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Immediate facial reanimation in oncological parotid surgery with neurorrhaphy of the masseteric-thoracodorsal-facial nerve branch

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Abstract

The extracranial facial nerve may be sacrificed together with the parotid gland during a radical parotidectomy, and immediate reconstruction of the facial nerve is essential to maintain at least part of its function. We report five patients who had had radical parotidectomy (two with postoperative radiotherapy) and immediate (n = 3) or recent (n = 2) reconstructions of the masseteric-thoracodorsal-facial nerve branch. The first mimetic musculature movements started 6.2 (range 4–8.5) months postoperatively. At 24 months postoperatively clinical evaluation (modified House-Brackmann classification) showed grade V (n = 3), grade IV (n = 1), and grade III (n = 1) repairs. This first clinical series of masseteric-thoracodorsal-facial nerve neurorrhaphies has given encouraging results, and the technique should be considered as an option for immediate or recent reconstruction of branches of the facial nerve, particularly when its trunk is not available for proximal neurorrhaphy.

Keywords: Facial reanimation; Facial nerve reconstruction; Facial nerve branching; Thoracodorsal nerve; Masseteric nerve

Introduction

The extracranial course of the facial nerve may be involved as a consequence of a neoformation that has arisen in the parotid region, in which case excision of the lesion will require resection of branches of the facial nerve.[1] Multiple operations for consecutive recurrences of a pleomorphic adenoma may also result in amputation of the facial nerve because it is impossible to trace and spare its branches. If the facial nerve is resected together with the tumour, immediate reconstruction is necessary to limit functional and aesthetic deficits,[2] and the best way is to substitute the facial nerve with a graft from one, the sacrifice of which carries a lower morbidity.[3–5]

Neither of the most commonly used nerves, the sural nerve and great auricular nerve, has enough collateral branches to reconstruct all the main terminal branches of the facial nerve that are present at the periphery of the parotid gland (normally 5-8). In contrast, the thoracodorsal nerve trunk readily matches with the extracranial facial nerve trunk and its distal branches resemble branches of the facial nerve, both numerically and in calibre.[5]

In some cases, it is not advisable to use the proximal stump of the facial nerve as a motor source because a frozen section

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Table 1
Characteristics of the patients.

Case No	Sex M/F	Age (years)	Aetiology	Operation	No of reconstructed branches
1	F	49	Sixth recurrence of pleomorphic adenoma	Radical parotidectomy + access ostectomy of mandibular ramus with subsequent replacement. Masseteric-thoracodorsal-facial nerves neurorrhaphy.	6
2	M	70	Previous radical parotidectomy + radiotherapy for parotid adenocarcinoma	Masseteric-thoracodorsal-facial nerve neurorrhaphy.	5
3	M	67	Squamous cell carcinoma	Radical parotidectomy + masseteric-thoracodorsal-facial nerves neurorrhaphy + postoperative radiotherapy.	5
4	M	46	Multiple schwannomas of the facial nerve	Radical parotidectomy + masseteric-thoracodorsal-facial nerves neurorrhaphy + cross-face nerve graft for orbicularis oculi.	6
5	F	42	Previous radical parotidectomy + radiotherapy for parotid adenocarcinoma	Masseteric-thoracodorsal-facial nerves neurorrhaphy + 2 cross-face nerve grafts for orbicularis oculi and great zygomatic muscle.	6

taken during the pathological examination might be invaded, and would subsequently require a boost of radiotherapy postoperatively. If reconstruction of branches of the facial nerve is secondary to excision and radiotherapy, axonal sprouting of the facial nerve may be reduced, and the process of finding its intraosseous course may damage the nerve and lower its potential for regeneration. In such cases it is advisable to consider another nerve as the motor source that will be connected to the thoracodorsal nerve graft.

Recently, the masseteric nerve has been used successfully for various facial reanimation procedures,[6,7] and here we have analysed its use as a motor source for immediate extracranial reconstruction of facial nerve branching by a masseteric-thoracodorsal-facial nerve branch neurorrhaphy.

Patients and methods

The research protocol was approved by the ethics committee of San Paolo University Hospital in accordance with the Helsinki Declaration.

Five patients (three men and two women, median (range) age 55 (49-70) years) had their facial nerve branches reconstructed using masseteric-thoracodorsal-facial nerve neurorrhaphies between September 2011 and February 2013. They were all operated on by the same surgeon (FB).

Aetiology

The causes were the sixth recurrence of a pleomorphic adenoma (n = 1), multiple extracranial facial nerve schwannomas (n = 1), extended carcinoma and pleomorphic adenoma (n = 1), and previous radical parotidectomy plus radiotherapy with no attempt to reconstruct the facial nerve at the time (n = 2). Of the last two patients, who were operated on elsewhere, one was reanimated 6 months after oncologial surgery and the other 8 months postoperatively.

Investigations

Facial nerve function was evaluated preoperatively according to the modified House-Brackmann classification.[8] Three cases were grade VI (complete paralysis) and the other two grade III (intermediate). Subsequent radical parotidectomy, together with removal of branches of the facial nerve, resulted in complete facial nerve paralysis immediately postoperatively in all cases (grade VI).

Electromyography was used preoperatively to test the presence of mimetic muscular fibrillations at rest, indicating "live" muscles to be reanimated. Fibrillation was evident in all cases. The masseter muscle was also tested electromyographically to confirm the availability of the masseteric nerve as the donor motor nerve. Nerve function was normal in all cases. There were six reinnervated distal branches of the facial nerve in three patients, and five in the other two (Table 1).

Surgical technique (Figs. 1 and 2)

A facelift-type incision, hidden by the tragus, is extended cranially into the temporal region and caudally into the neck with a submandibular extension. A skin flap is raised to gain access to the masseteric-parotid region. At this point, all branches of the facial nerve at the periphery of the parotid region are identified gently. Generally, they number between five and eight.