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Endoscope-assisted medial sural artery perforator flap for head and neck reconstruction

Xiang-qian Shen [a,1], Ying Lv [b,1], Hui Shen [a], Hui Lu [a], Shou-cheng Wu [a], Xiang-jin Lin [c,*]

[a] *Department of Hand Surgery and Microsurgery Center, The First Affiliated Hospital, College of Medicine, ZheJiang University, HangZhou, China*
[b] *The Children's Hospital, Zhejiang University, School of Medicine, HangZhou, China*
[c] *Department of Orthopaedics, The First Affiliated Hospital, College of Medicine, ZheJiang University, HangZhou, ZheJiang Province 310003, China*

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Summary *Background:* Head and neck defect reconstructions with various free perforator flaps have been widely reported. We recommend a technique of using endoscopy to confirm the location of the medial sural artery perforator (MSAP). Further, we use a free MSAP flap for the reconstruction of head and neck defects.
Patients and methods: Since 2010, we have carried out 18 transfers of the free MSAP flap in various anatomical locations of the head and neck. The free flap was designed based on endoscopy confirmation and contained perforator vessels. The donor site was directly sutured or skin grafted.
Results: Twenty perforators (35.7%) detected by Doppler were confirmed by endoscopy. The number of sizable perforators ranged from one to three (mean, 1.4). The size of the flaps ranged from 22 to 88 cm^2 (mean, 41 cm^2). The length of vascular pedicle ranged from 5 to 14 cm (mean, 8.3 cm). All 18 flaps survived with good quality and aesthetic contours.
Conclusions: The MSAP flap is an ideal flap for head and neck reconstruction. It has generally thin and pliable skin, a long and reliable vascular pedicle, straightforward intramuscular dissection, the possibility of chimeric flap design, and minimal donor-site morbidity. The reliability and safety of harvesting an MSAP flap may be increased by endoscopic confirmation of the perforators.

* Corresponding author. Tel.: +86 0571 87236121.
E-mail address: linxjco@outlook.com (X.-j. Lin).
[1] Xiang-qian Shen and Ying Lv contributed equally to the study.

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In recent years, head and neck defect reconstruction with various free perforator flaps has been widely reported.[1] Researchers continue to search for new methods using flaps of satisfactory contours and similar histological and anatomical structures as the defect site in order to cause little damage at the donor site. The medial sural artery perforator (MSAP) flap was first described by Cavadas in 2001.[2] The skin of the MSAP flap is uniformly thin and less hair bearing.[3] Since 2010, 18 cases of defects at various locations have been repaired successfully with a free MSAP flap. The reliability and safety of harvesting a MSAP flap could be increased by endoscopic confirmation of the perforators. The purpose of this article was to report on the endoscope-assisted design of the MSAP flap and to present our experience with the reconstruction of soft tissue defects of the head and neck.

Patients and methods

Since 2010, we have carried out 18 transfers of the free MSAP flap in various anatomical locations, such as the tongue and mouth floor, cheek, and skin of the neck (Table 1). The series included 14 men and four women, and the mean age of the patients was 53.6 years (range, 32—79 years).

Handheld Doppler ultrasound (US) was performed to detect the perforators. The location was plotted to a coordinate system, with the *x*-axis representing the distance from the perforator perpendicular to the popliteal crease and the *y*-axis representing the distance from the perforator perpendicular to the posterior calf midline.[4]

The locations of the perforators were marked using a Doppler preoperatively. Two separate incisions, about 1—2 cm, were made over the anterior border of the flap. A 4-mm endoscope with a 30° angle was used to confirm the location and size (with a 0.8-mm probe) of the perforator (Figure 1). The cavity for the endoscopic camera was made using retractors. The camera and instruments were placed under the deep fascial layer to have a clear field of vision. The size and location of the appropriate perforators were confirmed. If the dominant perforator was absent, we decided at an early stage to harvest the contralateral MSAP flap or the anterolateral thigh (ALT) flap.

The size of the flap was determined by the intraoral defect to be repaired, and the perforator was placed in the center of the skin paddle. After final identification, we redesigned the flap template, if necessary. The dissection of the flap was performed accordingly. The MSAP flap was harvested as previously reported.[5] A chimeric flap with two fasciocutaneous flaps was designed if there were two or more dominant perforators (Figure 2). The potential

Table 1 Patient summary.

Case	Sex/age	Diagnosis	Flap thickness (mm)	Pedicle length (cm)	Recipient vessels	Flap size (cm)	Complication	Donor site
1	M/59	TC	5	8	FA, EJV	7 × 5	None	PC
2	M/57	TC	5	8	FA, EJV	7 × 6	None	PC
3	M/60	TC	4		EMA, FV, EJV	6.5 × 6	None	PC
4	F/59	TC	8	6	EMA, FV, EJV	8 × 4	None	PC
5	M/57	MFC	5	8	EMA, FV	7 × 5	None	PC
6	M/32	TC	5	7	FA, EJV	9 × 6	None	STSG
7	M/51	MFC	4	8	EMA, EJV, FV	8 × 5	None	PC
8	M/40	Recurrent GC	4	8	STA, EJV	9 × 6.5	None	PC
9	M/47	BC	6	8	EMA, EJV	5.5 × 4	None	PC
10	F/52	TC	7	9	STA, FV	5 × 5	None	PC
11	M/36	TC	6	9	STA, EJV, FV	5 × 3	None	PC
12	M/75	MFC	5	6	STA, STV	8 × 5	None	PC
13	F/79	Recurrent ThC	6	5	STA, IJV	8 × 6	None	PC
14	M/68	HC	4	14	STA, IJV	7 × 9 + 5 × 5	Wound infection; fistulas	STSG
15	M/50	HC	5	12	STA, IJV	7 × 9	None	STSG
16	F/42	HC	6	10	STA, IJV	7 × 6	Stricture	STSG
17	M/53	TC	5	8	FA, EJV	6 × 4	None	PC
18	M/48	TC	4	6	FA, EJV	7 × 5	None	PC

Abbreviations: TC, Tongue cancer; MFC, Mouth floor cancer; BC, Buccal cancer; GC, Gingival carcinoma; ThC, Thyroid cancer; HC, Hypopharyngeal carcinoma. STA, Superior thyroid artery; EMA, External maxillary artery; FA, Facial artery; FV, Facial vein; EJV, External jugular vein; IJV, Internal jugular vein; STV, Superior thyroid vein; PC, Primary closure; STSG, Split-thickness skin graft.