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Septocutaneous tensor fasciae latae perforator flap for breast reconstruction: Radiological considerations and clinical cases☆

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Summary *Introduction:* The deep inferior epigastric artery perforator (DIEP) flap is the first choice in autologous breast reconstruction; in cases when it cannot be used, alternative flaps are available. A radiological study and clinical cases using septocutaneous tensor fasciae latae (sc-TFL) flap for breast reconstruction are presented.
Materials: Magnetic resonance angiographies (MRAs) of 55 patients were evaluated. The pedicle and the perforators of the TFL were studied. Five consecutive sc-TFL flaps for breast reconstruction were performed.
Results: Thirty-seven MRA scans were included. There was a mean of 1.5 septocutaneous perforators per thigh. The mean pedicle length was 8.3 cm. Every perforator originated from a branch of the lateral circumflex femoral artery (LCFA). The LCFA originated from the arteria femoralis profunda in 89.2% of cases. In the vertical plane, the mean distance of the perforator from the antero-superior iliac spine was 8.7 cm. There were no major complications in the five sc-TFL performed.
Conclusion: On MRA, the septocutaneous pedicle of the TFL perforator flap was consistently present. MR angiographic assessment of the septocutaneous branches was very helpful in the preoperative evaluation of our patients. Dissection of the sc-TFL can be performed in a supine position simultaneously with mastectomy and/or dissection of the mammary vessels.

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Finally, the donor-site scar can be hidden by underwear, giving minimal deformity. We recommend the sc-TFL flap as a good alternative to the DIEP flap for autologous breast reconstruction. Preoperative imaging is mandatory for correct planning of the flap.

Introduction

The deep inferior epigastric artery perforator flap (DIEP) is accepted worldwide as the first choice in autologous breast reconstruction. However, in patients with previous abdominoplasty, lack of sufficient subcutaneous fat or scarring in the abdominal region, breast reconstruction with this flap may not be possible. The most common alternatives to the DIEP flap in these patients are the transverse myocutaneous gracilis (TMG) flap[1] and the superior gluteal artery perforator (S-GAP) flap,[2] which use the inner thigh or the gluteal region as the donor site, respectively.

The lateral thigh region as a source of tissue for breast reconstruction was described in 1990 by Elliot[3] (as a tensor fasciae latae (TFL) myocutaneous free flap) and later in 2011 by Kind et al.[4] (as a case report with a TFL perforator flap). In both studies, no preoperative imaging was performed, which most probably explains why one of the TFL perforator flaps failed in the case described by Kind et al.

The effect of TFL in terms of morbidity at the donor site is not described in the literature. We hypothesised that the upper lateral thigh region might be very attractive as a donor site.

In the present study, we focussed on the best way to harvest a free flap from the upper lateral thigh region. In preoperative MRAs of patients scheduled for breast reconstruction with the DIEP flap, we observed the consistent presence of septocutaneous perforators running between the TFL and the gluteus medius muscles, vascularising the upper lateral thigh region, the gluteal region and the TFL muscle. On the basis of this observation, we retrospectively analysed all MRA examinations with a specific focus on the lateral thigh region. In addition, we performed a literature review on the TFL and TFL perforator flaps. Using the obtained information, we decided to perform a septocutaneous TFL (sc-TFL) free perforator flap for breast reconstruction in four patients.

Patients and methods

Patients who underwent breast reconstruction with a DIEP flap between January and December 2012 were included in this study. A total of 55 MRA examinations were available for retrospective analysis. In the second stage of this study, five breast reconstructions in four patients were performed using a septocutaneous TFL flap.

Radiology

Contrast-enhanced magnetic resonance angiography (CE-MRA) images were acquired on a 1.5T MRI system (Ingenia or Intera, Philips Healthcare, Best, The Netherlands) with a SENSE body coil (Philips Healthcare). The contrast agent used was 15 mL of Gadovist (Bayer Schering Pharma) administered intravenously, followed by 25 mL of normal saline using an electronic injector at 2 mL/s. A three-dimensional (3D) fat-suppressed ultra-fast gradient echo sequence was used, with the following parameters: TE: 4 ms; TR: 8.4 ms; SF: 2 (feet-head); FOV: 380 $\times$ 304; and matrix: 400 $\times$ 320. Retrospective analysis was performed with IMPAX 6 software (AGFA Healthcare) on the original and reconstructed images (T.B.). The following parameters were systematically analysed: (1) number of septocutaneous branches of the ascending branch of the lateral circumflex artery, (2) origin from the lateral circumflex femoral artery (LCFA), (3) distance from the anterior superior iliac spine (ASIS) to the level where the septocutaneous branches enter the subcutaneous fat: *y*-axis, and (4) maximal pedicle length defined as the distance from the origin of the ascending branch of the lateral circumflex femoral artery to the location where the septocutaneous branch enters the subcutaneous fat.

Clinical cases

Five consecutive sc-TFL flaps were performed in four patients for breast reconstruction between September 2012 and February 2013 at Maastricht University Medical Centre in The Netherlands. Patients' demographics, medical history, smoking status, perforator characteristics, pedicle length and vessel size, operative technique and time, length of hospital stay and outcomes were registered.

Preoperative landmarks

All patients underwent preoperative imaging using MRA and colour Doppler before surgery. Only patients with a suitable septocutaneous perforator (with a good calibre and a pedicle length of 6 cm or more) were considered for using the sc-TFL flap (Figure 1).

On the basis of MRA images, the distance between antero-superior iliac spine (ASIS) and the position of the perforator emerging from the fascia in the subcutaneous tissue (*y*-axis) was measured and identified on the skin of the patient, as schematically shown in Figure 2. Because the skin contour in the gluteal-thigh region is convex (not flat as in the abdominal region, for example), the distance of the perforator from the midline that we calculated on the MRA is not always reproducible. However, the plane in which the pedicle of the septocutaneous perforator runs is either the ventral septum (between rectus femoris/vastus lateralis muscles and TFL) or the dorsal septum (between