Masseteric-Facial Nerve Anastomosis: Case Report

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ABSTRACT

When a viable proximal facial nerve is not accessible, facial nerve paralysis has been managed with hypoglossal facial anastomosis, which results in varying degrees of hemiglossal atrophy and its sequelae. These authors have used the masseteric nerve to neurotize the facial nerve in one patient.

KEYWORDS: Masseteric-facial nerve anastomosis, facial paralysis, facial nerve neurotization

Case Report

A 23-year-old soldier was injured by gunshot in October, 2001, with fracture of the right temporal bone and right temporomandibular joint, resulting in right peripheral facial palsy, right deafness, and no occlusal disturbances. The condylar fracture was managed with therapy and a soft diet. In November, 2001, a CT scan demonstrated total destruction of the facial nerve in the intratemporal segment, and electromyography noted severe denervation, reflecting a complete lesion of the facial nerve.

The patient arrived at the authors' hospital in January, 2002. He had not recovered any facial function (Fig. 1). A second electromyographic series demonstrated a complete facial nerve lesion and no signs of reinnervation. We proposed a two-stage reconstruction to the patient: first, a cross-facial nerve graft (CFNG) and a partial hypoglossal-facial nerve transfer as "baby sitter"; and second, once the axons had traversed the graft (9 months later), the CFNG would be coapted to some distal branches of the facial nerve on the paralyzed side.

During scheduling, we introduced this patient to another solider who had undergone the proposed two-stage procedure. Our reported patient liked the facial movements produced, but was very fearful of obtaining the same lingual deformity and deviation. We decided to attempt a new procedure to obtain sufficient nerve fibers and to avoid the tongue sequelae.

To clarify which branches were to be used and how they were configured to appose the masseteric motor, the senior author (L.E.B.) performed cadaveric anatomic dissections of the facial and masseteric nerves resembling the surgery we ultimately performed in this case (Figs. 2–5). As can be seen, there is no discrepancy between the sizes of the two branches.

On February 19, 2002, a first stage of surgical rehabilitation for facial palsy was carried out with cross-facial nerve grafting and masseteric-facial anastomosis as a baby sitter. A face-lift incision was made in the left, non-paralyzed side of the face. Facial dissection in a subcutaneous plane was carried up to the anterior border of the parotid gland. Branches of the facial nerve were identified and marked with vessel loops. Simultaneously, the sural nerve was harvested using multiple small transverse incisions.

A face lift incision with submandibular extension was made in the right paralyzed side of the face. Facial dissection in the subcutaneous plane was carried up to the anterior border of the masseter. Identification of the facial nerve branches was accomplished, and retrograde sharp dissection of the branches of the temporal division

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Figure 1 (A,B) Preoperative views of the patient with complete right facial nerve paralysis caused by a gunshot wound in the temporal bone.

of the facial nerve was carried through the parotid gland (Fig. 6A). A lower zygomatic branch of the facial nerve was marked with a vessel loop.

The masseteric motor nerve was identified. As Zuker and Manktelow described,[1] the nerve is located on the undersurface of the masseter muscle, coursing vertically downward at the posterior margin of the muscle just below the zygomatic arch. The overlying fascia and the origin of the masseter muscle were cleared from the zygomatic arch, and the dissection was carried downward to the undersurface of the muscle. The muscle fibers were carefully retracted and transected until the

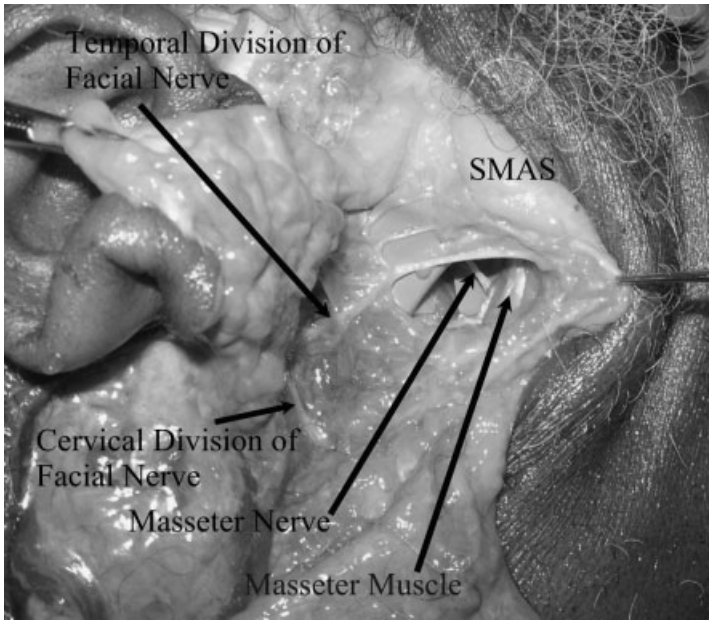

Figure 2 Anatomic dissection of the facial nerve after upward retraction of the parotid gland. The masseter muscle has been split to find the masseteric nerve.

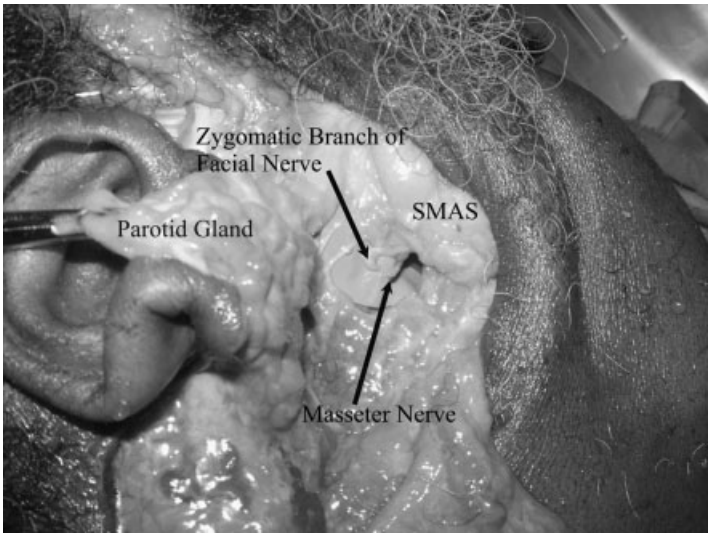

Figure 3 The branches have been cut, the zygomatic branch has been folded downward, and the masseteric branch upward.

undersurface of the masseter was encountered, using a nerve stimulator. Distal dissection of the masseteric nerve was continued, in order to obtain a branch and more length (15 mm), marking it with a vessel loop (Fig. 6B).

The nerve graft was tunneled reversed into the face, passing through the superior lip. Anastomoses of the donor distal zygomatic and buccal branches of the left facial nerve to the graft were carried out. The branch of the right masseteric nerve was anastomosed to a zygomatic branch of the right facial nerve previously marked. The distal end of the nerve graft was marked with a hemoclip and attached to the surrounding tissue with stabilizing sutures near the distal branches of the facial nerve.

On June 17, 2002, 4 months later, physical examination revealed incipient slight movements in the right hemiface and oral commissure at the same level as the contralateral side. In August, the patient had evidence of good movement in the right hemiface, improvement of tone in his lower eyelid and oral commissure, with excellent movement during voluntary smile (Fig. 7).

Because we used the distal branches of the facial nerve (zygomatic to mouth elevators), the patient did not have recovery of eye sphincter function. This selective neurotization of specific muscles would have increased the possibility of downgrading the results obtained, if we had performed a planned second-stage procedure with the cross-facial nerve graft, than results with a conventional babysitting technique; however, the patient did not accept the risk (and results) of the second stage. In the future, we would recommend dissecting the facial nerve more proximally and using a more proximal branch of the facial nerve, in order to obtain more extensive

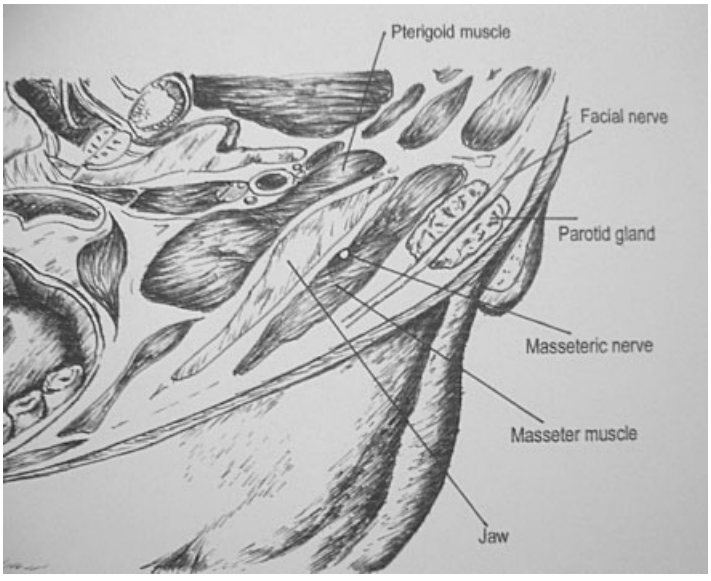

Figure 4 Relationship between the masseter nerve and facial nerve branches in a cross-sectional anatomy schema.

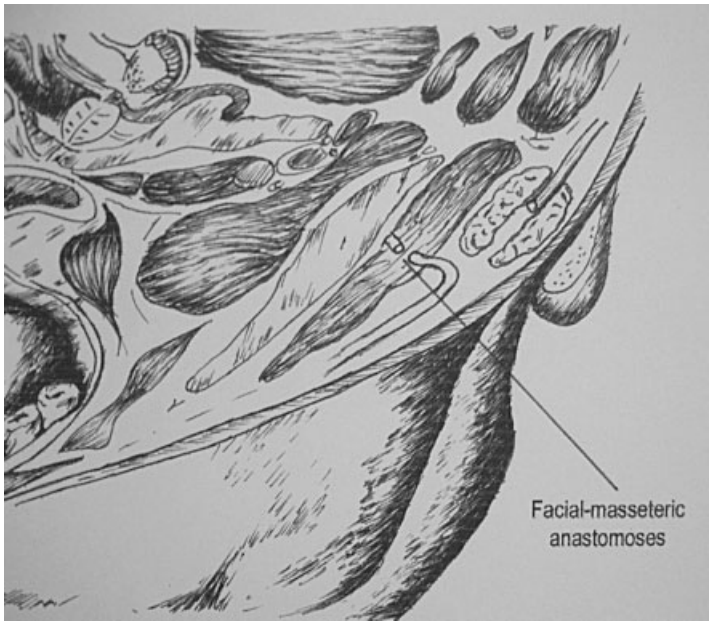

Figure 5 Schema of anastomoses between the masseter nerve and zygomatic branch of the facial nerve.

recovery of the facial muscles, as is demonstrated in the dissections in Figures 8 and 9.

DISCUSSION

The optimal reconstruction of an injured facial nerve would be reinnervation of the paralyzed facial muscles by ipsilateral nerve repair. However, in most instances of facial paralysis, the proximal ipsilateral nerve stump is not available for primary repair or grafting. The lingual, hypoglossal, spinal accessory, phrenic, and ansa cervicalis have been transferred to the distal facial nerve, with variable degrees of success in restoring the tonicity of the facial muscles.

Currently, the most utilized nerve transfer is hypoglossal-facial; this procedure has proven its reliability. But the tradeoffs such as hemilingual atrophy, facial hypertonia, and facial synkinesis are difficult to manage, and this has encouraged the search for a better solution for facial paralysis. Several variations have been described to avoid the side effects: partial nerve transfer, jump interpositional graft anastomosis,[3] and end-to-side neurorrhaphy,[4] among others.

In contrast to experimental models in animals,[5] the functional motor recovery following end-to-side neurorrhaphy is not precisely predictable in humans.[6–8] Zuker and Manktelow[1] described the motor branch of the fifth nerve as a source of axons to innervate a transplanted gracilis muscle in patients with Moebius syndrome, where the hypoglossal nerve is frequently involved to some extent. Fournier et al.[9] proposed a masseteric-facial nerve neurorrhaphy to restore facial function, but clinical experiences have not been published to date.

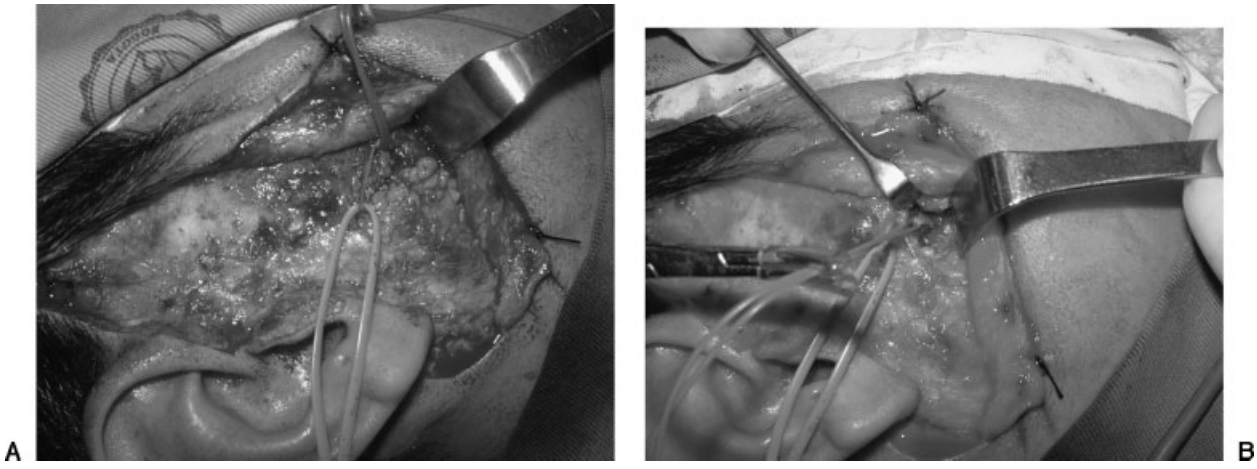

Figure 6 Intraoperative view of branches of the (A) facial nerve and (B) masseteric nerve before the anastomosis.

Figure 7 (A,B) Postoperative photographs 6 months following facial-masseteric neurorrhaphy. Symmetrical smile activated by masseter motion. Note some contraction of the lower eyelid orbicular oculi with this movement.

CONCLUSIONS

We have described a masseteric-facial nerve transfer to reanimate facial paralysis in one patient with good results and no side effects. This nerve transfer has several advantages: 1) there is no morbidity related to the donor nerve; 2) the complete procedure can be easily performed by the standard preauricular incision used in a face lift; and 3) because of the proximity of the main branches of

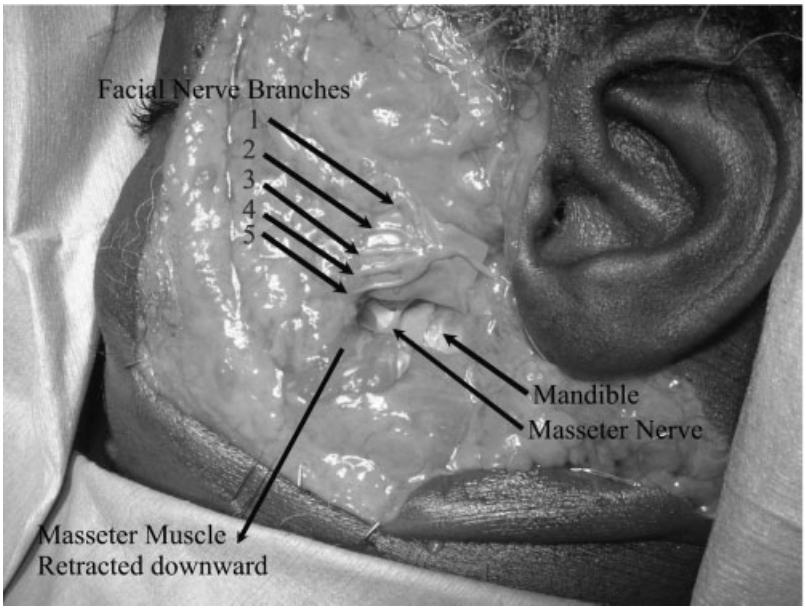

Figure 8 Branches of the temporal division of the facial and masseter nerves under the masseter muscle in anatomic dissection.

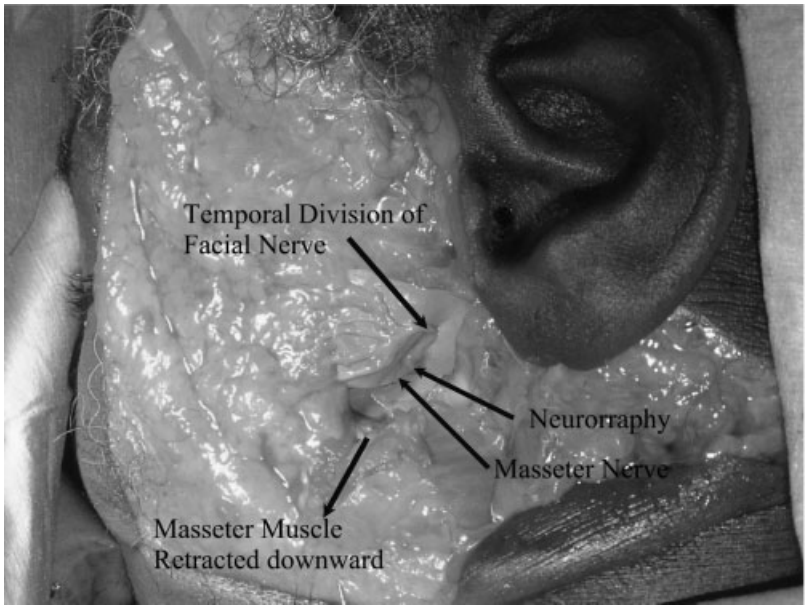

Figure 9 Proposed surgical procedure using the temporal division of the facial nerve as recipient of the masseter nerve, to reinnervate more facial muscles, and allowing the use of more distal branches of the facial nerve in a second-stage procedure of a cross-facial nerve graft. Anatomic dissection.

the facial nerve to the masseteric nerve, the transfer can be selectively used in patients with partial lesions of the facial nerve or to avoid facial synkinesis. The procedure should be considered as a good alternative in facial palsy reanimiation.

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