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CASE REPORT
Reconstructive

# Simultaneous Surgical Treatment for Smile Dysfunction and Lagophthalmos Involving a Dual Latissimus Dorsi Flap

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**Summary:** Paralytic lagophthalmos and smile dysfunction are serious complications of facial paralysis and various reconstructive procedures have been developed to treat them. Among these procedures, there is no doubt that dynamic procedures are more effective than static ones. The 1-stage simultaneous surgical treatment of these 2 dysfunctions with a dynamic procedure involving a single muscle would be ideal, but no such methods have been reported. In this article, we present a 1-stage method for the simultaneous surgical treatment involving the use of a dual latissimus dorsi muscle flap. In this method, 2 muscle flaps based on the descending and transverse branches of the thoracodorsal vessels are transferred to the face. The descending and transverse branches of the thoracodorsal nerve are sutured to separate branches of the masseteric nerve. Using this method, complete eyelid closure during strong clenching and voluntary smiling during weak clenching without eyelid closure were achieved. Although our method does not result in spontaneous smiling, we believe that it is a good option for some patients with long-standing facial paralysis. *(Plast Reconstr Surg Glob Open 2017;5:e1370; doi: 10.1097/GOX.0000000000001370; Published online 25 July 2017.)*

Paralytic lagophthalmos and smile dysfunction are serious complications of facial paralysis. The dynamic procedures reported to date include temporal muscle transfer[1] and free gracilis muscle transfer[2] for paralytic lagophthalmos and temporalis muscle transfer[3] and free vascularized muscle transfer[4–6] for smile dysfunction. In patients with complete paralysis, paralytic lagophthalmos and smile dysfunction are always severe, and the simultaneous treatment of these 2 dysfunctions with a dynamic procedure would be ideal. In this article, we present the case of a patient with complete facial paralysis who underwent simultaneous surgical treatment for smile dysfunction and paralytic lagophthalmos using a dual latissimus dorsi muscle flap. In this method, 2 muscle flaps based on the descending and transverse branches of the thoracodorsal vessels are transferred to the face. The descending and transverse branches of the thoracodorsal nerve are sutured to separate branches of the masseteric nerve. Using this method, eyelid closure during strong clenching and voluntary smiling during weak clenching without eyelid closure were achieved.

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## PATIENTS AND PROCEDURE

A 74-year-old man presented with complete right facial palsy. He had undergone ablation of his right parotid gland and modified neck dissection for cancer and had received postoperative radiotherapy at another hospital. As his right facial nerve had been completely resected, he suffered from complete right facial paralysis. He subsequently consulted us with a complaint of eyelid closure dysfunction and severe facial asymmetry (**see video, Supplemental Digital Content 1**, which displays the preoperative view. The patient exhibits complete right facial paralysis, ***http://links.lww.com/PRSGO/A465***). First, eyebrow lifting with supra-eyebrow skin excision and upper blepharoplasty were performed under local anesthesia. Three months later, a dynamic reconstructive procedure involving a dual latissimus dorsi neuromuscular flap transfer combined with fascia lata grafting was planned.

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**Video Graphic 1.** See video, Supplemental Digital Content 1, which displays the preoperative view. The patient exhibits complete right facial paralysis, ***http://links.lww.com/PRSGO/A465***.

The schematic of the operation is shown in Figure 1. A subcutaneous pocket was created in the right cheek. Two fascia lata grafts were transferred to the upper and lower lips because the tonus of the orbicularis oris muscle on the affected side was severely reduced. Two branches of the ipsilateral masseteric nerve were dissected, cut, and turned superficially to facilitate suturing. To treat lagophthalmos, fascia lata grafts were transferred to the upper and lower eyelids, and their medial stumps were fixed to the medial canthal tendon via a small incision.

The dual latissimus dorsi muscle flaps were harvested on the right side. Two muscle segments were elevated based on the descending and transverse branches of the thoracodorsal vessels. The muscle flap used to treat the patient's smile dysfunction (muscle A) was larger than that used to treat the patient's lagophthalmos (muscle B).

The harvested neurovascular muscle flaps were placed into the cheek pocket. The muscle A was attached to the nasolabial region and the muscle B had been sutured to the nearby fascia lata graft beforehand. The thoracodorsal artery and vein were anastomosed to the facial artery and common facial vein. After revascularization had been confirmed, the branches of the thoracodorsal nerve were sutured to different branches of the ipsilateral masseteric nerve (Fig. 2). Finally, the muscle flaps were fixed to the periosteum overlying the zygomatic body and arch. The cheek skin was then closed and subjected to suction drainage.

The patient's postoperative course was uneventful. Voluntary contraction of the 2 muscles was observed at 3 postoperative months. At 16 postoperative months, Z-elongation of the fascia lata graft transferred to the upper eyelid was performed because it had been tensioned so tightly that the patient could not open his upper eyelid smoothly. At 19 postoperative months, the patient was able to close his eyelids completely during strong clenching and smile voluntarily without closing his eyelids during weak clenching (**see video, Supplemental Digital Content 2**, which displays the patient at 19 postoperative months. The patient demonstrated the voluntary eyelid closure and smiling without closing his eyelids, ***http://links.lww.com/PRSGO/A466***).

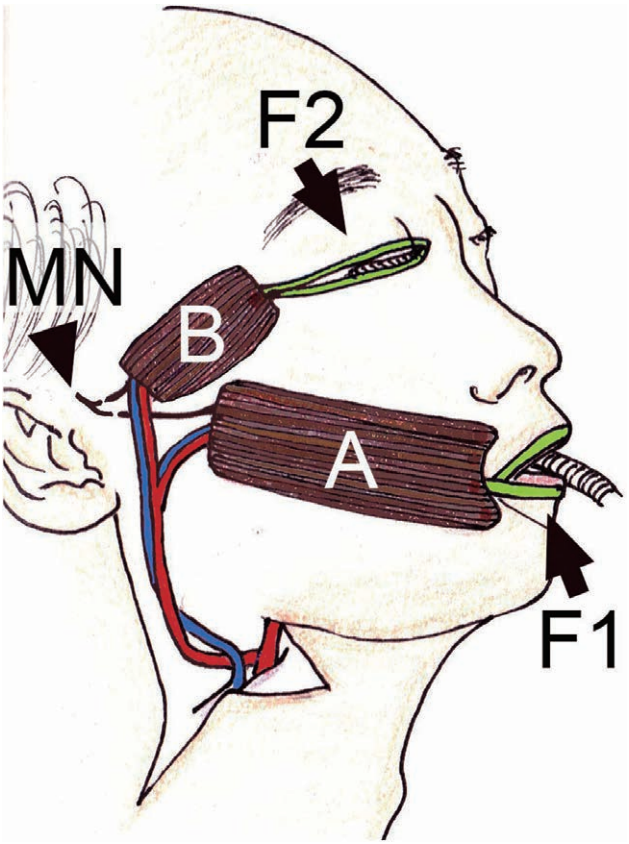


**Fig. 1.** Schematic representation of the transfer of the muscle flaps and fascia lata grafts to the face. The distal end of muscle A is fixed to the nasolabial region and the fascia lata graft, whereas the distal end of muscle B is only fixed to the fascia lata graft. Muscles A and B are innervated separately by the 2 branches of the ipsilateral masseteric nerve. A, muscle A; B, muscle B; F1, fascia lata grafts to the upper and lower lips; F2, fascia lata grafts to the upper and lower eyelids; MN, 2 branches of the masseteric nerve.

## DISCUSSION

We previously reported the 1-stage dual latissimus dorsi muscle flap transfer with a pair of vascular anastomoses and double nerve suturing for smile reconstruction.[7] In the method, 2 muscle flaps based on the descending and transverse branches of the thoracodorsal vessels are transferred to the cheek for smile reconstruction. The true trunk of the thoracodorsal nerve, which innervates 1 muscle flap, is sutured to the contralateral facial nerve, whereas the short branch of the thoracodorsal nerve, which innervates the other muscle flap, is sutured to the ipsilateral masseteric nerve. The voluntary smiling is guaranteed within 5 months and spontaneous smiling becomes possible after about 1 postoperative year. The procedure described in this article is the modification of our previous report. In our method, the patient need to practice smiling without eyelid closure. But he was able to consciously close his eyelids during strong clenching and smile voluntarily without closing his eyelids during weak clenching.

Temporal muscle transfer is an established treatment option for lagophthalmos. However, we gave up on this approach because the patient's temporal muscle was stiff

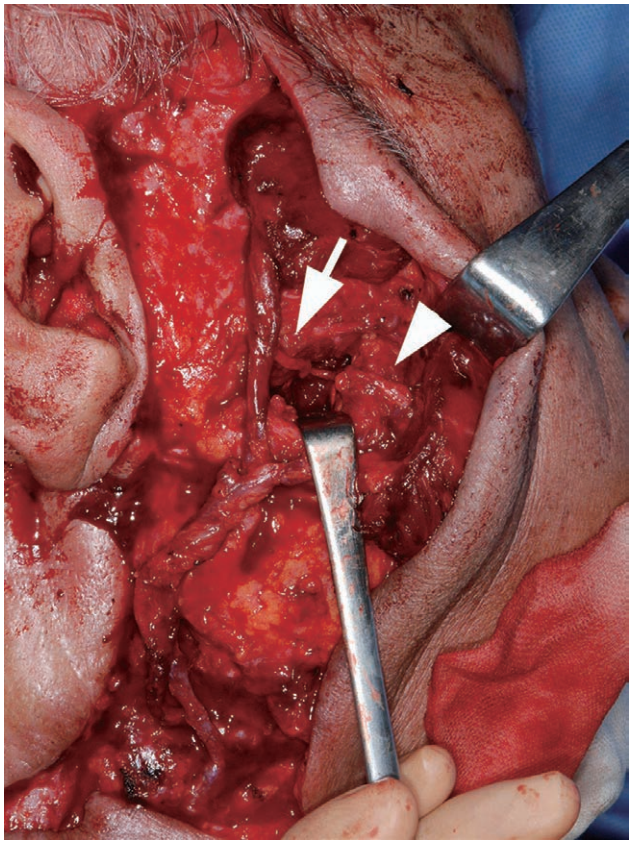

**Fig. 2.** Intraoperative view: nerve suture. Two branches of the thoracodorsal nerve were sutured to separate branches of the masseteric nerve. The arrowhead indicates the branch of the thoracodorsal nerve from muscle A, whereas the arrow indicates the other branch from muscle B.


**Video Graphic 2.** See video, Supplemental Digital Content 2, which displays the patient at 19 postoperative months. The patient demonstrated the voluntary eyelid closure and smiling without closing his eyelids, ***http://links.lww.com/PRSGO/A466***.

and did not seem to be fully functional due to the effects of postoperative radiotherapy. So, we devised the method described in this study. Consequently, the patient's lagophthalmos and smile dysfunction were treated simultaneously without any additional sacrificing of the temporal muscle.

Free muscle transfer and the suturing of the associated nerve to the ipsilateral masseteric nerve has the advantage of guaranteeing voluntary contraction of the transferred muscle and smiling and involves a shorter period of recovery from paralysis, although it makes spontaneous smiling difficult.[8–10] In the present case, we used the ipsilateral masseteric nerve as a motor source because we considered that good contraction would not have been achieved if the contralateral facial nerve had been used as a motor source. The reasons for this are as follows: his old age (74-year-old) would have resulted in delayed and insufficient innervation, and his stiff and edematous cheek skin (due to the previous neck dissection and radiotherapy) would not have allowed sufficient movement of the nasolabial skin.

## CONCLUSIONS

Our method allowed the 1-stage simultaneous dynamic surgical treatment of smile dysfunction and lagophthalmos in a patient with complete facial paralysis. Although our method does not result in spontaneous smiling, we believe that it is a good option for some patients with long-standing facial paralysis.

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## PATIENT CONSENT

*The patient provided written consent for the use of his image.*

## REFERENCES

1. Andersen JG. Surgical treatment of lagophthalmos in leprosy by the Gillies temporalis transfer. *Br J Plast Surg.* 1961;14:339–345.
2. Frey M, Giovanoli P, Tzou CH, et al. Dynamic reconstruction of eye closure by muscle transposition or functional muscle transplantation in facial palsy. *Plast Reconstr Surg.* 2004;114:865–875.
3. Rubin LR. *Entire Temporal Muscle Transposition. Reanimation of the Paralyzed Face.* St Louis, MO.: The C. V. Mosby Co.; 1977;294–309.
4. Harii K, Ohmori K, Torii S. Free gracilis muscle transplantation, with microneurovascular anastomoses for the treatment of facial paralysis. A preliminary report. *Plast Reconstr Surg.* 1976;57:133–143.
5. O'Brien BM, Franklin JD, Morrison WA. Cross-facial nerve grafts and microneurovascular free muscle transfer for long established facial palsy. *Br J Plast Surg.* 1980;33:202–215.
6. Vedung S, Hakelius L, Stålberg E. Cross-face nerve grafting followed by free muscle transplantation in young patients with long-standing facial paralysis. Reanimation of the cheek and the angle of the mouth. *Scand J Plast Reconstr Surg.* 1984;18:201–208.
7. Okazaki M, Mutsumi O, Kentaro T, et al. One-stage dual latissimus dorsi muscle flap transfer with a pair of vascular anastomoses and double nerve suturing for long-standing facial paralysis. *J Plast Reconstr Aesthet Surg.* 2015;68:e113–e119.
8. Lifchez SD, Matloub HS, Gosain AK. Cortical adaptation to restoration of smiling after free muscle transfer innervated by the nerve to the masseter. *Plast Reconstr Surg.* 2005;115:1472–9; discussion 1480.
9. Bianchi B, Copelli C, Ferrari S, et al. Facial animation with free-muscle transfer innervated by the masseter motor nerve in unilateral facial paralysis. *J Oral Maxillofac Surg.* 2010;68:1524–1529.
10. Biglioli F, Colombo V, Tarabbia F, et al. Double innervation in free-flap surgery for long-standing facial paralysis. *J Plast Reconstr Aesthet Surg.* 2012;65:1343–1349.