Endoscopic harvest of the medial gastrocnemius muscle flap: a cadaveric study


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SUMMARY. The aim of our study was to prove that endoscopic-assisted harvest of the medial gastrocnemius muscle is as effective as the conventional technique. We performed endoscopic dissection on 10 fresh human cadavers, and found that the medial gastrocnemius muscle was easily harvested through a minor donor-site incision, because of its topography and constant dominant proximal vascular pedicle. The operative technique is described. © 2002 The British Association of Plastic Surgeons

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Minimally invasive surgery has been used in a growing number of aesthetic and reconstructive plastic-surgical procedures.1,2 The medial gastrocnemius muscle flap can be raised easily, quickly and safely because of its topography and its constant dominant proximal vascular pedicle.3 It is the principal muscle flap used for knee coverage,3,4 and offers a salvage procedure when a knee prosthesis becomes exposed.5–8

Operative technique

We report a technique for harvesting the medial gastrocnemius muscle flap endoscopically, based on our experience in the dissection of fresh human cadavers. In contrast to the conventional long incision, only one small access incision is made. This is particularly important in young females.

Materials and methods

Ten fresh human cadavers (20 legs) were dissected at the Ecole de Chirurgie du Fer-à-Moulin, Paris, France. We used a 5 mm 30° angled endoscope, inserted using an endoretractor (small Subcu-Retractor, Ethicon) (Fig. 1) to create an optical space. Long-handled dissecting scissors and forceps were used.

Operative technique

The outlines of the medial and lateral gastrocnemius muscles and the Achilles tendon are marked on the calf. One skin incision, internal paramedian, 4 cm in length, is made at the lower musculotendinous junction of the medial gastrocnemius muscle. The sural nerve and the lesser saphenous vein are then dissected and protected in the midline. These structures are two key landmarks that help to locate the natural cleavage between the medial gastrocnemius muscle and the lateral gastrocnemius muscle in the midline. The muscle aponeurosis is also incised under direct vision.

Medial blunt dissection is performed using forceps inserted through the same access incision. The endoscopic-mounted retractor is inserted, and dissection of the loose avascular areolar tissue separating the lateral part of the muscle from the underlying soleus muscle is easily performed through the optical cavity where the surgical instruments are manipulated (Fig. 2).

Figure 1—The endoretractor used during the harvest of the medial gastrocnemius muscle.

Figure 2—Lateral dissection: S: soleus muscle; MG: medial gastrocnemius muscle.
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Figure 3—Midline dissection: S: soleus muscle; MG: medial gastrocnemius muscle; LG: lateral gastrocnemius muscle.

Figure 4—Achilles tendon dissection.

The medial dissection of the medial gastrocnemius muscle from the lateral gastrocnemius muscle (Fig. 3) is a little more difficult because of the intermingling of their muscle fibres and the arterial and venous communications between the muscle heads.

Dissection is continued without problems until the knee joint is reached. The endoscopic-mounted retractor is then turned distally to dissect the Achilles tendon (Fig. 4), which is separated from the soleus tendon and secured by traction to allow undermining of the deep surface of the muscle (Fig. 5A). The plantaris tendon is retracted, and the artery described by Atchabahian and Masquelet, which we found in three cases (Fig. 5B), is ligated.

The medial sural pedicle is visualised, and the motor nerve branch to the muscle is divided (Fig. 6). The medial gastrocnemius muscle flap is then mobilised on its pedicle toward the knee, after incising the medial skin and aponeurosis (Fig. 7). The mean operative time in our series was 40 min.

Discussion

Endoscopic techniques are gaining popularity in plastic surgery. They have already been used to harvest muscle flaps, including the tensor fascia lata, gracilis, latissimus dorsi and rectus abdominis. The adipofascial flap of the lower leg, the temporoparietal fascial flap, the omentum and the jejunum have also been harvested using this procedure.

Endoscopic-assisted harvest of the medial gastrocnemius muscle is a simple procedure in the cadaver, and will minimise postoperative scarring of the donor site in
The medial gastrocnemius muscle flap is the 'gold standard' for reconstruction of the soft tissue in the knee region and the proximal third of the lower leg. It can also be used to salvage an exposed or contaminated prosthesis. The conventional technique for harvesting this flap involves making an incision from the union of the proximal third and middle third of the lower leg to the popliteal fossa.

The technique described here cannot eliminate the posterior scar, but can significantly reduce its length, in a reasonable operative time for an endoscopic procedure, because of the topography and constant vascularisation of the medial gastrocnemius muscle. This is particularly advantageous in the young, especially females, if direct access to the medial gastrocnemius muscle through the initial wound is impossible. Moreover, the muscle may be elevated for free-flap transfer through this small porthole.

Clinical cases are now being performed to evaluate the safety, reliability and cost effectiveness of endoscopic harvest of the medial gastrocnemius muscle.

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References


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