

Clinical Paper  
Reconstructive Surgery

# Reconstruction of the tongue and mouth floor with the myofascial vastus lateralis free flap after cancer ablation

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**Abstract.** The current study was undertaken to evaluate a novel approach to tongue and mouth floor reconstruction using the myofascial vastus lateralis free flap (MVLFF). The surgical techniques, benefits, complication rate, and the aesthetic and functional results are described. A series of six patients underwent functional tongue reconstruction between July 2013 and November 2014. The myofascial vastus lateralis flap was obtained as follows: the vastus lateralis muscle was exposed, the neurovascular pedicle was identified, and the myofascial flap was raised. Postoperatively, the neotongue appeared plump and was able to maintain palatal contact. Moreover, no obvious decrease in flap volume was observed during the follow-up period. Most patients experienced good tongue mobility. Further use of the MVLFF should confirm whether the mucous membrane on the surface of the flap becomes part of the tongue mucosa in the true sense, whether and how well the patients will recover their sense of taste, and the degree to which quality of life is improved after nerve anastomosis. So far, it appears to be a suitable approach to tongue and mouth floor reconstruction.

Key words: functional reconstruction; MVLFF; tongue and mouth floor.

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The functional reconstruction of tongue defects following cancer ablation remains one of the most challenging problems for oral and maxillofacial surgeons.<sup>1</sup> Since the advent of microsurgery, different free flaps, such as the radial forearm (RF) flap and anterolateral thigh (ALT) flap, have been introduced to achieve functional tongue reconstruction after oncological resection.<sup>2–5</sup> Although many advantages of these flaps have been described, the main

disadvantages of all skin flaps include colour mismatch, lack of lubrication and taste sensation, and/or the presence of hairs on the skin paddles.<sup>6</sup>

The purpose of this study was to suggest a novel approach to tongue and mouth floor reconstruction with the myofascial vastus lateralis free flap (MVLFF). The specific aims of the study were to describe the surgical techniques, benefits, complication rate, and aesthetic and functional results.<sup>7</sup>

## Materials and methods

### Patients

A new way of performing this operation was designed and implemented. The study population comprised a series of six patients who underwent functional tongue reconstruction with the MVLFF after cancer

<sup>3</sup> These authors contributed equally to this work and K. Liu is co-first author.

ablation in the department of oral and maxillofacial–head neck oncology of a university hospital in Wuhan, China, between July 2013 and November 2014. Four patients were men and two were women, and they ranged in age from 42 to 67 years. All patients were pathologically diagnosed with squamous cell carcinoma of the tongue. Among these patients, two were classified as T3N0M0, three as T2N1M0, and one as T3N1M0.

### Surgical procedure

All surgical procedures were performed using a two-team approach by the same two senior surgeons.<sup>8</sup> Tumour resections along with modified radical or selective neck dissection were done simultaneously in all patients. Tumour resection was achieved with a pull-through technique via transmandibular approach, with or without a partial mandibulectomy. All patients had a tracheotomy.<sup>9</sup>

The MVLF was raised as follows. The skin, subcutaneous tissue, and fascia were incised along the intermuscular septum and the vastus lateralis muscle was exposed subfascially. Following elevation and retraction of the rectus femoris muscle, the neurovascular pedicle was identified and carefully dissected proximally. The outlined muscle segment was then elevated to obtain the myofascial flap. Flap raising was finished by further proximal dissection of the vascular pedicle in the proximal direction until the lateral circumflex femoral artery was reached (Fig. 1). When the flap was brought up to the defect area, both the donor and recipient vessels were prepared appropriately; the microanastomosis was performed using the Microvascular Anastomotic Coupler System (Synovis Micro Companies Alliance Inc., Birmingham, AL, USA) following the manufacturer's instructions. The myofascial flap was then sutured to the defect to complete the tongue reconstruction (Fig. 2). After careful

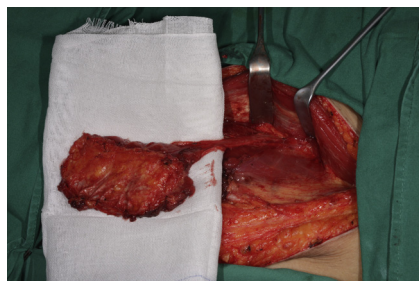


Fig. 1. The design of the myofascial vastus lateralis free flap.

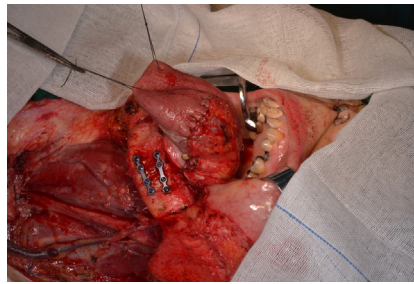


Fig. 2. The reconstructed tongue during surgery.

inspection of the patency of the anastomoses, the suction drain was appropriately placed and the incisions were closed in layers.

### Postoperative management and follow-up

Postoperatively, flap monitoring was performed every 30 min for the first 24 h, then every 1 h for the second and third 24 h, and then every 24 h for the following days. If necessary, low-dose low-molecular-weight heparin was used as postoperative anticoagulation therapy. Anatomical and clinical experience suggests that the blood supply of muscles is more reliable than that of skin. A Doppler ultrasonic blood flow detector was used by less experienced colleagues to assess flap perfusion, especially in the first postoperative days. Patients received a liquid diet through nasogastric feeding tubes during the first few days, until they were discharged home. The need for postoperative radiotherapy was assessed by a radiotherapy physician according to the TNM staging.

Retrospective reviews were conducted by an independent investigator at 1, 3, and 6 months postoperative for the predictor variables, including flap contour, colour, and mucosalization, function of the reconstructed tongue, and disease recurrence.

### Results

Among the patients treated from July 2013 to November 2014, six had complete operative notes; these patients comprised the study sample (Table 1). No flap failure occurred in this case series, showing an overall flap survival rate of 100%. There was also no vascular crisis during the monitoring of all patients. The postoperative period was uneventful in all cases except for one case of submental oral-cutaneous fistula, which healed in 36 days following further surgical debridement. Two patients had no lymph node metastasis. The other four patients received radiotherapy after surgery. The donor site wounds underwent primary healing without any complications. No recurrence was identified during the follow-up period.

During the first postoperative days, the transferred MVLF presented a normal appearance of the deep fascia. This then took on a mixed appearance of normal muscle and necrosis-like fascia, coupled with an uneven and tough surface, between day 5 and day 10 postoperative (Fig. 3). A gradual spontaneous and centripetal remucosalization was seen during the subsequent healing time. About 1 month after surgery, the gross appearance of the reconstructed tongue was identical to the residual tongue, with a smooth and wet surface. The neotongue underwent evident mucosalization, with the physical aspect of the flap resembling that of the native tongue mucosa covered with taste buds. The appearance of the reconstructed tongue was good due to the perfect colour match and the absence of hairs, suggesting better aesthetic results as compared to those obtained with cutaneous flaps (Fig. 4).

The neotongue appeared plump, ensuring the maintenance of palatal contact. Moreover, no obvious shrinking in volume of the flap was observed during the follow-up period. Most patients achieved good tongue mobility, with the ability to perform forward, upward, leftward, and

Table 1. Clinical data of the patients included in this study ( $N = 6$ ).

	Number	Percentage (%)
Clinical tumour stage		
T3N0M0	2	33.3
T2N1M0	3	50.0
T3N1M0	1	16.7
Postoperative radiation therapy		
Administered	4	66.7
Not administered	2	33.3
Flap donor site infection	0	
Haematoma	0	
Donor site complications	0	
Flap loss	0	
Fistula	1	16.7

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