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Case Report

Simultaneous Quadruple Nerve Transfer for Independent Zonal Facial Reanimation Following Traumatic Facial Paralysis

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Abstract

Introduction: Facial paralysis (FP) is a devastating condition causing functional, aesthetic and psychosocial impairments. Following acute traumatic injury to the main trunk of the facial nerve, complete flaccid FP can occur. Ocular protection and smile restoration are top priority goals of the reanimation process. In cases where the proximal facial nerve stump is unavailable or inaccessible, nerve transfer procedures should be considered for reinnervation.

Case Description: We report a case of a 22-year-old male suffered a gunshot wound to the left preauricular area that traversed the external auditory canal and mastoid, causing immediate complete left sided flaccid facial paralysis. Attempts were made to identify the proximal facial nerve stump, however, these attempts were unsuccessful secondary to missile damage and infection. Here, we present a case using four distinct donor nerves to perform four separate nerve transfers to independently reinnervate the upper, middle and lower face following traumatic transection of the intratemporal facial nerve.

Discussion: Acute traumatic FP with an inaccessible proximal facial nerve stump poses a reanimation challenge. Using 4 distinct donor nerves, independent zonal reinnervation was achieved. The described technique in this report provides a systematic method for management of acute traumatic FP with an inaccessible facial nerve stump in order to independently reanimate the upper, middle and lower face.

Keywords: Quadruple Nerve Transfer; Zonal Facial Reanimation; Traumatic Facial Paralysis

Introduction

Facial paralysis (FP) is a devastating condition causing functional, aesthetic and psychosocial impairments [1]. Complete flaccid FP typically follows acute traumatic injury to the main trunk of the facial nerve. This results in a loss of resting tone and movement diffusely, resulting in brow ptosis, lagophthalmos, ectropion, nasal obstruction, midface ptosis, oral incompetence and dysarthria [1]. Ocular protection and smile restoration are top priority goals of the reanimation process. Within the first two years following nerve insult, the facial muscles remain receptive to reinnervation. Following this period, the muscles undergo fibrosis and atrophy rendering them nonfunctional. It is therefore critical to proceed with reinnervation procedures prior to this period in order to achieve dynamic restoration using native musculature. Following known or suspected nerve transection, exploration with primary repair or interposition grafting should be attempted as soon as feasible. In cases where the proximal facial nerve stump is unavailable or inaccessible, nerve transfer procedures should be considered for reinnervation [1,2]. Here, we present a case using four distinct donor nerves to perform four separate nerve transfers to independently reinnervate the upper, middle and lower face following traumatic transection of the intratemporal facial nerve.

Case Report and Discussion

A 22-year-old male suffered a gunshot wound to the left preauricular area that traversed the external auditory canal and mastoid. He had immediate complete left sided flaccid facial paralysis. He

presented 3 weeks after the event with florid mastoiditis and was taken for mastoidectomy and debridement. Attempts were made to identify the proximal facial nerve stump, however, these attempts were unsuccessful secondary to missile damage and infection. He reported left-sided lagophthalmos with dry eye symptoms, nasal obstruction, cheek biting, dysarthria, oral incompetence and smiling inability. Pre-operative eFACE and FaCE scores [3,4] were 61 and 33, respectively.

Given the recent timing of the injury (~ 1 month) and inaccessible proximal facial nerve stump, a quadruple nerve transfer was planned to independently reinnervate the upper, middle, and lower facial zones. The following nerve transfers were performed: 1) End-to end crossfacial nerve graft from largest redundant right zygomatic oculi branch to distal left zygomatic oculi branch using a sural nerve graft, 2) End-to-end left nerve to masseter to distal left zygomatic branch supplying zygomaticus muscle complex, 3) End-to-side distal left marginal mandibular branch to left hypoglossal nerve, 4) End-to-end left descending hypoglossal nerve to distal left cervical branch. A depiction of the nerve procedures can be seen in Figure 1. Additionally, a single-strip fascia lata graft was placed along the left nasolabial crease using the minimally invasive technique described by Faris., *et al*. [5] as well as a right depressor labii inferioris resection as described by Lindsay., *et al* [6].

Figure 1: Schematic depiction and intraoperative photos of quadruple nerve transfer.

Figure 1A: 1) End-to end crossfacial nerve graft from largest redundant right zygomatic oculi branch to distal left zygomatic oculi branch using a sural nerve graft. 2) End-to-end left nerve to masseter to distal left zygomatic branch supplying zygomaticus muscle complex. 3) End-to-side distal left marginal mandibular branch to left hypoglossal nerve. Not pictured: End-to-end left descending hypoglossal nerve to distal left cervical branch

Figure 1B: 1) Left zygomatic branch of the facial nerve to orbicularis oculi. 2) Left zygomatic branch of the facial nerve to zygomatic muscle complex. 3) Left nerve to masseter. 4 and 5) Left marginal mandibular branch of the facial nerve. Not pictured: LEFT hypoglossal nerve, LEFT descending hypoglossi nerve, LEFT cervical branch of the facial nerve

The patient was last evaluated 12 months postoperatively. He has excellent tone across all facial zones. However, he did develop moderate oral-ocular synkinesis when he performs a volitional smile which has been responsive to onabotulinumtoxinA injections to the orbicularis oculi. Post-operative eFACE and FaCE scores were 87 and 52, respectively. Pre- and post- operative photos are included in Figure 2.

Figure 2: Preoperative and postoperative photos. A) Pre-operative photo at rest showing tone asymmetry. B) Pre-operative smile photo with complete left-sided facial paralysis. C) Post-operative photo at rest showing symmetric tone. D) Post-operative volitional smile photo demonstrating symmetric smile with oral-ocular synkinesis requiring onabotulinumtoxinA injections to left orbicularis oculi.

Conclusion

Acute traumatic FP with an inaccessible proximal facial nerve stump poses a reanimation challenge. Using 4 distinct donor nerves, independent zonal reinnervation was achieved. A redundant contralateral branch to the oculi musculature was used to restore ipsilateral periorbital tone. All ipsilateral masseteric axons were utilized to maximize oral excursion via the dominant zygomatic branch to the zygomatic musculature. Finally, 2 additional donor nerves were transferred to maintain symmetry of the lower face. The described technique provides a systematic method for management of acute traumatic FP with an inaccessible facial nerve stump.

Bibliography

1. Jowett N and TA Hadlock. "An Evidence-Based Approach to Facial Reanimation". *Facial Plastic Surgery Clinics of North America* 23.3 (2015): 313-334.

2. Bhama Prabhat K and Tessa A Hadlock. "Management of the Paralyzed Face". Facial Plastic and Reconstructive Surgery, 4th edition, Thieme (2016): 737-744.

3. Banks CA., *et al*. "Clinician-Graded Electronic Facial Paralysis Assessment: The eFACE". *Plastic and Reconstructive Surgery* 136.2 (2015): 223e-230e.

4. Kahn JB., *et al*. "Validation of a patient-graded instrument for facial nerve paralysis: the FaCE scale". *Laryngoscope* 111.3 (2001): 387-398.

5. Faris C., *et al*. "Minimal Nasolabial Incision Technique for Nasolabial Fold Modification in Patients with Facial Paralysis". *JAMA Facial Plastic Surgery* 20.2 (2018): 148-153.

6. Lindsay RW., *et al*. "A systematic algorithm for the management of lower lip asymmetry". *American Journal of Otolaryngology* 32.1 (2011): 1-7.