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Masseteric-to-facial nerve transfer for facial reanimation: a comprehensive approach in 15 patients

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Aim To evaluate the outcomes after masseteric-to-facial nerve transfer performed as the cornerstone of a comprehensive facial reanimation approach with tailored adjunctive procedures.

Methods The records of 15 patients undergoing masseteric-to-facial nerve transfer between 2017 and 2025 were retrospectively reviewed with a minimum 12-month follow-up. Adjunctive procedures were individualized and performed to address midface and lower-face ptosis and provide ocular protection. The most common etiologies of paralysis were iatrogenic injuries after vestibular schwannoma surgery (n=8, 53%) and facial nerve schwannoma surgery (n=4, 27%).

Results Facial reanimation was achieved in all patients. Mean time to initial facial movement was 6.1 months (range 3-12). At 12 months, outcomes were excellent in 4 patients (27%), good in 7 (47%), and moderate in 4 (27%); 73% achieved good-to-excellent results. No clinically significant donor-site morbidity or masseter atrophy was observed.

Conclusion Masseteric-to-facial nerve transfer, when integrated into a comprehensive protocol with adjunctive procedures, provides predictable facial reanimation with minimal donor morbidity and favorable functional and esthetic outcomes at 12 months.

INTRODUCTION

Facial paralysis is a clinical challenge with profound effects on patient quality of life (1). Beyond the obvious cosmetic deformity, patients experience functional deficits including oral incompetence, impaired speech articulation, and corneal exposure risk (2). The psychological impact of facial asymmetry further compounds the disability (3).

Optimal management of facial paralysis requires a comprehensive approach addressing both dynamic reanimation and static restoration (4). Dynamic procedures restore muscle function and voluntary movement, while static procedures address soft tissue ptosis, brow malposition, and corneal protection (5). The combination of these techniques often yields superior functional and esthetic outcomes compared with isolated interventions.

The masseteric nerve, a branch of the mandibular division of the trigeminal nerve, has been recognized as an effective donor for facial reanimation (6,7). The nerve provides several technical advantages including consistent anatomy, proximity to facial nerve branches, and substantial axonal content. Unlike the hypoglossal nerve, which has been traditionally employed for this purpose, the masseteric nerve can be transferred without significant functional deficit at the donor site (8).

Despite growing interest in masseteric nerve transfer, the majority of published studies focus on the nerve transfer in isolation, with limited data on outcomes when the transfer is combined with adjunctive procedures. This study presented our institutional experience with masseteric-to-facial nerve transfer combined with adjunctive procedures in 15 patients with facial paralysis of various etiologies over an 8-year period. We assessed patient characteristics, surgical technique evolution, adjunctive interventions, recovery timeline, and clinical outcomes.

PATIENTS AND METHODS

Study design and patient selection

We retrospectively reviewed the records of all patients who underwent masseteric-to-facial nerve anastomosis at the Department of Ear, Nose, and Throat and Head and Neck Surgery, University Hospital Center Zagreb, between January 2017 and December 2025. Patients with insufficient follow-up data were excluded. Fifteen patients meeting the inclusion criteria were enrolled in the study. All patients had a minimum 12-month follow-up with formal outcome assessment.

Patient demographics

All cases of vestibular schwannoma (8 [53.3%]) and facial nerve schwannoma 4 [26.7%] represented iatrogenic facial nerve injuries sustained during tumor resection. Two patients (13.3%) had cholesteatoma and one (6.7%) had Bell's palsy. The mean patient age was 45.1 years (range 14-71 years). The mean time from paralysis onset to surgical intervention was 9.5 months (range 4-16 months).

Masseteric nerve transfer technique

All procedures were performed under general anesthesia. A standard face-lift incision was used for exposure. Facial nerve branches were identified in the deep plane anterior to the masseter muscle, most commonly the buccal or zygomatic branch. Retrograde dissection was then performed to the facial nerve trunk. The marginal mandibular branch was deliberately sacrificed in some patients due to the antagonistic action of its innervated muscles (depressors of the lower lip and oral commissure) relative to the elevators targeted for reanimation. This maneuver was intended to reduce counterproductive forces during a smile excursion and minimize synkinetic movements. This decision was individualized based on preoperative facial dynamics and intraoperative findings.

The masseteric nerve was identified using the subzygomatic triangle as an anatomical landmark (9). The triangle is defined by the zygomatic arch superiorly, the temporomandibular joint posteriorly, and the frontal branch of the facial nerve anteriorly. Within this triangle, the nerve was located 10-15 mm deep to the parotideomasseteric fascia.

After identification, the distal portion of the masseteric nerve was mobilized while preserving proximal branches to the masseter muscle to prevent masseter atrophy. The nerve was divided distally, which provided adequate length for tension-free coaptation to the upper division of the facial nerve trunk. Neurorrhaphy was performed using interrupted 9-0 monofilament epineural sutures under microscopic magnification. Typically, three epineural sutures were placed to achieve secure, tension-free neurorrhaphy with proper fascicular alignment. The surgical site was irrigated, hemostasis achieved, and a closed suction drain placed (Figure 1).

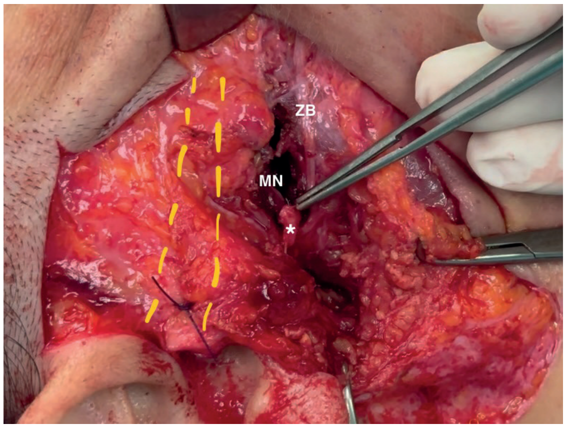

FIGURE 2. Intraoperative view demonstrating masseteric-to-facial nerve transfer technique (the right side of the face). DeBakey forceps hold the upper division of the facial nerve (*), which has been rotated superiorly toward the masseteric nerve (MN). Note the zygomatic branch (ZB) of the facial nerve, which has been dissected in the deep plane and followed retrograde to the trunk. The yellow dashed line indicates the zygomatic arch. The masseteric nerve is typically located 3 cm anterior to the tragus and 1 cm below the zygomatic arch. A hemostatic clamp retracts the parotid gland, which is re-approximated at the conclusion of the procedure.

Adjunctive procedures

Based on individual patient needs and the extent of facial paralysis, the following adjunctive procedures were performed either concurrently or in a staged fashion:

Cross-facial nerve grafting: Five patients (33%) underwent cross-facial nerve grafting for double innervation in a single-stage procedure. On the healthy contralateral side, intraoperative neuromonitoring was used to identify a double zygomatic branch, which was sacrificed for anastomosis. The sural nerve was harvested and coapted end-to-end to this donor branch using 9-0 monofilament sutures under microscopic magnification. The graft was tunneled subcutaneously across the midline to the paralyzed side. During the same operative session, the distal end of the sural nerve graft was coapted end-to-side to the masseteric-facial nerve neurorrhaphy site, creating immediate double innervation. This single-stage approach provides immediate robust motor input from the masseteric nerve while the cross-facial graft regenerates, potentially enabling spontaneous, emotionally driven facial animation.

Deep plane facelift: Deep plane facelift was performed in 13 patients (87%) to address soft-tissue ptosis and midface descent resulting from prolonged facial paralysis. The procedure involved subperiosteal elevation of the malar fat pad and deep plane dissection to restore facial contour and symmetry.

Static fascia lata suspension: Eleven patients (73%) underwent static facial suspension using fascia lata grafts. This technique immediately improves facial symmetry at rest and supports the paralyzed lower face and oral commissure.

Brow lift: Brow ptosis correction was performed in 10 patients (67%) using a direct brow lift approach to address forehead asymmetry and reduce visual field obstruction. An incision was made immediately superior to the brow, and the brow was elevated and secured to the periosteum to match the height and contour of the contralateral brow.

Upper eyelid weight placement: Ten patients (67%) received upper eyelid weights for corneal protection. Gold or platinum weights were selected based on preoperative testing to achieve complete eyelid closure. The weight was secured to the tarsal plate through a lid crease incision.

Postoperative management and follow-up

All patients were followed at regular intervals postoperatively with formal outcome assessment at a minimum of 12 months. Clinical examination assessed facial symmetry at rest and during movement. Time to initial facial movement was recorded. Patients were instructed in facial physiotherapy exercises. For patients who received eyelid weights, corneal health was monitored closely with ophthalmology consultation. Lubrication protocols were implemented to prevent exposure keratopathy.

Outcome measures

Primary outcome was the time to initial visible facial movement. Secondary outcomes included facial symmetry at rest and with animation, oral commissure excursion, corneal protection, and complications. At 12-month follow-up, outcomes were graded as moderate, good, or excellent based on clinical assessment of facial symmetry, oral commissure movement, eye closure, and overall functional restoration.

RESULTS

All 15 patients completed the surgical procedure without intraoperative complications. Mean time to initial facial movement was 6.1 months (range 3-12 months).

At 12-month follow-up, outcomes were graded as excellent in 4 patients (27%), good in 7 patients (47%), and moderate in 4 patients (27%). Overall, 11 patients (73%) achieved good to excellent outcomes. Representative clinical outcomes are shown in Figures 2 and 3.

All patients achieved functional recovery following masseteric-to-facial nerve transfer. No donor site morbidity was observed. No patient developed masseter muscle atrophy or reported difficulty with mastication, which confirms the safety of distal masseteric nerve harvest with the preservation of proximal branches.

Adjunctive procedures enhanced overall outcomes by addressing static facial asymmetry and by providing corneal protection during the reinnervation period. Minor complications were limited to eyelid weight revision in 2 patients (13%) for inadequate closure. Both patients underwent successful revision with heavier weights. No other significant complications related to the primary nerve transfer or adjunctive procedures were recorded. No cases of sialocele, parotid fistula, or Frey's syndrome were observed.

DISCUSSION

This 8-year experience with 15 patients demonstrates the effectiveness of masseteric-to-facial nerve transfer as the primary method for facial reanimation. The majority of patients (73%) achieved good to excellent outcomes at 12 months, with a mean recovery time of 6.1 months. Our patient group included a wide age range (14-71 years), which demonstrates the applicability of this technique across various age groups.

FIGURE 3. Representative case 1 (vestibular schwannoma, age 58). Preoperative (left) and 12-month postoperative (right) frontal views at rest. A comprehensive reanimation approach restored facial symmetry and midface contour. The patient provided informed consent for the publication of the images.

Advantages of the masseteric nerve

The masseteric nerve offers several advantages as a donor nerve for facial reanimation (6,7,9,10). Anatomically, its consistent location within the subzygomatic triangle facilitates reliable identification during surgery. The nerve's proximity to facial nerve branches allows direct coaptation without the need for interpositional grafts, which reduces the number of coaptation sites and potential signal attenuation. The robust axonal content contributes to strong reinnervation and greater oral commissure excursion. Importantly, no patient in our series developed masseter muscle atrophy or mastication difficulty, a finding confirming the safety of distal masseteric nerve harvest with preservation of proximal branches.

Surgical approach evolution

Our surgical technique has evolved significantly over the study period. Initially, we employed a standard parotidectomy approach to expose the facial nerve trunk, similar to approaches used in parotid surgery. However, this proved unnecessarily complex, time-consuming, and associated with increased morbidity.

We subsequently transitioned to a deep-plane facelift approach, identifying distal facial nerve branches (most commonly buccal or zygomatic) in the deep plane anterior to the masseter muscle and performing retrograde dissection to the facial nerve trunk. This modification has provided several advantages: significantly reduced operative time, preservation of the parotid gland, and decreased surgical morbidity. Importantly,

FIGURE 4. Representative case 2 (facial nerve schwannoma, age 41). Preoperative (left) image showing an attempted smile with lower facial paralysis, and 12-month postoperative image (right) showing a symmetric smile and oral commissure elevation following masseteric nerve transfer, deep plane facelift, and cross facial nerve graft. The patient provided informed consent for the publication of the images.

this approach leaves the parotid gland intact. At the conclusion of neurorrhaphy, the parotid fascia is carefully reapproximated, and since we had adopted this technique we observed no cases of sialocele in our series. The deep-plane approach provides adequate exposure for the masseteric nerve identification and facial nerve coaptation while avoiding the potential complications associated with the parotid gland manipulation.

Treatment protocol evolution: the role of static suspension

Our treatment protocol has also undergone significant evolution. Initially, we performed masseteric nerve transfer without fascia lata suspension. While dynamic reanimation with a smile was satisfactory, patients demonstrated noticeable facial asymmetry at rest due to inadequate tone in the paralyzed lower face. The masseteric nerve provides excellent dynamic function but insufficient activation at rest.

This observation led us to incorporate static fascia lata suspension into our protocol. Since we had adopted this combined approach, facial symmetry at rest improved markedly. The fascia lata suspension provides immediate structural support and maintains oral commissure position, complementing the dynamic reanimation achieved once the masseteric nerve reinnervates. This combination addresses both the resting and dynamic phases of facial function, resulting in superior overall esthetic outcomes.

Comprehensive surgical approach

Our approach to facial reanimation centers on masseteric-to-facial nerve transfer as the primary method for restoring dynamic facial function, but recognizes that nerve transfer alone addresses only one component of facial paralysis. The high utilization of adjunctive procedures in our series (ranging from 33% to 87%) reflects our philosophy that comprehensive rehabilitation requires concurrent management of static deformities, corneal protection, and structural support. These procedures are not merely supplementary but are integral to optimizing functional and esthetic outcomes during and after the reinnervation period.

Cross-facial nerve grafting, performed in one-third of patients using a single-stage, end-to-side double innervation technique, represents an attempt to combine the rapid, robust motor input of the masseteric nerve with a potential for a spontaneous, emotionally driven smile from the contralateral facial nerve. While our follow-up period does not yet allow definitive assessment of spontaneous smile recovery, this approach provides immediate masseteric function while the cross-facial graft matures over 12-18 months.

Comparison with published literature

Our outcomes are comparable to published series of masseteric nerve transfer (7,11-15). The mean recovery time of 6.1 months falls within reported ranges in the literature. It represents predictable, relatively rapid reinnervation compared with alternative techniques such as cross-facial nerve grafting alone, which typically requires 12-24 months for functional recovery. The range of 3-12 months in our series reflects variability in patient factors including age, time to surgery, and extent of denervation. The mean time from paralysis onset to surgical intervention was 9.5 months, suggesting that relatively early intervention may optimize outcomes while nerve pathways remain viable.

Future directions

Looking forward, we are considering expansion to triple innervation, following the principles described by Biglioli et al (16). The addition of hypoglossal nerve input to our current double innervation protocol (masseteric plus cross-facial graft) may provide even more robust motor input and potentially improved functional outcomes. This remains an area for future investigation at our institution.

Limitations

This study has several limitations inherent to its retrospective design and modest sample size. The heterogeneity of the performed adjunctive procedures reflects individualized treatment but precludes direct comparison between protocols. Our treatment protocol evolved during the study period, with earlier patients not receiving fascia lata suspension, which potentially affected outcome comparisons. Outcome assessment, while systematic, was based on clinical grading rather than quantitative measures such as commissure excursion in millimeters or standardized photographic analysis. The diverse etiologies in our cohort limited subgroup analysis. A longer follow-up would allow an assessment of late complications, durability of results, and development of a spontaneous smile in patients with double innervation. Prospective studies with larger samples, standardized objective outcome measures, and a longer follow-up would provide more robust data.

Conclusion

Masseteric-to-facial nerve transfer represents a reliable and powerful foundation for dynamic facial reanimation, providing predictable recovery with minimal donor-site morbidity. However, optimal rehabilitation of facial paralysis requires more than isolated nerve repair. Our experience demonstrates that integrating masseteric nerve transfer into a comprehensive surgical protocol – including static suspension, soft tissue repositioning, and ocular protection – considerably enhances both functional and esthetic outcomes. Facial reanimation should therefore be approached as comprehensive facial reconstruction, addressing dynamic movement, resting symmetry, and structural support simultaneously. This combined strategy offers stable, balanced, and reproducible results, and should be considered a standard framework for modern facial reanimation surgery.

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Declaration of authorship
MM conceived and designed the study; acquired the data; all authors analyzed and interpreted the data; drafted the manuscript; all authors critically reviewed the manuscript for important intellectual content; all authors gave approval of the version to be submitted; all authors agree to be accountable for all aspects of the work.

Competing interests
All authors have completed the Unified Competing Interest form at www.icmje.org/coi_disclosure.pdf (available on request from the corresponding author) and declare: no support from any organization for the submitted work; no financial relationships with any organizations that might have an interest in the submitted work in the previous 3 years; no other relationships or activities that could appear to have influenced the submitted work.

REFERENCES

1. Miller H. Facial paralysis. BMJ. 1967 Sep 30;3(5569):815-9.
2. Tollefson TT, Hadlock TA, Lighthall JG. Facial paralysis discussion and debate. Facial Plast Surg Clin North Am. 2018 May;26(2):163-80.
3. Vargo M, Ding P, Sacco M, Duggal R, Genther DJ, Ciolek PJ, et al. The psychological and psychosocial effects of facial paralysis: A review. Journal of Plastic, Reconstructive & Aesthetic Surgery. 2023 Aug;83:423-30.
4. Chan JYK, Byrne P. Management of facial paralysis in the 21st century. Facial Plastic Surgery. 2011 Aug 26;27(04):346-57.
5. Lu GN, Flynn J. Facial nerve reconstruction. Otolaryngol Clin North Am. 2023 Aug;56(4):757-67.
6. Park H, Jeong SS, Oh TS. Masseter nerve-based facial palsy reconstruction. Arch Craniofac Surg. 2020 Dec 20;21(6):337-44.
7. Henstrom DK. Masseteric nerve use in facial reanimation. Curr Opin Otolaryngol Head Neck Surg. 2014 Aug;22(4):284-90.
8. Bianchi B, Ferri A, Ferrari S, Copelli C, Salvagni L, Sesenna E. The masseteric nerve: a versatile power source in facial animation techniques. British Journal of Oral and Maxillofacial Surgery. 2014 Mar;52(3):264-9.
9. Murphey AW, Clinkscales WB, Oyer SL. Masseteric nerve transfer for facial nerve paralysis. JAMA Facial Plast Surg. 2018 Mar;20(2):104-10.
10. Gray ML, Hu S, Gorbea E, Mashkevich G. Masseteric-zygomatic nerve transfer for the management of eye closure-smile excursion synkinesis. Am J Otolaryngol. 2020 Jul;41(4):102479.
11. Hadford SP, Genther DJ, Byrne PJ. Pediatric facial reanimation. Facial Plast Surg Clin North Am. 2024 Feb;32(1):169-80.
12. Abou-Al-Shaar H, Karsy M, Eli IM, Agarwal JP, Gociman B, Mahan MA. Masseter-to-facial nerve transfer for facial nerve reanimation. Neurosurgical Focus: Video. 2023 Jan;8(1):V6.
13. Varelas AN, Varelas EA, Kay-Rivest E, Eytan DF, Friedmann DR, Lee JW. Facial reanimation after intratemporal facial nerve schwannoma resection: a systematic review. Facial Plast Surg Aesthet Med. 2024 Jun 1;26(3):355-61.
14. Hontanilla B, Marre D, Cabello Á. Masseteric nerve for reanimation of the smile in short-term facial paralysis. British Journal of Oral and Maxillofacial Surgery. 2014 Feb;52(2):118-23.
15. Gibelli D, Tarabbia F, Restelli S, Allevi F, Dolci C, Dell'Aversana Orabona G, et al. Three-dimensional assessment of restored smiling mobility after reanimation of unilateral facial palsy by triple innervation technique. Int J Oral Maxillofac Surg. 2020 Apr;49(4):536-42.
16. Telich-Tarriba JE, Navarro-Barquin DF, Pineda-Aldana G, Cardenas-Mejia A. Triple nerve transfers for the management of early unilateral facial palsy. J Plast Surg Hand Surg. 2023 Aug 9;58:62-6.