Available online at www.sciencedirect.com
ScienceDirect
British Journal of Oral and Maxillofacial Surgery xxx (2017) xxx–xxx
BRITISH Journal of Oral and Maxillofacial Surgery
www.bjoms.com

Use of the masseteric nerve to treat segmental midface paresis

Federico Biglioli [a], Mahmoud Soliman [b,*], Mohamed El-Shazly [c], Wael Saadeldeen [c], Essam A. Abda [d], Fabiana Allevi [a], Dimitri Rabbiosi [a], Filippo Tarabbia [e], Alessandro Lozza [f], Silvia Cupello [g], Antonino Privitera [g], Dell'Aversana Orabona G. [e], Califano L. [e]

[a] *Maxillo-Facial Surgery Department, San Paolo Hospital, University of Milan, Milan, Italy*
[b] *Plastic Surgery Department, Assiut University, Assiut, Egypt and Clinical Fellow at San Paolo Hospital, Milan University, Milan*
[c] *Plastic Surgery Department, Assiut University, Assiut, Egypt*
[d] *Rheumatology and Rehabilitation Department, Assiut University, Assiut, Egypt*
[e] *Division of Maxillofacial Surgery, Department of Neurosciences, Reproductive and Odontostomatological Sciences, University of Naples "Federico II", Naples, Italy*
[f] *Service of Neurophysiopathology – National Neurological Institute C. Mondino, Pavia, Italy*
[g] *Rehabilitation Medicine Department, San Paolo Hospital, University of Milan, Milan, Italy*

Accepted 31 July 2018

Abstract

Segmental midface paresis with or without synkinesis reflects incomplete recovery from Bell's palsy, operations on the cranial base or parotid, or trauma, in 25%–30% of cases. To correct the deficit, the masseteric nerve was used to deliver a powerful stimulus to the zygomatic muscle complex, with the addition of a cross-face sural nerve graft to ensure more spontaneous smiling. By doing this, the orbicularis oculi muscle continues to have an appropriate stimulus from the facial nerve, and the zygomatic muscle complex is separately innervated, which considerably reduces synkinesis between the two muscle compartments. For those patients with muscular contractures of the midface, the new healthy neural stimulus relaxes muscles at rest. From January 2011 to March 2017, 20 patients presented with segmental facial paresis of the midface and were operated on using this new technique. All patients were evaluated before and after operation using Clinician-Graded Electronic Facial Paralysis Assessment (eFACE), and they showed considerable postoperative improvements in static, dynamic, and synkinetic variables. Our proposed use of the masseteric nerve to treat segmental facial paresis produces favourable results, but our initial data require confirmation by further studies.

Keywords: Segmental facial paresis; synkinesis; masseteric nerve; sural nerve graft

* Corresponding author at: Plastic Surgery Department, Assiut University, Assiut, Egypt and Clinical Fellow in Maxillo-Facial Surgery Department, San Paolo Hospital, University of Milan, Via di Rudini, 8, 20142 Milan, Italy. Tel.: +39 3201636694; Fax: +2 01062888741.
E-mail addresses: Federico.biglioli@unimi.it (F. Biglioli), Mahmoudsoliman56@aun.edu.eg (M. Soliman), elshazly@aun.edu.eg (M. El-Shazly), waelsaadeldeen@gmail.com (W. Saadeldeen), essamabda@hotmail.com (E.A. Abda), fabiana.allevi@gmail.com (F. Allevi), dimitri.rabbiosi@tiscali.it (D. Rabbiosi), filippotarabbia@gmail.com (F. Tarabbia), alelozza@gmail.com (A. Lozza), silvia.cupello@ass-santipaolocarlo.it (S. Cupello), antonio.previtera@unimi.it (A. Privitera), giovani.dellaversanaorabona@unina.it (G. Dell'Aversana Orabona), califano@unina.it (L. Califano).

https://doi.org/10.1016/j.bjoms.2018.07.023
0266-4356/

Please cite this article in press as: Biglioli F, et al. Use of the masseteric nerve to treat segmental midface paresis. *Br J Oral Maxillofac Surg* (2017), https://doi.org/10.1016/j.bjoms.2018.07.023

Introduction

Segmental facial paresis may be caused by incomplete recovery from Bell's palsy, trauma at the cranial base, or operations on the cranial base or parotid gland. Varying degrees of synkinesis, mass movement, and muscular contracture are associated in 9.1%-100% of cases.[1] An element of synkinesis is often evident in healthy subjects – for example, closure of the eyelids during spontaneous smiling.[2] When the synkinesis is atypical, obvious, aesthetically disturbing, and develops only after onset of a deficit of the facial nerve, it is considered pathological. The most common manifestation is involuntary smiling when closing the eyelids.[3–5]

Treatment remains challenging. Although both surgical and non-surgical procedures have been used to treat patients with facial paresis and synkinesis, no consensus has yet been achieved about the optimal intervention.[3,4,6] Non-surgical methods, such as injection of botulinum toxin A, chemical neurectomy, and various forms of biofeedback, are preferred by most physicians because they are minimally invasive, but their effects are debatable.[7–9] The outcomes of surgical procedures are more stable but poorly predictable, and operation is obviously an aggressive treatment option.[3,4]

Here we present our initial results of the use of what is to our knowledge a new surgical technique for patients with segmental midface paresis (with or without synkinesis). The masseteric nerve is anastomosed end-to-end with the deficient midface branch of the facial nerve, which affords a powerful new neural stimulus, and a cross-face sural nerve graft is added end-to-side to ensure the spontaneity of the smile. The orbicularis oculi muscle continues to deliver an appropriate stimulus to the facial nerve, but the zygomatic muscle complex has new innervation. We sought to reduce synkinesis between the two muscular compartments. For patients with contracture of the midface, the new healthy masseteric neural stimulus relaxes the contracted muscles. The results are evaluated with the new Clinician-Graded Electronic Facial Paralysis Assessment (eFACE), which is widely accepted worldwide because of ease of use and reliability.[10]

Patients and methods

Surgical technique (Fig. 1)

Most patients who are affected by an obvious midface paresis are treated in two steps, the first operation being preparation for the second one by getting healthy axons of the facial nerve ready for neurorrhaphy on the damaged side. This is accomplished by a cross-face sural nerve graft about one year before the main operation. On the healthy side of the face we make a facelift-type incision, and raise a skin flap just anterior to the parotid gland to identify the branch of the facial nerve that is directed toward the zygomatic muscle complex. The branch is stimulated electronically to verify its involvement in smiling. At the same time, a portion of the sural nerve 20–25 cm long is harvested by a second surgical team. The harvested nerve is reversed and placed across the face to join the contralateral tragus, towards which the graft is inclined subcutaneously. The branch of the facial nerve on the healthy

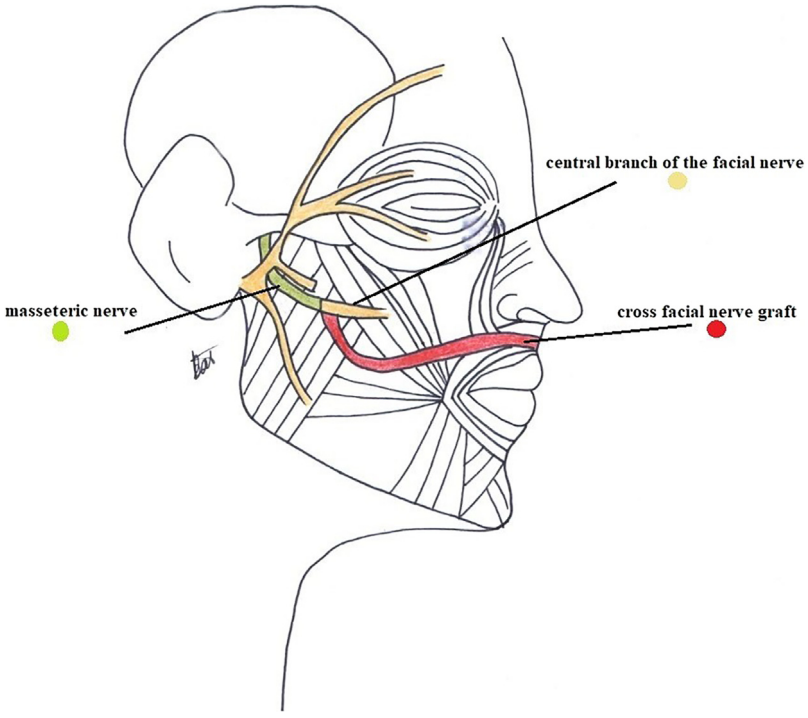

Fig. 1. Digram of the operation. Note the end-to-end neurorrhaphy between the masseteric nerve and a central branch of the facial nerve. An end-to-side neurorrhaphy is added distally to the first one, between the cross-face sural nerve graft and the selected branch of the central facial nerve.

Please cite this article in press as: Biglioli F, et al. Use of the masseteric nerve to treat segmental midface paresis. *Br J Oral Maxillofac Surg* (2017), https://doi.org/10.1016/j.bjoms.2018.07.023