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Free perivascular tissue flap transfer☆

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Summary Local flaps and composite grafting are the procedures of choice for reconstructing relatively small soft tissue defects. However, despite their limited conveyable volume, local flaps sometimes require a wide dissection area and long new incisions. Composite grafts also have serious limitations and require a well-vascularized recipient bed. To overcome these limitations, we used a free vascularized perivascular tissue flap based on the descending branch of the lateral femoral circumflex artery. Using this method, we performed reconstructions for seven patients (four cases in head and neck region and three cases in lower limb) with various soft tissue defects (ranged from 4.0 cm^3 to 40.0 cm^3). This flap was easily elevated, without the need for precise preoperative flap design, and the flap volume was adjustable regardless of whether deep fascia and muscle were included. The flap has a rich vascular supply, which allows bone and cartilage tissue to be combined with the transfer of soft tissue, and satisfactorily treats chronic wounds with poor blood supply.

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Introduction

Local flap transfer is the treatment of choice for reconstructing relatively small but deep soft tissue defects, although nonvascularized composite grafting is occasionally selected. However, local or pedicled flaps are limited in size and require extended dissection, including the area neighboring the defect, which can diminish the blood flow in the defect area, thus resulting in inadequate wound healing. The size of composite grafts is quite limited, and the receiving bed must have adequate vascularity. In contrast, conventional free flaps require longer operating times for harvesting and are often too bulky for small defects. The use of a small free flap which can be easily harvested within short time might address these limitations. We reconstructed small tissue defects by using small free flaps that were based on the descending branch of the lateral femoral circumflex vessels and included perivascular tissue around the vascular pedicle (free perivascular tissue flap).

Patients and methods

All patients provided written informed consent for participation in the study and use and publication of pre-, intra-, and postoperative photographs. During the period from May 2010 through February 2014, soft tissue defects in 7 patients (5 men and 2 women) were reconstructed using free perivascular tissue flaps (Table 1). Patient age at the time of surgery ranged from 31 to 74 years (mean, 50.7 $\pm$ 5.6 years). Four patients had soft tissue defects in the head and neck region; the other three had defects in the lower limbs. The size of the reconstructed defect ranged from 20 $\times$ 20 $\times$ 10 mm (4.0 cm^3) to 50 $\times$ 40 $\times$ 20 mm (40.0 cm^3) (mean, 19.7 $\pm$ 6.1 cm^3). The postoperative follow-up period ranged from 8 to 29 months (mean, 16.0 $\pm$ 2.5 months).

Surgical procedure

After preparation of the recipient vessels was finished, we started flap elevation with a 10- to 15-cm-long incision in the anterolateral thigh region. Because a skin island is not carried with the flap, pre- and intraoperative detection of cutaneous perforators and meticulous design of the skin incision are not required. This flap contains more perivascular tissue, such as soft tissue in the intermuscular space and perifascial areolar tissue,[1] and is more adjustable in volume, than the cutaneous and adipofascial anterolateral thigh flaps, both of which are based on the same vascular pedicle (Figure 1).

After detecting the descending branch of the lateral femoral circumflex vessels in the intermuscular space between the rectus femoris and vastus lateralis, the flap is elevated with its surrounding perivascular tissue. A flap up to 15 cm in length can be elevated with the vascular pedicle (Figure 2). If extra tissue volume is required, part of the rectus femoris or/and vastus lateralis muscle, or its fascia can be included with the deep fascia branch along with the vascular pedicle. If skin grafting is preferred, graft material can be harvested from the flap donor site incision.

Results

Postoperative course was uneventful in all patients, and all flaps completely survived. In one case, the skin graft on the flap developed partial necrosis, which required additional skin grafting. No complications were noted at donor sites.

Table 1 Summary of the cases.

Case	Age	Sex	Original disease (region)	Estimated defect size and volume	Graft(s) or flap(s) used with the flap	Recipient vessels (*end-to-side anastomosis)	Follow-up period (months)
1	55	M	Plate exposure (medial malleolus)	20 $\times$ 20 $\times$ 10 mm (4.0 cm^3)	Skin graft	PTA*/V	8
2	62	F	Dermoid cyst (eyebrow region)	30 $\times$ 40 $\times$ 30 mm (36.0 cm^3)	Iliac bone graft	STA/V	11
3	31	M	Full-thickness contracture (lower eyelid)	30 $\times$ 15 $\times$ 10 mm (4.5 cm^3)	Conchal cartilage + skin graft	STA/V	14
4	43	M	Diabetic ulcer (heel)	70 $\times$ 30 $\times$ 15 mm (31.5 cm^3)	Skin graft	PTA*/V	18
5	74	M	Recurrent basal cell carcinoma (alar region)	30 $\times$ 40 $\times$ 15 mm (18.0 cm^3)	Nasolabial, malar and forehead flap + conchal cartilage + skin graft	Facial A/V	29
6	52	M	Post-traumatic chronic ulcer (heel)	20 $\times$ 20 $\times$ 10 mm (4.0 cm^3)	Skin graft	PTA*/V	15
7	38	F	Recurrent pleomorphic adenoma (parotid gland)	50 $\times$ 40 $\times$ 20 mm (40.0 cm^3)	Nerve graft	Facial A/V	17

PTA/V: posterior tibial artery/comitant vein.
STA/V: superficial temporal artery/vein.