The flap can be harvested with the patient either supine (frog-legged, for contralateral side) or prone. **Figures 3, 4**

In this dissection, the flap territory is taken to be the upper third of the posterior medial calf. A vertical line marks the midline of the posterior calf and the dissection begins here in either the subfascial or suprafascial (more difficult) plane from midline to lateral (in reality, the medial side of leg). Starting from the anterior border of the flap is easier with the patient in the supine position.

The largest perforator(s) is identified and then traced back towards the popliteal artery by splitting the muscle. The

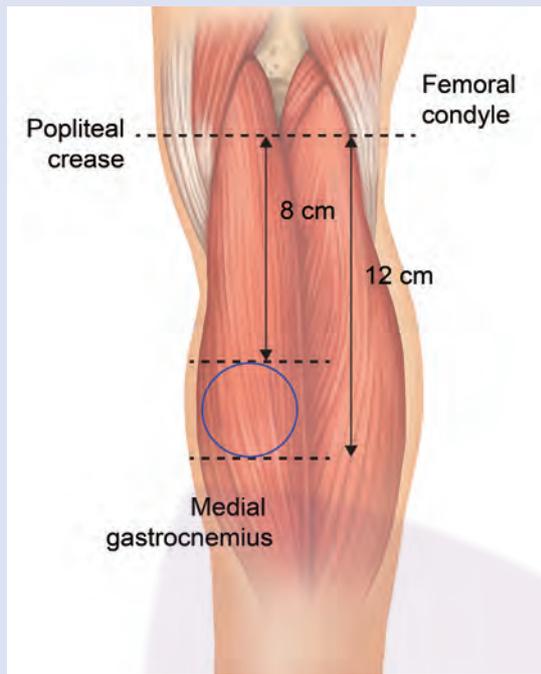


Figure 1
Design of the flap



Figure 3
Design of the flap and measurement to locate the perforators

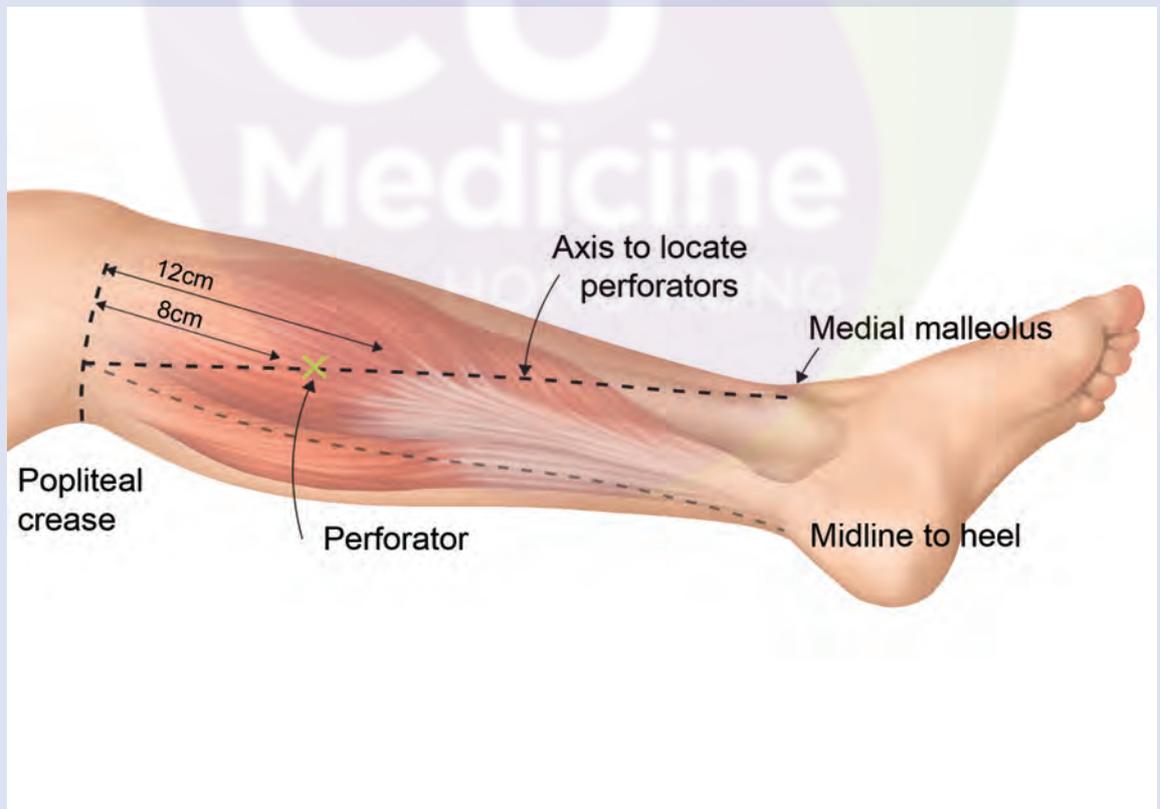


Figure 2
Landmarks to locate the perforator(s)

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remaining borders of the flap can be incised at this point. **Figures 5-8**

Take care to spare the motor nerve to the medial belly of the gastrocnemius.

Taking the superficial cutaneous veins (short saphenous) along with the skin paddle facilitates alternate/additional drainage.

The donor site can usually be closed directly if it is 5-6 cm or less in width. The muscle surface can be aponeurotic and if skin grafts are needed, it may be worthwhile trimming the thick fibrous layer to improve take.

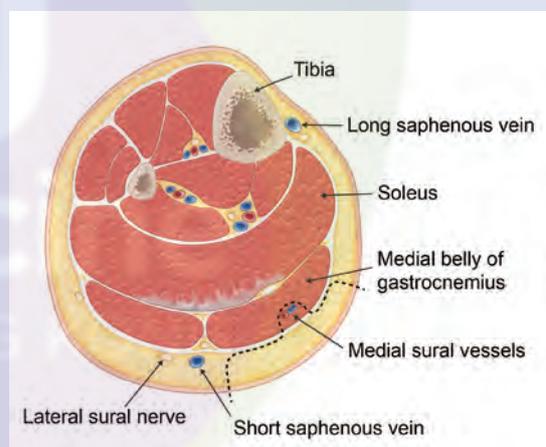


Figure 4
Cross section of the calf

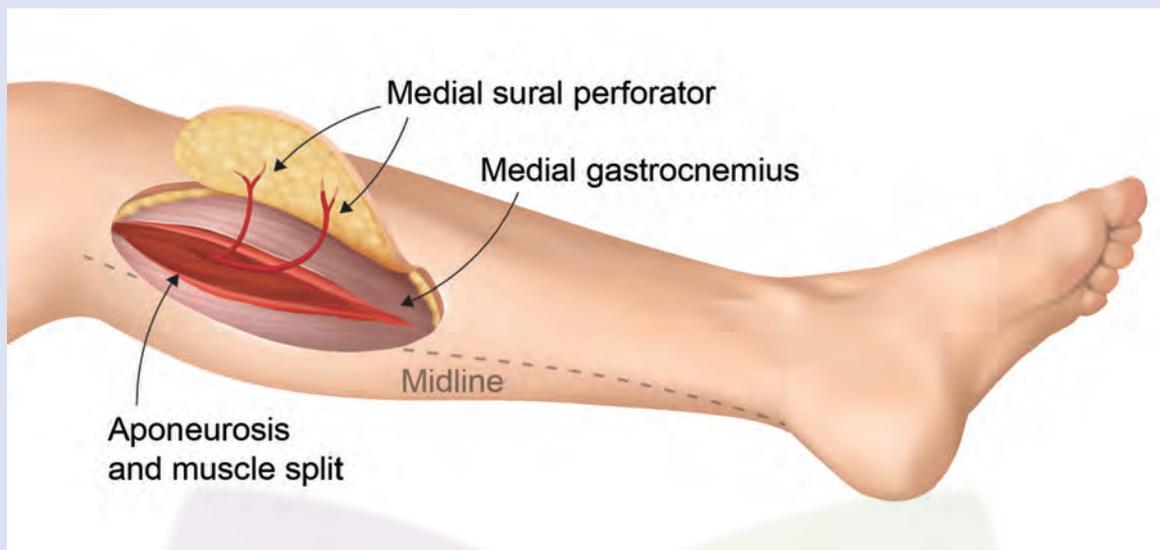


Figure 5

Schematic diagram of a raised medial sural flap

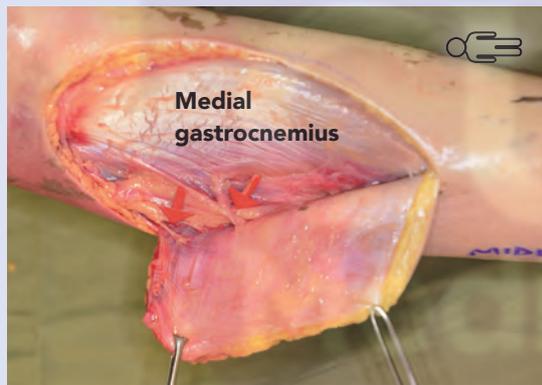


Figure 6

Two perforators

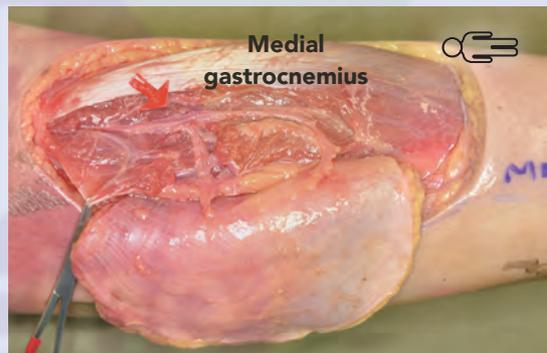


Figure 8

Intramuscular course of the medial sural artery

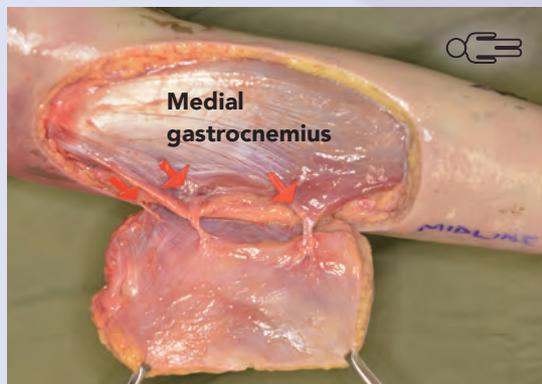


Figure 7

Posterior border of the flap incised with perforators indicated

KEY POINTS

1. The MSAP flap is a useful alternative to the radial forearm flap.
2. The MSA usually arises from the popliteal artery and runs through the medial belly of the gastrocnemius.
3. The perforators are concentrated at a distance of 8-12 cm from the popliteal fossa crease.
4. The flap can be harvested with the patient in a frog-legged or prone position.
5. Take care to spare the motor nerve to the medial belly of the gastrocnemius.
6. The muscle surface can be aponeurotic and this is best trimmed if skin grafts are required.

