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著者別名	佐々木 薫, 足立 孝二, 関堂 充
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Title page

Transverse fascial suspension with muscle bow traction: Advantages for  
full-thickness lip reconstruction involving the oral commissure using free flap

Kaoru Sasaki MD, Koji Adachi MD, Mitsuru Sekido MD, PhD

Department of Plastic and Reconstructive Surgery, University of Tsukuba,

Tsukuba, Ibaraki, Japan

Correspondence to: Kaoru Sasaki, Tennodai 1-1-1, Tsukuba, Ibaraki, Japan,

305-8577

TEL&FAX: +81-29-853-3122 , E-mail: [sasakikaoru32@hotmail.com](mailto:sasakikaoru32@hotmail.com)

## Summary

Large full-thickness oral defects involving the oral commissure continue to be a challenge for reconstructive surgeons.

Although local flaps are the best option for full-thickness lip reconstruction, they are unavailable for large defects. In particular, recent advances in microsurgery have extended the available surgical options using free flaps, but for full-thickness large oral defects involving the oral commissure, it is still difficult to obtain good function and competence. The major disadvantages are the drooping and loosening of the reconstructed lip and the difficulty in restoring a natural oral commissure.

We present 2 cases of lip reconstruction for full-thickness large defects involving the oral commissure in which free flaps with the muscle bow traction method were used to overcome these problems.

In case 1, the lip was reconstructed with a free radial forearm-palmaris longus tendon composite flap. The tendon was sutured onto the orbicularis oris stumps. In case 2, the lip was reconstructed with a free anterolateral thigh flap including the fascia lata. A fascial strip in the flap was sutured to the residual orbicularis muscles. In each case, additional nonvascularized fascia lata was harvested

and suspended the reconstructed lip in transverse direction as a muscle bow traction method. Both patients achieved good oral competence without medial deviation of the oral commissure and were able to resume a regular diet without drooping and loosening of the reconstructed lip.

For large full-thickness oral defects involving the oral commissure, transverse fascial suspension with muscle bow traction is useful for functional and cosmetic reconstruction.

**Keywords:** Lip reconstruction; Oral commissure; Muscle bow traction; Fascial suspension; Masseter muscle

## **Introduction**

Large full-thickness oral defects involving the oral commissure continue to be a challenge for reconstructive surgeons. The reconstructive aims are to restore the oral lining, external skin, oral competence, and function (i.e., articulation, speech, and mastication).

Local flaps are the best option for full-thickness lip reconstruction. However, they are unavailable for large defects. Meanwhile, free flaps are utilized for large defects. But, obtaining good function and competence are still difficult.

We present 2 cases in which full-thickness large lip defects involving the oral commissure were successfully reconstructed with free flaps using the muscle bow traction method<sup>1</sup>.

## **Case Reports**

### **Case 1**

An 80-year-old man had a recurrent squamous cell carcinoma on his left upper lip (Figure 1A). He had undergone excision of the primary tumor and irradiation 4 years previously. The carcinoma recurred and was excised. The resultant

defect involved 75% of the upper lip, 60% of the lower lip, and the left oral commissure.

A free radial forearm-palmaris longus composite flap was harvested (Figure 1B). The flap was transferred to the defect to cover the oral lining and skin surface. The palmaris longus tendon was sutured to the orbicularis oris stumps as a sling. A strip of nonvascularized tensor fascia lata was simultaneously harvested and linked with adequate tension between the palmaris longus tendon around the reconstructed oral commissure and the left masseter muscle. The tensor fascia lata passed around the left masseter muscle (Figure 1C,D). By means of these procedures, the restored oral commissure was suspended in the transverse direction. At the 12-month postoperative follow-up, the patient had satisfactory oral function in eating and speaking, without drooping and loosening of the reconstructed lip. Although the flap was bulky, he was satisfied with the result and did not require additional revisional surgery (Figure 1E,F).

## **Case 2**

A 71-year-old woman presented with squamous cell carcinoma of the left buccal region. Wide resection of the tumor resulted in a defect involving 70% of

the upper lip, 30% of the lower lip, and the left oral commissure. (Figure 2A).

A free anterolateral thigh flap including fascia lata was elevated and transferred to the defect(Figure 2B). The flap was folded to restore the oral lining and the cheek and lip defects. The fascial strip in the flap was sutured to the residual orbicularis muscles. A strip of nonvascularized fascia lata was simultaneously harvested from the same donor site. An additional fascial sling was passed around the left masseter muscle and sutured between the ends of the sling and the residual orbicularis muscle stumps for the suspension in the transverse direction (Figure 2C,D). The patient had good oral competence and was able to resume a regular diet without drooping and loosening of the reconstructed lip. She was satisfied with her appearance at the 8-month follow-up (Figure 2 E,F).

## **Discussion**

Lip reconstruction using a free flap for large full-thickness oral defects involving the oral commissure has disadvantages such as drooping and loosening of the reconstructed lip caused by the loss of orbicularis oris function. The function should be restored and was described in many reports.<sup>2,3</sup> In this

procedure, the reconstructed oral commissure tends to move medially without lateral suspension.

The other disadvantage of free flap is the difficulty in restoring a natural oral commissure. If the secondary operation to repair the oral commissure is performed with only skin treatment, limited opening of the mouth will probably appear as a result of the scar contracture around the oral commissure.

To solve the problems, many suspension techniques with a fascial sling have been suggested<sup>4,5</sup>. Most of them were methods to raise the lip and oral commissure upward. However, the plastic smile resulting from raising the oral commissure upward sometimes appears unnatural.

Muscle bow traction is a method of transverse suspension described by Maegawa for facial palsy in 1999.<sup>1</sup> We utilized this technique for the lip reconstruction after tumor excision. The transverse suspension has the cosmetic advantage of preventing the deviation of the oral commissure, making it easy for the patient to make more natural expressions than the unnatural smile that results from raising the oral commissure upward. From the viewpoint of function, this method prevents drooping and loosening of the reconstructed lip because transverse suspension exerts equal tension on the upper and lower



lips. In other words, the method provides adequate suspension without upward traction.

Unlike Maegawa's report, our restored oral commissure had hardly any motion. This may be attributable to the stiffness in the soft tissue caused by the wide subcutaneous scar formation and the radiation therapy.

## **Conclusion**

We presented 2 cases of lip reconstruction for full-thickness large oral defects around the oral commissure using free flaps. The lip reconstruction using a fascial sling for oral sphincter function and transverse suspension using the masseter muscle were useful for functional and cosmetic reconstruction.

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Conflicts of interest: None declared

Ethical approval: Not required

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## **Figure Legends**

### **Figure 1.**

Case 1. An 80-year-old man with upper lip squamous cell carcinoma.

(A) Design for tumor excision.

(B) A radial forearm-palmaris longus composite flap was harvested.

(C) Layout of the fascia and tendon.

(D) Schema of the surgical procedures.

Microvascular anastomosis between the pedicle of the flap and the left facial vessels was performed in an end-to-end manner.

(E) Postoperative view at the 12-month follow-up. Acceptable result in resting position.

(F) Natural competence of the oral commissure with the mouth open.

**Figure 2.**

Case 2. A 71-year-old woman with buccal squamous cell carcinoma.

(A) Concomitant full-thickness defects after excision of buccal cancer.

(B) An anterolateral thigh flap including the fascia lata was harvested.

(C) Layout of the fascia and tendon.

(D) Schema of the surgical procedures.

Microvascular anastomosis between the flap artery and the right superior thyroid artery and venous anastomosis with the branch of the internal jugular vein were performed in an end-to-end manner.

(E) The oral commissure in the resting position was natural at the 8-month follow-up.

(F) Medial deviation of the oral commissure did not occur with the mouth open.



