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Clinical experience with a tensor fasciae latae perforator flap based on septocutaneous perforators☆

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Summary *Background:* Based on an anatomical study of the perforators of the tensor fasciae latae (TFL) perforator flap, a clinical study was undertaken to confirm our data in a clinical trial and to demonstrate the ability to harvest a TFL perforator flap on septocutaneous perforators.
Methods: A retrospective case series analysis was performed of patients, who had undergone reconstruction of soft-tissue defects of the extremities, the groin and the head in 17 cases with a TFL perforator flap based on septocutaneous perforators; in three cases, a combined flap was used. The size of the flaps, the number of perforators, their external diameter, the length of the pedicle and the location and the distance from the anterior superior iliac spine (ASIS) were recorded.
Results: The average number of septocutaneous perforators per flap was 1.3 (range, 1—3); the average distance from the ASIS was 11 cm (range, 8—14 cm). The pedicle length varied between 4 and 10 cm, with an average of 7 cm; the average diameter of the pedicle was 4 mm (range, 1—5 mm). The average length of the flaps was 14 cm (range, 4.5—25), and the average width was 7 cm (range, 4.5—19). Donor site closure was achieved by direct closure in 14 patients, and in three patients with a split-thickness skin graft. In one case, at least two-thirds of the flap became necrotic because the septocutaneous perforator was located too far laterally from the flap centre. In one case of a combined flap, one skin island became partly necrotic due to compression after the pedicle was placed beneath the tendon of the extensor tibialis anterior muscle. One flap was successfully revised after venous thrombosis.

☆ This study has been approved by the ethic committee of the Medical University of Graz (registered at the Office for Human Research Protections, IRB00002556). EK — Number: 21—418 ex 09/10. Ethikkommission, Auenbruggerplatz 2, 8036 Graz, Austria. ethikkommission@medunigraz.at

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Conclusions: The reliability and consistency of the septocutaneous perforators of the TFL flap make planning of this flap easy and the dissection straightforward. Although the number of complications is high in this series, only one complication is related to the flap and the planning itself. With the proposed modifications, we recommend this flap as an interesting alternative to other fasciocutaneous flaps.

The introduction of the perforator flap technique was a remarkable step in reconstructive surgery. This technique shifted the focus from a simple coverage of defects towards minimising donor site morbidity, refining the flap and selecting the most appropriate donor tissue, to reduce bulk and to reconstruct defects in a functional and even three-dimensional manner. It can, however, be difficult to plan these flaps, due to the variable position of the perforators. A hand-held Doppler probe, coloured duplex sonography and even computed tomography (CT) and magnetic resonance imaging (MRI) are used to detect perforators preoperatively.[1–6] These perforators, if detected, are usually musculocutaneous. A long intramuscular course, a high number of tiny side branches and the occasionally very small diameter of these perforators can render the dissection arduous and time-consuming.

By contrast, a perforator flap based on septocutaneous perforators, which are reliably present,located in a small area and whose position can be detected by simple clinical examination without the use of the devices mentioned above, could facilitate the planning of a flap. Furthermore, the course of these perforators in a septum between two muscles would facilitate dissection of the pedicle.

Our previous anatomic and cadaveric study showed the constant presence of septocutaneous perforators between the tensor fasciae latae (TFL) muscle and the gluteus medius muscle.[7] These perforators are branches of the ascending branch of the lateral circumflex femoral artery and pierce the deep femoral fascia at a mean distance from the anterior superior iliac spine (ASIS) of 10.9 cm distally. Moreover, all the septocutaneous perforators emerge from the deep fascia in a straight line between these two muscles and are larger compared with the musculocutaneous perforators.

We report our clinical experience with a TFL perforator flap based on these septocutaneous perforators.

Patients and methods

Between 2008 and July 2010, 17 TFL perforator flaps based on septocutaneous perforators were created for 17 patients, 15 men and two women, with an average age of 44 years (range, 16—71). The aetiology of the defects was trauma in 10 cases, infection in four, ablative tumour surgery and osteoradionecrosis and unstable scar in one case each. The defect localisation was a lower extremity in nine cases, an upper extremity in six and the groin and the head in one case. With one exception (a pedicled flap for a defect in the groin), all were free flaps. The external diameters of the perforators were measured with a slide calliper. This study was approved by the ethic committee of the Medical University of Graz, and all patients gave verbal and written informed consent.

Surgical technique

With the patient in supine position, the ASIS is palpated and marked. The greater trochanter is palpated. Next, the lateral intermuscular septum between the TFL and the gluteus medius muscle is identified. This is done with a variation of the method of von Hofstetter, originally described to find the upper ventral quadrant of the gluteus medius muscle for a safe intramuscular injection.[8] With this method, the contralateral hand of the surgeon is placed over the hip region. The index finger points to the ASIS, and the palm of the hand lies on the greater trochanter. The triangle between the index and the third finger marks the upper ventral quadrant of the gluteus medius muscle. This method can also be used to find the intermuscular septum. In contrast to the original technique, the tip of the index finger should be placed approximately 4 cm dorsal to the ASIS to compensate for the width of the TFL. In slender persons, this width can be estimated by simply palpating the TFL.

After the septum has been located, a point 11 cm distal to the ASIS is marked over the septum, representing the average point of emergence of all septocutaneous perforators.

The flap is then planned around this position. Care should be taken to place the perforator in one-third of the flap.

The harvest of the flap starts on the medial margin of the flap. The dissection is carried out in a suprafascial plane towards the lateral thigh. If a composite flap is needed, a musculocutaneous perforator can be preserved during this dissection. This preparation proceeds laterally until the septum between the TFL and the gluteus medius muscle is reached, and the septocutaneous perforators are identified. At this point, the location of the skin island can be adapted to the position of the perforators, and a decision can be made as to the number of perforators to be used. If needed, a composite flap can also be based on septocutaneous perforators alone.

The septum is opened, only a very small cuff of fascia is left on the perforators, the TFL and the gluteus medius muscle are separated and the perforator is traced down to the ascending branch. Care should be taken not to injure the motor branch of the TFL. If a long pedicle is needed, the space between the medial border of the TFL, the rectus femoris and the rectus intermedius muscle can be opened with an additional incision at the medial border of the TFL. With this approach, the branching of the lateral circumflex