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Anterolateral adipofascial turnover flap of the leg: Anatomical study



L. Ioppolo^a, F. Stagno d'Alcontres^a, M.R. Colonna^a, V. Casoli^b,
F. Lupo^a, G. Delia^{a,*}

^a Plastic Reconstructive and Aesthetic Surgery Unit, University of Messina, Policlinico 'G. Martino',
Via Consolare Valeria 1, 98125 Messina, Italy

^b Plastic and Burn Unit Fx Michelet Centre, Bordeaux Segalen University, Bordeaux, France

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KEYWORDS

Lower limb
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Summary *Aim:* The aim of this study is to clearly define the vascularisation of the lateral paratibial septum of the leg, defining the basis for a vertical pedicled adipofascial flap harvested from the anterolateral aspect of the leg to cover pretibial soft tissue defects.

Materials and methods: Twelve cadaver legs (eight fixed with formalin and four fresh) were dissected. The vessels running into the lateral paratibial septum were identified. The number of vessels were noted and evaluated at the lateral border of the proximal, middle and distal thirds of the leg.

In addition, an angiographic study was performed on two limbs to confirm the connection between tibialis anterior artery and the overlaying fascia through these septal vessels.

Results: All the specimens had periosteal-septal vessels running in the lateral aspect of the tibia. The average number was 6.6. The distribution was constant in all the thirds of the leg.

Conclusion: These data are useful to propose the harvesting technique for adipofascial flap with vertical pedicle as a suitable reconstructive option to cover pretibial soft tissue defects.

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Introduction

The coverage of pretibial soft tissue defect is a challenge in reconstructive surgery for its intrinsic anatomical features. In this region, the bone is covered only by a thin layer of fasciocutaneous tissue, which can easily be lost during traumatic injuries. The possibility to use local flap is

* Corresponding author. Gabriele Delia, Plastic Reconstructive and Aesthetic Surgery Unit, A.O.U. Policlinico 'G. Martino', University of Messina, Via Consolare Valeria 1, 98125 Messina, Italy. Tel.: +39 3289215256; fax: +39 090 221 3727.

E-mail addresses: gabrieledelia@gmail.com, gdelia@unime.it (G. Delia).

reduced by the low quantity and elasticity of the soft tissues surrounding this region.

To overcome these problems, muscular, free, and propeller flaps are a common solution, but they themselves have their own unique concerns.

The former are associated with negligible donor-site morbidity, while the latter involve often a time-consuming procedure and require a good microsurgical training facility to perform competently.

Ponten, and many other authors^{2–5} since the 1980s, developed a pedicled fasciocutaneous flap at the lower limb.¹ These studies analysed and defined the vascularisation of the fascial layer of the leg.

During the 1990s, popularized by Lai^{6,7} and Lin,^{8–10} these concepts allowed the modification of the fasciocutaneous flap of the leg with the appearance of adipofascial flap.

During the 2000s, several studies reported on the application and results of lateral (Lee¹¹) and medial adipofascial flap for lower leg reconstruction (Heymans).¹²

These flaps are composed of the deep fascia of the leg and the overlying subcutaneous tissue.

The main advantages of this flap are the lower donor-site morbidity with the concomitant easier inset over the defect due to their great pliability and, in addition, the possibility to mobilize the flap with a turnover transposition.

This last feature has allowed a flap design with the pedicle localized on the margin of the defect, which is usually not possible when designing standard local flaps.

In this cadaveric study, the focus was on the periosteoseptal vessel running in the lateral surface of the tibia, providing an anatomical rationale for an easy and safe harvesting of lateral adipofascial flaps with vertical paratibial pedicle.

Anatomical summary of fascial vascularisation in the leg

The vascular anatomy of the fasciocutaneous tissue is very similar throughout the body. The main networks are the fascial, the subcutaneous and the subdermal.

The periaponevrotic system of the leg is more developed than in other regions. It is formed by the perifascial (suprafascial and sub-fascial) network (Figure 1) and by the capillary anastomotic network within the fascial tissue.¹³ The periosteoseptal vessels running on the lateral surface of the tibia were evaluated.

Aim

The aim of the study was to assess the constancy, number and size of the septo-fasciocutaneous vessels in the lateral paratibial septum of the leg in the proximal, middle and distal third of the leg.

Material and methods

This anatomical study was performed in the anatomical laboratory of the Bordeaux II University, France.

Dissections were performed on Eight cadavers from the body donation program of the Bordeaux II University. We made the dissection on 12 lower limbs, of which four limbs were fresh and harvested from different cadavers. The male to female ratio was 1:1, and they ranged between 70 and 85 years.

The anatomical region studied was the anterolateral aspect of the leg with focus on arterial vascularisation of the fascia. The dissection was performed with loupes (3.5× magnification), dissecting out the skin from adipofascial layers and separating these tissues from the underlying muscles in a latero-medial direction (Figure 2).

Once the lateral tibial ridge was exposed, we evaluate the presence of vessels in the septum between the lateral aspect of tibia and the tibialis anterior muscle.

Two measurements were reported: (1) the number of the vessels running in the proximal, medial and distal third of the leg, and (2) the average diameter of the vessel on the lateral surface of the tibia before passing through the fascia.

We injected two fresh adult male cadaver's legs with a mixture of barium sulphate and gelatine (100 ml barium

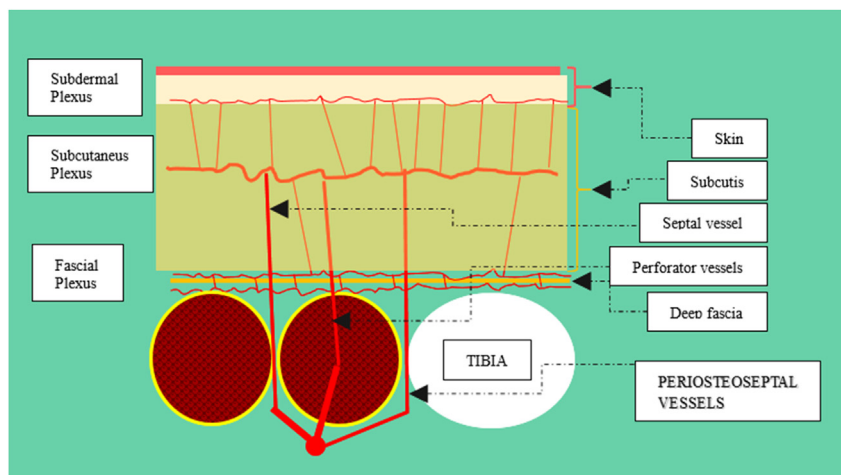


Figure 1 Schematic anatomy of the vascularization of soft tissue in the leg.

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