OPEN

PRS GLOBAL OPEN

IDEAS AND INNOVATIONS

Reconstructive

Clinical Application of Foci Contralateral Facial Artery Myomucosal Flap for Tongue Defect Repair

Mengxiong Pan, MS
Tao Ma
Junwu Mao
Xiaorong Qin
Bo Li, MS

Summary: This study aims to investigate the clinical efficacy of foci contralateral facial artery myomucosal flap (FAMF) in repairing the defect of tongue after tumor resection. There were 10 cases who received the operation to repair tongue tissue defects caused by tumor resection from January 2010 to January 2016. FAMF flap size ranged from 2.5×3 cm to 5×5 cm. All flaps survived after surgery, and no local necrosis occurred. For the donor and receptor sites of 10 cases, 8 cases got wounds healed at stage I, wound dehiscence of donor site occurred in 2 cases, and the dehisced wounds were healed after local cleaning. All 10 patients were followed up for 13 months to 5 years, with an average of 2 years and 4 months. No obvious deformity appeared on face after surgery, and there was no mouth floor leakage. After surgery, 3 cases had clinical manifestations of facial nerve marginal mandibular branch injury and returned to normal in 3 months. All patients had a limitation for mouth opening after surgery, 9 cases returned to normal after 1 year, and 1 case still had a mild limitation for mouth opening. There was no impact on patients' eating, swallowing, language, or other functions. The foci contralateral FAMF surgery is simple and brings ideal plastic effect, high survival rate of flap, less donor site lesion, simple postoperative care, no breaking after surgery, and no impact on radical cure of tumor, which is suitable for repairing defect of tongue.
(Plast Reconstr Surg Glob Open 2018;6:e1669; doi: 10.1097/GOX.0000000000001669; Published online 26 February 2018.)

INTRODUCTION

Tongue cancer is an oral malignant tumor with high incidence, and there are many methods to use flaps to repair tissue defects that are caused by surgical resection. As many doctors master the vascular anastomosis, forearm free flap and anterolateral femoral flap now have become common flaps that repair the tongue defect. However, the 2 flaps only cover the wound, and the shortcomings such as large difference between flap color and oral tissue color, long surgery time, complex postoperative care, long hospital stay, needing to live in an intensive care unit ward after surgery, and high cost of treatment are of increasing concern to surgeons and patients.

Since the facial artery myomucosal flap (FAMF) was first reported in 1992,[1] many authors have used the FAMF to repair defects on head and neck. A total of 441 FAMFs have been reported so far.[2] It is generally believed that, with simple surgery, color close to that of the tongue, and small deformity in donor site, FAMF should be the ideal flap for tongue defect. But as tongue cancers often are transferred to the ipsilateral neck, using ipsilateral facial artery flap may affect radical treatment, which limits the application that uses FAMF to repair tongue defects after tongue carcinoma surgery. Therefore, we used contralateral FAMF to repair tongue defects after tongue carcinoma surgery, which has advantages such as color that is almost similar to that of tongue and mouth, simple cutting, short surgery time, high survival rate, and small deformity in donor site. We used contralateral FAMF to successfully repair 10 cases with tongue defects after tongue carcinoma surgery.

METHODS

Patients and Methods

This prospective study was approved by the Institutional Review Board of the Affiliated Hospital of Guilin Medical College. From January 2012 to January 2016, in Affiliated Hospital of Guilin Medical College, there were 10 patients whose defects of tongue after resection were repaired by foci contralateral FAMF, including 7 men and 3

From the Department of Stomatology, Affiliated Hospital of Guilin Medical College, Guilin, China.
Received for publication July 31, 2017; accepted December 14, 2017.

DOI: 10.1097/GOX.0000000000001669

Disclosure: *The authors have no financial interest to declare in relation to the content of this article. The Article Processing Charge was paid for by the authors.*

women. The youngest one was 45 years old, and the oldest was 65 years old, with average of 56 years old. The cutting range of FAMF was from 2.5×3 cm to 5×5 cm. The surgery method that repairs tongue and mouth floor by jointly using contralateral FAMF and submental island flap was used in 2 patients with defect size of more than 5×5 cm. Ten patients underwent functional cervical lymphadenectomy. Four patients underwent radiotherapy after surgery. The follow-up period after surgery was from 13 months to 5 years, with an average of 2 years and 4 months.

Local Anatomy

The facial artery, a branch of the external carotid artery, enters the face from the lower border of the mandible at the anterior border of the masseter muscle. It has a tortuous course and runs upward and forward lateral to the mouth commissure. The facial artery is superficial to the buccinator. It gives multiple perforators to the cheek and superior labial artery, and from this point it takes the name angular artery. It passes deep to the buccinator muscle and superficial to the risorius, the zygomaticus muscles, and the superficial lamina of the orbicularis oris muscle. The facial artery has a variety of branching patterns and terminal branches as reported in many studies. The facial vein was almost always located posterior to the facial artery.[3] It starts at the internal canthus as the angular vein and becomes the facial vein as it runs down the nasogenian fold. Near the mandible, the artery and vein travel very close together and they diverge from each other as they travel up toward the nose.[4,5] In this study, we used the facial vein, but not the venous plexus around the artery, for the first time, according to our clinical practices. However, we have made a few modifications, such as using a wider flap (due to repair scope) were dissected anterogradely. Meanwhile, the anterior facial vein means the facial vein in the upstream of the normal facial vein.

Surgical Technique

(1) Doppler was used before surgery to detect and mark the facial walking path of the facial artery, and flap size was designed according to the scope of repair.
(2) At 1.5–2 cm on the lower edge of foci contralateral mandible, the subcutaneous layer of the skin and platysma muscle were cut along the direction of the relaxed skin tension lines, and the platysma muscle was upwardly dissected from the bottom to expose the facial nerve mandibular branch and protect it, and find facial artery and anterior facial vein for separate protection.
(3) The oral mucosa, submucous tissue, and muscle were cut according to the design while ensuring that the facial artery and anterior facial vein were in the flap, and that the level of blood vessels and tissue were separated. After completion of flap preparation, the flap was transferred outside the mouth at the lower edge of the facial nerve mandibular branch.
(4) FAMF was turned to the internal side of mandible and transferred to the contralateral wound area through mylohyoid muscle and mouth floor mucosal tunnel, and the wound was sutured. In this study, the FAMM flap was not the standard FAMM flap, which has been modified. We created an island flap with a proximal fibrofatty-vascular pedicle for reach.
(5) The surgery method that repairs tongue and mouth floor by jointly using contralateral FAMF and submental island flap was used in 2 patients: FAMF was taken according to the above method, the size of submental myocutaneous flap was designed based on surgical requirements before the surgery, external maxillary artery and anterior facial vein were dissected at the lower mandibular edge from top to bottom, finding the submental artery and submental vein, anatomizing submental artery and vein to the anterior digastric muscle, cutting the skin, subcutaneous layer, and platysma muscle according to the design. When taking the submental flap, no submental lymphoid tissue could be brought in separation of submental area and platysma muscle to prevent affecting the radical treatment. The flaps contained the anterior digastric muscle. After completion of flap taking, the combined flap was formed for facial artery blood supply and vena facialis anterior blood return, the FAMF and submental island flap were transferred to the internal mandible, and then transferred to wound in contralateral receptor site through mylohyoid muscle and mouth floor mucosal tunnel, and the wound was sutured.

Typical Case 1

The patient, female, 60 years old, was hospitalized due to left tongue mass for more than 1 month. The general examination found no abnormality. There was a mass measuring 3×3 cm on the mouth floor of left tongue abdomen. The mass surface had ulcers and hard base, and the pathological diagnosis showed well-differentiated squamous carcinoma. Treatment procedure: under the tracheal intubation in general anesthesia, the left tongue abdomen mouth floor neoplastic foci extended resection and functional cervical lymph node dissection were carried out, and the foci contralateral FAMF was used to immediately repair them; the size of myomucosal flap was 4×3 cm, and the pedicle length was 6.5 cm. All flaps survived after surgery, with good flap texture as shown in Figures 1–4.

Typical Case 2

The patient, male, 65 years old, was hospitalized due to left tongue mass for more than 5 months. The general examination found no abnormality. There was a mass measuring about 5×4 cm on the left tongue abdomen mouth floor, and the mass surface had ulcers and hard base, and the pathological diagnosis showed well-differentiated squamous carcinoma. Treatment procedure: under tracheal intubation in general anesthesia, the left tongue abdomen mouth floor neoplastic foci extended resection and functional cervical lymph node dissection were carried out, and the foci contralateral FAMF and foci contralateral submental myocutaneous flap were used to

Fig. 1. Resection range of tongue cancer.

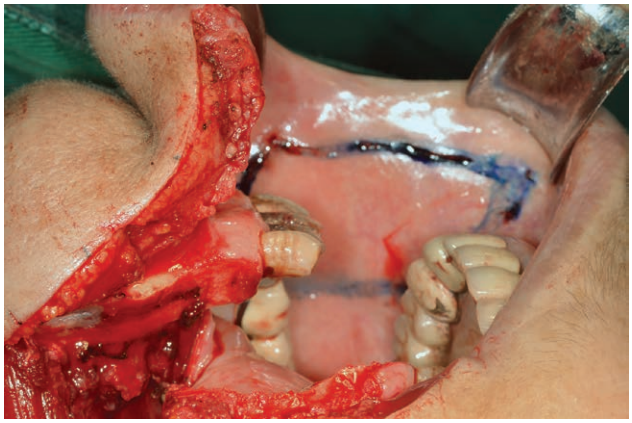

Fig. 2. Designed foci contralateral FAMF.

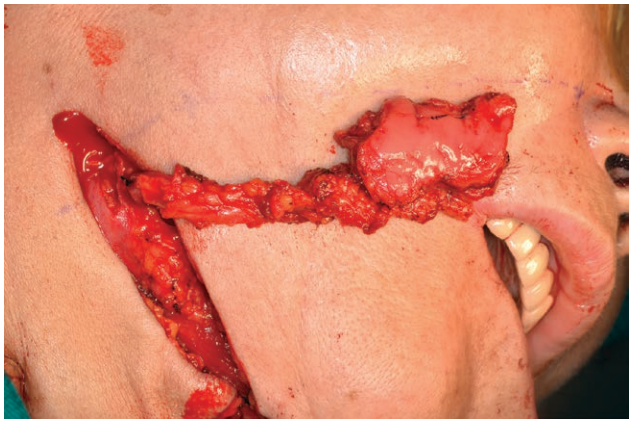

Fig. 3. Complete preparation of FAMF.

immediately repair them. The size of myomucosal flap was 4×3 cm, the size of submental myocutaneous flap was 5×4 cm, and the pedicle length was 6.5 cm. All flaps survived after surgery, with good flap texture.

RESULTS

Among the 10 cases, the foci contralateral FAMF had enough vascular pedicles to reach the contralateral mouth floor tongue abdomen; all flaps survived and all donor sites could be sutured and closed after surgery. For the donor and receptor sites of 10 cases, 8 cases got wounds healed at stage I, wound dehiscence of donor site occurred in 2 cases, and the dehisced wounds were healed after local cleaning; all 10 patients were followed up for 13 months to 5 years, with an average of 2 years and 4 months. No obvious deformity appeared on face after surgery, and there was no mouth floor leakage. After surgery, 3 cases had clinical manifestations of facial nerve marginal mandibular branch injury and returned to normal in 3 months. For all patients 3 months after surgery, there was no obvious distortion of commissure, no impact on suction or whistling. All patients had a limitation for mouth opening after surgery, 9 cases returned to normal after 1 year, and 1 case still had a mild limitation for mouth opening.

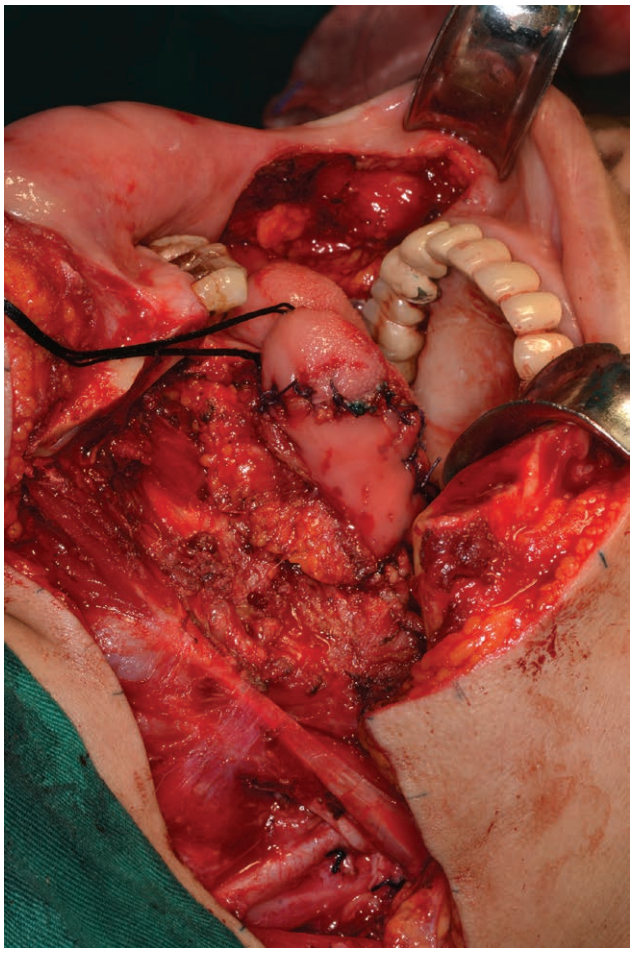

Fig. 4. Transferring the FAMF to the contralateral side.

DISCUSSION

Tongue cancer is the most common oral cancer, and early cervical lymph node metastasis often occurs in tongue cancer and mouth floor cancer. Using foci, homolateral FAMF may affect the radical treatment, but using foci contralateral FAMF does not affect cervical lymph

node dissection or radical treatment. FAMF is safe and has short time and simple flap taking. The donor site scar is hidden well by mandible, and the FAMF color, texture, and thickness are suitable for repairing tissue defects that are caused by tongue cancer and mouth floor cancer resection.

The facial artery and anterior facial vein are superficial and have larger blood vessels and reliable blood supply. Someone very long ago (such as Thiersh[6] in 1868) used the facial artery retrograde nasolabial groove flap with pedicle on it to repair palate defects, and in 1916, Rosenthal[7] used the facial artery antegrade nasolabial groove flap with pedicle under it to repair palate defects. In 1992, Pribaz et al.[1] reported that 18 patients with oral defects were treated with the antegrade or retrograde FAMF and believed that repair of oral defects by using FAMF was better than other flaps. Repair of oral defects with contralateral FAMF has not been reported, and we should be the first to apply contralateral FAMF to repair oral defects.

In the cutting of the FAMF, we should protect the marginal mandibular branch of the facial nerve and avoid cutting off or damaging it that causes distortion of commissure; in preparation of the flap, we should avoid damaging the parotid duct, and the patients should avoid forcibly opening the mouth after surgery to prevent wound dehiscence.

The foci contralateral FAMF has a thick facial artery for blood supply and anterior facial vein blood return, so it has rich blood supply and high survival rate. It does not affect radical treatment of tongue and mouth floor malignant cancers; its color is almost similar to that of the tongue, and no skin flap shrink was seen in 6 patients on the 13th month after surgery. However, the tissue amount of FAMF is limited after all, the maximum flap taken by us was 5 × 5 cm, but after surgery, the suture wound dehiscence of donor site cheek occurred. The mouth opening still had middle limitation on the sixth month after surgery. When the greater cheek mucosa is cut, the mouth opening is more limited, and the wound dehiscence of donor site is more prone to occur. We think that it is better for the flap to be less than 3.5 × 3.5 cm, to prevent wound dehiscence or limited mouth opening after surgery. We think that, in case of tongue and mouth floor defects, the flap can be slightly smaller than the defect area, because both tongue and mouth have certain ductility. In repair of tongue defects, we should make efforts to try to suture flap to the area at 1/3 in front of the tongue, to avoid affecting the tongue movement or the quality of patient's life. We believe that the indication that foci contralateral FAMF repairs adaptation diseases of contralateral tongue and mouth floor malignant tumors is the defect area of less than 3.5 × 3.5 cm. When receptor site is more than 3.5 × 3.5 cm, the defect can be repaired together with submental myocutaneous flap, so that it can provide a larger amount of tissue. As the submental artery for blood supply of submental myocutaneous flap is the branch of facial artery, submental vein also flows back to the anterior facial vein. It is also the same incision for taking the 2 flaps, so it is very easy to operate. For those with large tumor, especially those with tongue and mouth floor tumors that pass over the midline and may transfer to the contralateral side, the foci contralateral FAMF cannot be used to repair tongue or mouth floor defects.

Although this study received some interesting results, there are also a few limitations. First, a higher rate of marginal mandibular nerve injury may occur in the processes of the disease; however, the present study has not discovered a better method to avoid this. Second, for the small tumor excision, the doctors do not incise the lower lip skin in general. However, this study incised the lower lip skin to achieve satisfying outcomes, which needs to be improved in the future study. Third, we have not elevated the flap after the submental lymph node dissection in this study.

CONCLUSIONS

With a high survival rate, the foci contralateral FAMF has advantages such as short time, small trauma for the patient, simple surgery, and ease of acceptance by patients, especially for older patients, as compared with the free flap surgery. For intraoral repair, foci contralateral FAMF is better than foci contralateral submental myocutaneous flap, as the tissue of FAMF is much like other oral tissues, and with no hair.

REFERENCES

1. Pribaz J, Stephens W, Crespo L, et al. A new intraoral flap: facial artery musculomucosal (FAMM) flap. *Plast Reconstr Surg.* 1992;90:421–429.
2. Ayad T, Xie L. Facial artery musculomucosal flap in head and neck reconstruction: a systematic review. *Head Neck.* 2015;37:1375–1386.
3. Lohn JW, Penn JW, Norton J, et al. The course and variation of the facial artery and vein: implications for facial transplantation and facial surgery. *Ann Plast Surg.* 2011;67:184–188.
4. Zhao Z, Li S, Xu J, et al. Color Doppler flow imaging of the facial artery and vein. *Plast Reconstr Surg.* 2000;106:1249–1253.
5. Dupoirieux L, Plane L, Gard C, et al. Anatomical basis and results of the facial artery musculomucosal flap for oral reconstruction. *Br J Oral Maxillofac Surg.* 1999;37:25–28.
6. Thiersh C. Verschluss eines Loches im harten Gaumen durch die Weichtheile der Wange. *Arch Heilkunde.* 1868;9:159.
7. Rosenthal W. [Velo-pharyngoplasty]. *Langenbecks Arch Klin Chir Ver Dtsch Z Chir.* 1960;295:912–915.