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Early Outcomes in an Emerging Facial Nerve Center: The Oregon Health and Science University (OHSU) Experience

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Abstract

Objectives: Nerve transfer (NT) and free gracilis muscle transfer (FGMT) are procedures for reanimation of the paralyzed face. Assessing the surgical outcomes of these procedures is imperative when evaluating the effectiveness of these interventions, especially when establishing a new center focused on the treatment of patients with facial paralysis. We desired to discuss the factors to consider when implementing a facial nerve center and the means by which the specialist can assess and analyze outcomes.

Methods: Patients with facial palsy secondary to multiple etiologies, including cerebellopontine angle tumors, head and neck carcinoma, and trauma, who underwent NT or FGMT between 2014 and 2019 were included. Primary outcomes were facial symmetry and smile excursion, calculated using FACE-gram and Emotrics software. Subjective quality of life outcomes, including the Facial Clinimetric Evaluation (FaCE) Scale and Synkinesis Assessment Questionnaire (SAQ), were also assessed.

Results: 14/22 NT and 6/6 FGMT patients met inclusion criteria having both pre-and postoperative photo documentation. NT increased oral commissure excursion from 0.4 mm (SD 5.3) to 2.9 mm (SD 6.8) ($P = 0.05$), and improved symmetry of excursion ($P < 0.001$) and angle ($P < 0.001$). FGMT increased oral commissure excursion from –1.4 mm (SD 3.9) to 2.1 mm (SD 3.7), ($P = 0.02$), and improved symmetry of excursion ($P < 0.001$). FaCE scores improved in NT patients postoperatively ($P < 0.001$).

Conclusions: Measuring outcomes, critical analyses, and a multidisciplinary approach are necessary components when building a facial nerve center. At our emerging facial nerve center, we found NT and FGMT procedures improved smile excursion and symmetry, and improved QOL following NT in patients with facial palsy secondary to multiple etiologies.

Keywords

Facial nerve disorders, facial nerve paralysis, facial nerve, otology, otolaryngology, nerve transfer, facial reanimation, free gracilis muscle transfer

Introduction

In recent history, dramatic enhancements in surgical techniques for facial reanimation have positively impacted patient outcomes. Some of the key innovations within the field of facial reanimation include nerve transfer (NT) techniques that limit donor-site morbidity,[1] earlier timing of NT to maximize nerve regeneration,[2] and the detailed study of free muscle transfers.[3] The resultant knowledge, coupled with the expansion of facial nerve centers across the world, allows for the application of these surgical techniques to improve the outcomes in patients with facial paralysis. As these techniques are adopted within medical centers, we have the responsibility and challenge to analyze our outcomes to ensure quality of care, while tracking progress across institutions and establishing a common means of evaluation. Additionally, even as knowledge surrounding facial nerve surgical interventions continues to advance, questions remain about optimal interventions, both in terms

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of timing and combinations of procedures. Therefore, collecting clinical outcomes is imperative to guide future evidence-based recommendations.

In this study, we report our initial 4.5-year experience at Oregon Health & Science University (OHSU) following the implementation of a facial nerve center that offers surgical techniques for the management of facial paralysis, including NT and free gracilis muscle transfer (FGMT) surgeries. Our goal was to effectively establish a referral base, build a center focused on the treatment of facial paralysis, and prospectively assess surgical outcome data and evaluate quality of life (QOL) in NT and FGMT patients.

Material and Methods

Design, Setting, and Participants

Patients with facial paralysis undergoing NT or FGMT surgeries at OHSU were prospectively enrolled between December 2014 and March 2019. A minimum follow-up of 6 months was necessary for study inclusion. Patients for whom complete pre- and postoperative photo documentation was not acquired were excluded from analysis. OHSU Institutional Review Board (IRB) approval through independent review was obtained for this project (IRB 18715).

Demographic data, etiology of paralysis, duration of paralysis and survey results were recorded. Details regarding the facial nerve reanimation procedures were documented in the operative notes and photographs were reviewed.

Surgical Intervention

Patients with complete paralysis and no sign of nerve recovery 6 months after acoustic neuroma resection, other intracranial injury/surgery, or extra-temporal nerve resection/injury were offered a NT procedure, as these patients are unlikely to have satisfactory recovery of facial nerve function.[2] In these cases, a masseteric NT to a midfacial nerve branch was preferred (Figure 1). NT procedures were also considered in patients who underwent facial nerve resection at the time of an ablative oncologic surgery in combination with direct nerve repair or cable grafting, which was commonly used to connect the proximal facial nerve to a distal midfacial nerve branch most likely to elevate the commissure. Adjunctive masseteric NT to a midfacial nerve branch was considered in patients who could not be cable grafted due to loss of the proximal segment of the nerve and patients over 50 years of age with cable grafts measuring longer than 2 cm and involvement of the main trunk of the facial nerve. Functional outcomes of cable graft repair of the facial nerve show inconsistent results,[4-6] and combining cable graft repair with NT has yielded good outcomes.[7] Increased cable graft length results in reduced axonal regeneration.[8] A specific defect length cutoff of the facial nerve where a NT should be considered has not been established. The decision to add adjunctive NT in cases wherein a cable graft was longer than 2 cm was based upon clinician judgment. Hypoglossal NT was considered when a masseteric NT was not available and was performed utilizing a partial hypoglossal nerve donor. Two different surgeons (MKW and MLL) performed NT procedures. An algorithm to guide NT choices was generated (Supplemental 1) and standardized operative forms for data collection were developed, distributed, and made easily assessable to staff using an encrypted institution-supported cloud sharing program.

Additionally, cross-facial nerve grafting (CFNG) using a sural nerve graft was considered for patients younger than 65 years of age in both NT and FGMT procedures with the goal of adding spontaneity to facial movement. During NT procedures, the CFNG was performed end to end to a separate midfacial nerve branch from the branch used for NT. During FGMT, the obturator nerve was divided with one portion of the nerve used for the masseteric nerve and the other portion for the CFNG.

Patients with facial paralysis longer than 2-years duration were evaluated for FGMT, as a NT was unlikely to be successful.[9-12] Dual innervation with a two-stage surgery, including CFNG and masseteric NT, was offered to patients younger than 60 years of age. Single innervation with masseteric NT was offered to patients considering a single-stage surgery and patients over the age of 60. Given concerns regarding poor nerve regeneration in older individuals and in long nerve grafts, such as CFNG, dual innervation was offered to younger adults.[8,13] The specific age range wherein dual innervation is likely to be successful is unclear. Not all patients with paralysis lasting longer than 2 years were considered for FGMT; comorbidities and patient desires were also considered and some patients decided to undergo temporalis tendon transfer or static suspensions. FGMT surgeries were performed as a two-surgeon approach (both MKW and MLL; Figure 1).

Outcome Measurements

Objective photo analysis. The primary study outcomes were facial symmetry in repose and during smile, and smile excursion. Objective measurements were obtained using the Facial Assessment by Computer Evaluation software (FACE-gram; Mass Eye and Ear, Boston, MA),[14] as well as the newer Emotrics Software (Mass Eye and Ear, Boston, MA).[15] FACE-gram is an automated tool that requires manual marking of facial landmarks, in contrast to Emotrics, which uses machine learning for automatic facial landmark localization. "Oral commissure excursion" refers to the movement (in millimeters [mm]) of the oral commissure between repose and smile. The "change in angle" refers to the change in angle (in degrees) between repose and smile;

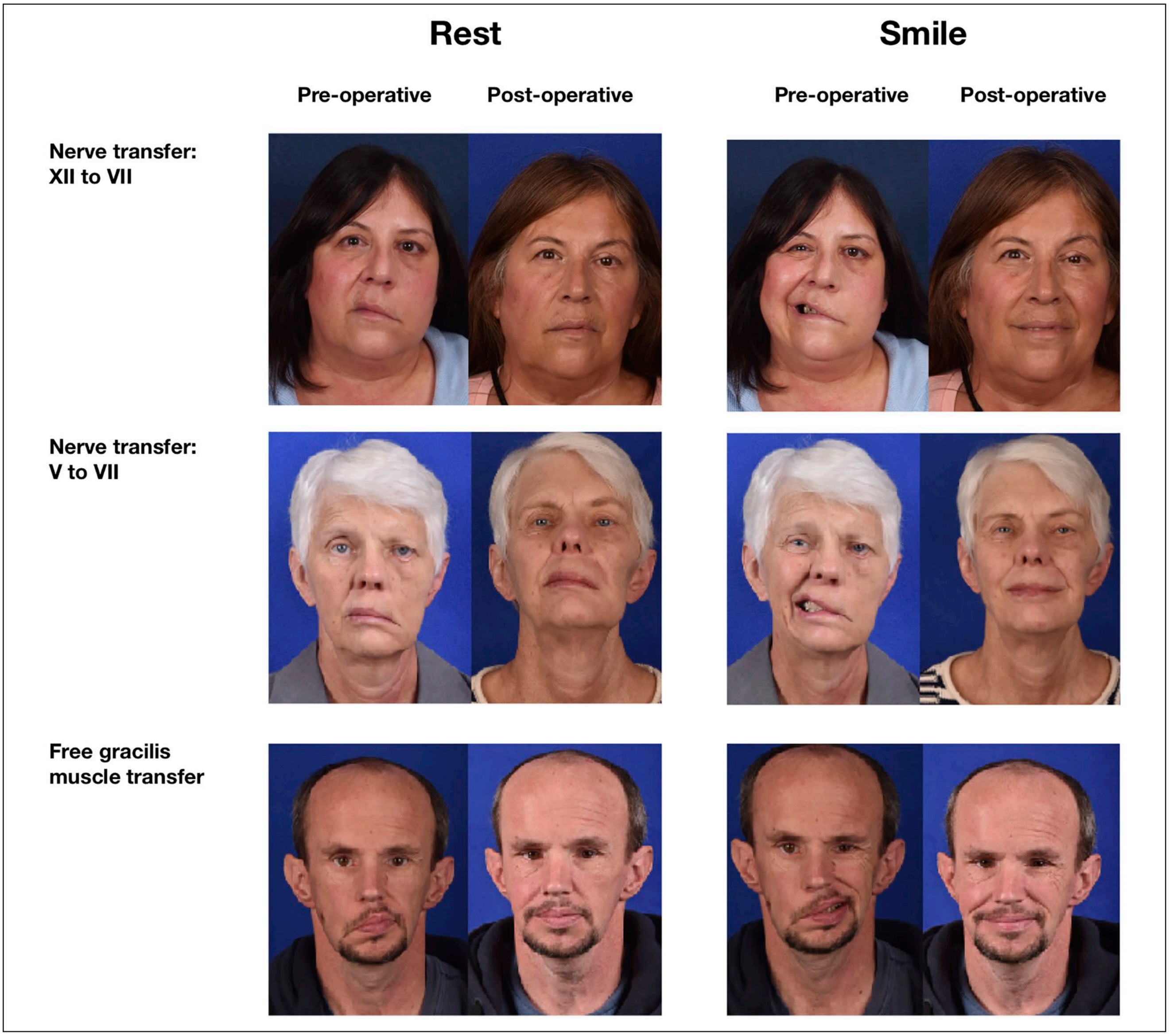

Figure 1. Examples of nerve transfer and free gracilis muscle transfer postoperative outcomes.

wherein the angle of the oral commissure was defined as the intersection between (1) the line formed by the oral commissure and the mid-point of the lower lip and (2) the vertical midline of the face. Postoperative values in oral commissure excursion and change in angle are expected to increase on the affected side, reflecting more movement. "Symmetry in angle" compares the oral commissure position in relation to the vertical midline of the lower lip between the affected and unaffected sides of the face in repose and during smile. "Symmetry in length" compares the distance between the oral commissure and the midline of the vermillion-cutaneous border between the affected and unaffected sides of the face in repose and during smile. Smaller values in the symmetry measurement signify increased symmetry.[3] Additionally, the facial asymmetry index (FAI) was utilized. The FAI equates to the difference between the distance from the medial canthus to the ipsilateral oral commissure on either side of the face in repose and during smile.[2] A smaller FAI corresponds to more symmetry between the affected and unaffected sides of the face. Adobe Photoshop software (Adobe Photoshop CC2017; Adobe, San Jose, CA.) was used to calculate the FAI.

Quality of Life (QOL) measures. Patient-reported outcome measures were obtained both pre- and postoperatively. Administered surveys included the Facial Clinimetric Evaluation (FaCE) Scale, which assesses patient-reported facial paralysis-specific QOL,[16] and the Synkinesis Assessment

Table 1. Demographic and Clinical Information.

	Nerve Transfer (n = 14)	Free Gracilis Muscle Transfer (n = 6)
Average age in years, mean (SD)	60.1 (18.6)	45.7 (14.3)
Gender, No. (%)		
Male	6 (43%)	3 (50%)
Female	8 (57%)	3 (50%)
Motor Nerve, No. (%)		
CN V	6 (43%)	4 (67%)
CN V + Cable Graft	3 (21.4%)	0 (0%)
CN V + CFNG	3 (21.4%)	2 (33%)
CN XII + CFNG	1 (7.1%)	0 (0%)
CN V + CN XII + Cable Graft	1 (7.1%)	0 (0%)
Cause of Paralysis, No. (%)		
Skull base tumor		
Cerebellopontine angle mass	5 (36%)	3 (50%)
Foramen Magnum Meningioma	1 (7%)	0 (0%)
Head and neck cancer		
Parotid neoplasm, primary or metastatic	6 (43%)	1 (17%)
Trauma	1 (7%)	1 (17%)
Central nervous system pathology		
Stroke	1 (7%)	0 (0%)
Solid tumor	0 (0%)	1 (17%)

Questionnaire (SAQ), which captures potential involuntary movement introduced with the procedures.[17]

Statistical Analysis

Pre- and postoperative photographs and survey data obtained from surgeries performed between the dates of December 1, 2014 and March 31, 2019 were analyzed using R (version 3.3.2, Vienna, Austria).[18] Differences in pre- and postoperative smile excursion, angle, and FAI were analyzed using 2-tailed *t*-tests, with significance defined as $P \leq .05$. Differences in pre- and postoperative SAQ and FaCE scores were also analyzed using 2-tailed *t*-tests.

Results

Patient and Operative Characteristics

Twenty-two patients underwent NT during the time period assessed. Eight of these patients did not have complete datasets and were excluded from analysis. Of the 8 patients with incomplete datasets, 1 patient failed to innervate, 1 patient died from head and neck carcinoma prior to reinnervation, and 6 were lost to follow-up. Fourteen NT patients had complete datasets necessary to undergo analysis of pre- and postoperative photographs. All 6 FGMT patients met inclusion criteria, all of whom had complete flaccid paralysis at presentation.

Table 1 shows demographic information, etiology of paralysis, and the motor nerve used for re-innervation in our patient cohort. Predominant causes of facial paralysis included cerebellopontine angle (CPA) masses (5/14, 36%) and parotid neoplasms, either primary or metastatic (6/14, 43%). When presenting with preoperative facial paralysis, all NT patients demonstrated complete flaccid paralysis with an average duration of paralysis of 5.6 (SD 8.1) months in head and neck cancer patients, 4.85 (SD 2) months in patients with CPA/skull base tumors, 9 months in the 1 patient who suffered trauma, and 7 months in the 1 patient who suffered a stroke. Three of the 6 head and neck cancer patients had facial nerve function prior to their oncologic surgery, however, all suffered complete facial nerve transection and, thus, complete facial paralysis after oncologic surgery.

The most common NT procedure performed was a masseteric to midfacial nerve branch repair (n = 12). Three patients underwent cable graft repair of the facial nerve using the greater auricular nerve, with graft lengths of 4, 4, and 6 cm. Two patients with head and neck cancer did not have a proximal facial nerve that could be cable grafted. None of the head and neck cancer patients underwent concurrent free tissue transfer at the time of NT. Two patients underwent hypoglossal NT. One patient underwent NT for facial paralysis resulting from a hemorrhagic midbrain stroke, with transposition of the main trunk of the facial nerve to the hypoglossal nerve after mastoidectomy, in addition to a CFNG. We estimate 40% of the hypoglossal nerve was used. This patient exhibited mild dysarthria with fully intelligible speech and no dysphagia postoperatively.

Table 2. Excursion, Angle, and Symmetry Outcomes before and after Nerve Transfer (NT) Procedures.

NT Measurements (n = 14)	Software	Condition Measured	Preoperative		Postoperative		*P* Value
			Mean	SD	Mean	SD	
Excursion (mm)	FACE-gram	Healthy side	3.5	5.7	1.9	6	**.05**
		Affected side	–2.3	4.8	2.7	4	**<.001**
	Emotrics	Healthy side	5	8	2.6	6.2	.26
		Affected side	0.4	5.3	2.9	6.8	**.05**
Angle (degrees)	FACE-gram	Healthy side	9.3	7.2	6.1	6.4	**.05**
		Affected side	2.1	10.1	4.9	8	.72
	Emotrics	Healthy side	10.5	6.7	5.6	8.7	**.05**
		Affected side	3.4	7.9	5.2	6.2	.52
Symmetry (Excursion, mm)	FACE-gram	Repose	4.4	3.3	4.5	2.8	.9
		Smile	8.5	8.3	3.5	5.7	**<.001**
	Emotrics	Repose	4.6	4.6	3.6	3.7	.38
		Smile	8.6	6.6	3.6	6.3	**<.001**
Symmetry (Angle, degrees)	FACE-gram	Repose	9.3	4.9	5.1	5	**<.001**
		Smile	8.5	9.9	6.2	4.8	**<.001**
	Emotrics	Repose	7.4	5.1	3.8	3.2	**<.001**
		Smile	12.7	5.7	4.7	4.2	**<.001**

The other patient underwent a large tumor resection and did not have a proximal facial nerve that could be cable grafted (no main trunk); only residual distal facial nerve branches remained. This patient underwent masseteric NT to a midfacial nerve branch and hypoglossal NT to a different midfacial branch. The midfacial nerve branch was connected to the hypoglossal nerve via an epineural window[19,20] and a cable graft from the ansa hypoglossi. This patient did not exhibit tongue weakness, dysarthria, or dysphagia postoperatively.

The 6 patients who underwent FGMT had masseteric innervation with 2 patients having dual innervation with a CFNG. The average weight of the FGMT was 29.3 g (SD 10.4) with an average length of 8.9 cm (SD 1.5) and width of 3.9 cm (SD 1.2) measured after harvest and prior to inset. The average duration of facial paralysis in this patient cohort was 5.4 years (SD 4.7).

The average length of follow-up for photo documentation was 15.8 months (SD 10.7) for the NT group and 12.1 months (SD 6.3) for the FGMT group. Two patients in the analyzed cohort died from metastatic head and neck carcinoma, 13 and 35 months after their initial surgery. Both patients demonstrated reinnervation prior to their deaths.

Objective Facial Symmetry and Smile Outcomes

Using Emotrics to calculate measurements, patients who underwent masseteric NT saw an increase in oral commissure excursion from 0.4 mm (SD 5.3) preoperatively to 2.9 mm (SD 6.8) postoperative on the affected side ($P = 0.05$). Table 2 shows the improvement in symmetry of excursion and angle during smile postoperatively using both FACE-gram and Emotrics. It should be noted that negative preoperative values for smile excursion are secondary to pull of the paralyzed commissure medially by the healthy side during smile.

Patients who underwent FGMT saw an increase in oral commissure excursion from –1.4 mm (SD 3.9) preoperative to 2.1 mm (SD 3.7) postoperatively on the affected side ($P = 0.02$). Table 3 shows the improvements in both symmetry of excursion and angle, as well as the improvements in repose, using both FACE-gram and Emotrics.

FAI improved in patients who underwent NT and FGMT procedures. At rest, FAI improved from 6.7 mm (SD 2.8) to 3.4 mm (SD 3.9) in NT patients ($P < 0.01$) and from 7.5 mm (SD 4.3) to 4.5 mm (SD 2.8) in FGMT patients ($P = 0.05$). During smile, the FAI improved from 9.1 mm (SD 3.3) to 3.9 mm (SD 2.9) ($P < 0.01$) in NT patients and from 16.6 mm (SD 7.9) to 4.5 mm (SD 4.2) ($P < 0.01$) for FGMT patients.

Patient-Reported QOL and Outcome Measures

Patients were administered both SAQ and FaCE scales pre- and postoperatively. The average follow-up period for survey collection for the NT group was 19.8 months (SD 10.3 months) and 13.8 months (SD 6.9 months) for the FGMT group. Of those patients who underwent photo analysis, 10 (71%) completed pre- and postoperative surveys in the NT group. The mean FaCE Scale score significantly improved to 46.2 from 32.9 ($P = 0.005$). The mean SAQ score increased to 29.8 from a preoperative score of 25.6 ($P = 0.36$); no statistically significant increase in involuntary movement was noted postoperatively.

Table 3. Excursion, Angle, and Symmetry Outcomes before and after Free Gracilis Muscle Transfer (FGMT) Procedures.

FGMT Measurements (n = 6)	Software	Condition Measured	Preoperative Mean	Preoperative SD	Postoperative Mean	Postoperative SD	*P* Value
Excursion (mm)	FACE-gram	Healthy side	3.8	4.2	3.2	3.0	.76
		Affected side	–2.6	2.1	3.2	4.3	**.01**
	Emotrics	Healthy side	6.1	4.9	4.0	5.1	.13
		Affected side	–1.4	3.9	2.1	3.7	**.02**
Angle (degrees)	FACE-gram	Healthy side	7.3	6.8	3.9	3.2	.27
		Affected side	0.6	8.2	3.6	6.3	.34
	Emotrics	Healthy side	6.4	5.4	4.1	5.4	.13
		Affected side	3.5	7.6	3.5	4.4	**.02**
Symmetry (Excursion, mm)	FACE-gram	Repose	6.1	3.7	2.2	5.5	**.01**
		Smile	12.4	4.9	2.8	4.2	**<.001**
	Emotrics	Repose	6.0	2.9	0.5	4.8	**<.001**
		Smile	13.7	4.8	1.8	3.9	**<.001**
Symmetry (Angle, degrees)	FACE-gram	Repose	9.4	8.6	5.4	2.8	.09
		Smile	15.2	9.5	5.3	6.8	**.03**
	Emotrics	Repose	8.9	3.7	5.8	3.3	**.01**
		Smile	11.2	4.7	6.2	4.1	.06

In the FGMT group (n = 4; two patients did not complete pre- and postoperative QOL surveys), the mean FaCE Scale score improved to 55.9 from 47.9 preoperatively, but this was not statistically significant ($P = 0.51$). The mean SAQ score increased to 28.3 from 26.7 preoperatively, but this was not statistically significant ($P = 0.78$).

Discussion

Facial paralysis results from a variety of conditions ranging from idiopathic paralysis to intra- or extra-cranial tumors, trauma, head and neck procedures, stroke, and congenital disorders. Given the complexity of these conditions, patients are often receiving care from multiple different subspecialists. Establishing relationships with these different groups of providers is one of the initial challenges of implementing a facial nerve center. Within Otolaryngology—Head and Neck Surgery, our colleagues in neurotology and head and neck oncology are most commonly caring for patients with facial paralysis. Outside of our specialty, Ophthalmology, Neurology, Neurosurgery, craniomaxillofacial surgery, and Rehabilitation Medicine are often involved. We began discussions with providers within our own department, who were more aware of the needs of facial paralysis patients and the surgical techniques available to them. During meetings and educational seminars, we discussed the treatments available, in addition to when and how to introduce them into practice, all while addressing queries and concerns. Equally important was establishing relationships with referring providers in order to facilitate timely care delivery and surgical intervention. There is a limited time period within which a NT is likely to be successful in re-innervating the face,[21] making prompt referral a key element to a successful facial nerve program and optimal patient outcomes. Over time, with a wider resultant referral base, our experience with NT procedures has grown from only 1 NT procedure in 2014 to 10 NT procedures in 2018. Our expectation is that this trend will continue as referring providers become more aware of the procedures offered at our institution.

In this study, we used FACE-gram and Emotrics to evaluate objective facial symmetry and smile outcomes. FACE-gram was developed as a tool to rapidly assess various facial measurements from standard patient photographs.[14] To this end, FACE-gram provided standardized instructions for manual collection of measurements using facial landmarks, including the eye, nose, and lips. Because FACE-gram is reliant on user input, there is inherent error and repeated measurements of the same image may result in different outcomes. For comparison, Emotrics is an automated tool that uses machine learning to generate facial landmarks and compute facial measurements. It is our experience that the software occasionally erroneously identified boundaries of the iris, face, and lips, which has been previously recognized as an issue. We recommend confirmation of the automatic landmarks by the researcher team. Both software products produced similar measurements, however, we plan on using Emotrics in future studies, as its user interface is easier to navigate.

Although our facial nerve center does not have the same depth or degree of longitudinal data collection as other well-established high-volume centers, our early results compare favorably. A previous case series that evaluated patients who underwent a nerve graft procedure at Johns Hopkins (including those who either underwent masseteric or hypoglossal NT) yielded 15 patients with FAI data; calculations using these data demonstrated a 3.2 mm average change in FAI at rest and 11.4 mm average change in FAI with smile.[2] Our study demonstrated an average FAI change of 2.9 mm at rest and 5.0 mm average change with smile. A larger case series from Massachusetts Eye and Ear Infirmary (MEEI), which included 60 patients who underwent masseteric NT procedures, demonstrated significant improvement in QOL scores, as evaluated by the FaCE Scale, with mean excursion during smile with maximal effort reported as 5.88 mm (SD 1.84).[21] In our study, we similarly demonstrated a significant improvement in QOL in NT patients, and found a mean excursion of 2.9 mm (SD 6.8). Our outcome measurements, however, are derived from photos taken while patients were asked to perform their most symmetric smile during photo documentation, as opposed to maximal effort. This may also explain the consistent postoperative loss of healthy side excursion and angle seen. It is possible that unrecognized factors related to malignancy and technical execution also affect final excursion. In future studies, separating the most symmetric smile from a smile with maximal movement of the commissure may be beneficial. A MEEI study evaluating the 10-year outcomes after FGMT demonstrated increases in excursion postoperatively an average of 7.8 mm from –0.86 mm, as measured by FACE-gram, as compared to an average of 3 mm from –2.7 mm in our patient population undergoing FGMT.[3] We also found significant postoperative improvements in symmetry during repose with respect to angle following FGMT. The size of our FGMT was similar to this previously published data. FGMT aims to transfer a muscle that is strong enough to elicit a meaningful smile, while being small enough to avoid distorting the face with excessive bulk. We did not examine volume added to the face in this study. Although we did not find a significant improvement in QOL in the FGMT group, our sample size limits analysis in this regard.

Our study included substantially more patients with head and neck carcinoma as an etiology for paralysis than other prior studies, as was shown in a recent meta-analysis in JAMA Facial Plastic Surgery, in which 81% of patients had facial paralysis as a result of CPA mass resection.[22] This suggests a knowledge gap regarding outcomes of NT procedures in head and neck cancer patients. In our cohort, patients with head and neck cancer (n = 6) demonstrated a mean change in the excursion on the affected side of 3.8 mm (SD 5.5) (P = 0.19), compared to 2.3 mm (SD 4.6) (P = 0.2) in patients with CPA pathology (n = 5). Larger case series are necessary to understand the differences in outcome measurements in patients with facial paralysis of differing etiologies. In head and cancer patients with loss of the proximal facial nerve trunk, a dual NT can be considered; a masseteric NT to a midfacial nerve branch for volitional smile and a hypoglossal NT to the main trunk or other available facial nerve branches to improve resting tone.[23] This was performed in 1 patient in this cohort with good affect and outcome.

We noted one failure in the NT cohort. This patient had parotid carcinoma and was diagnosed shortly after his surgery with metastatic renal cell carcinoma with both pulmonary and pancreatic involvement, requiring wedge resection and distal pancreatectomy with splenectomy. Extensive surgery is known to cause a pro-inflammatory response with significant immune dysfunction,[24] which may have played a role in his NT and cable graft failure. Unfortunately, 3 patients with head and neck cancer included in our cohort died secondary to disease progression after their initial surgery. Two of the 3 demonstrated reinnervation, while the other died prior to reinnervation. The potential QOL benefit, risks of the extended operative time, and additional morbidity of facial nerve procedures during head and neck cancer ablative surgery should be considered.

The heterogeneity in etiologies and procedures in this patient population is a major limitation. Lack of consistent follow up and patients lost to follow up further limit this study. Half of those patients lost to follow up in our study had head and neck carcinoma (3/6), while 2 had facial paralysis after a CPA mass resection and one following trigeminal decompression for neuralgia. Follow up for facial rehabilitation can be difficult in head and neck cancer patients who are subject to a high burden of treatments and surveillance. At our institution, the long distance often required of patients to travel for care further hinders consistent follow-up. Spontaneity in facial movement and smile was not studied in this cohort and may serve as an additional limitation.

Imperative to the success of a facial nerve center is standardized outcome measures[25] and implementation of comprehensive facial rehabilitation.[26] Efforts by the facial nerve community to collect clinical outcomes are necessary to help answer remaining questions on how best to manage patients with facial paralysis, including most favorable timing for NT, outcomes in head and neck cancer patients, and preferred NT and FGMT surgical techniques, including cable graft length at which adjunctive NT should be considered.

Conclusion

Building a center that treats facial paralysis requires collaborative effort between multiple specialties, including dissemination of knowledge pertaining to the options for management of facial nerve paralysis and appropriate timing of procedures. Consistent pre- and postoperative objective data collection allows for outcome assessment and analysis. In our initial experience, meaningful increases in smile excursion can be achieved with both NT and FGMT procedures in patients with facial paralysis, and facial-palsy specific QOL is improved in those who undergo NT procedures.

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Supplemental Material

Supplemental material for this article is available online.

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