Neurotized Platysma Graft: A New Technique for Functional Reanimation of the Eye Sphincter in Longstanding Facial Paralysis

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Background: In 1984, Terzis reported on the potential use of a free platysma muscle transfer to reanimate the orbicularis oculi in longstanding paralysis of this unit. However, the vascularized platysma flap proved difficult to transfer, and this technique is not widely used today. In the present study, the authors have described the technique involving grafting of the platysma muscle to restore eyelid function and retrospectively discussed its clinical outcomes.

Methods: This retrospective analysis included patients with longstanding facial paralysis who underwent orbicularis oculi reconstruction with neurotized platysma grafts. The authors have described the surgical technique and its retrospective clinical outcomes.

Results: Between 1992 and 2015, 38 consecutive patients underwent this procedure; of them, 34 [16 men (47 percent) and 18 women (53 percent)] completed the follow-up. The time between the first and second surgical stages was a mean 8.6 months (range, 6 to 22 months). The surgical results were good in 18 patients (53 percent) and the recovery was satisfactory in 13 (38 percent).

Conclusions: This study confirmed the feasibility and effectiveness of grafted muscle functional recovery and the efficiency of neuromuscular neurotization. The presented surgical technique is safe and effective for treating longstanding facial palsy of the orbicularis oculi muscle. This is the only technique that is easy and reproducible, leads to facial nerve recovery, and places a similar muscle at the original site of the paralyzed muscle for functional recovery. (*Plast. Reconstr. Surg.* 144: 1061e, 2019.)

CLINICAL QUESTION/LEVEL OF EVIDENCE: Therapeutic, IV.

Inability to close the eye and loss of the blink reflex are two of the most important functional problems accompanying facial palsy. If left untreated, the continuously exposed cornea can develop keratitis, ulcers, or even blindness.[1] Denervated facial muscles that are not spontaneously or surgically reinnervated within 2 years develop irreversible atrophy. In cases of longstanding facial palsy, the lost motor unit must be replaced with new muscles, not simply reinnervated.[2] However, the most commonly used techniques, lid-loading procedures, are almost always associated with lateral tarsorrhaphies or the need for fascial slings to support the lower eyelid. Most palliative lid-loading procedures use gold weights; the use of Morel-Fatio springs and lid magnets is well-known but much less common.[3,4] Gillies and Millard[5] and Thompson[6,7] described more functional techniques: respectively, temporalis muscle transposition through extension of its fascia and free extensor digiti minimi muscle grafting over the healthy orbicularis oculi. In both techniques, the muscle belly is placed medially or laterally to the paralyzed pretarsal orbicularis oculi; on muscular contraction, the eyelids are pulled in one direction, resulting in a local deformity. The

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motor unit must be placed at the site of the original muscle to ensure that it performs a similar function.[5–7]

In 1984, Terzis and Bruno and others reported that a free platysma muscle transfer could be used to reanimate the orbicularis oculi.[8–10] However, the vascularized platysma flap proved difficult to transfer, and this technique is not widely used today. This technique was first performed in December of 1992 and has since been used to treat 34 patients with satisfactory to excellent follow-up results. In the present study, we retrospectively reviewed the clinical outcomes of this surgical technique.

PATIENTS AND METHODS

In 1992, a 22-year-old woman presented with partial paralysis of the left side of the face. An examination revealed complete paralysis of the left orbicularis oculi and frontalis muscles. Electromyography showed no electrical signs of muscle function; no fibrillation or positive waves were recorded. This study was approved by the institutional review board, and the subjects provided verbal informed consent. The surgical strategy we proposed involved a cross-facial nerve graft in the first stage, followed by a free platysma graft neurotized by the previously placed nerve graft 6 months later. The patient's postoperative course was uneventful, and the first clinical signs of contraction were noticed 6 months after the second procedure. One year later, she could completely close her left eye without force. The closure was synchronous with the healthy side, and contraction of the grafted platysma muscle was noticeable during forceful closure of the eyes.

The present study involved a retrospective analysis of patients who underwent eyelid reanimation by this technique between 1993 and 2015. Only patients with complete paralysis of the orbicularis oculi for greater than 2 years who had never undergone any type of treatment were considered. We analyzed the degree of eyelid closure at least 2 years after surgery. The classification is summarized in Table 1.

Two randomly chosen patients underwent electromyography 18 months after the muscle graft transfer to confirm the origin of the neuronal stimulus and the level of muscle graft contraction. Electrodes were placed on the patients' eyelids on the normal and paralyzed sides. To differentiate the sides, stimulation was applied bilaterally but separately over the trunk of the facial nerves and recorded at the reanimated eyelids.

Table 1. Evaluation of Closure Based on the Degree of Palpebral Closure/Aperture

Score	Degree of Closure
Excellent	Functional blink reflex
Good	Complete gentle closure without force
Satisfactory	<2 mm on gentle closure and forceful closure complete
Fair	>2 mm on gentle closure and forceful closure incomplete
Poor	No closure/no contraction

For the histopathologic analysis, biopsy specimens of the contralateral and grafted platysma muscle tissue were taken from a patient during the third surgical procedure 2 years after transplantation.

Surgical Technique

The surgical technique consisted of two stages that were performed at 6- to 8-month intervals. Because this time interval was not controlled, it was longer in some patients; however, this did not modify the result. In the first stage, the two sural nerves were used as cross-facial nerve grafts to bring nerve motor axons from the healthy side to the paralyzed eyelids. The donor branches were carefully selected from the normal contralateral facial nerve. Two incisions approximately 3 cm long were used to expose the nerve branches: one transverse at the lateral orbital region following the lower eyelid skin lines 1 cm above the zygomatic arch, and another longitudinal and slightly curved 2 cm lateral to the nasolabial fold (Fig. 1).

Using electrical stimulation, only the branches radiating to the orbicularis oculi were selected

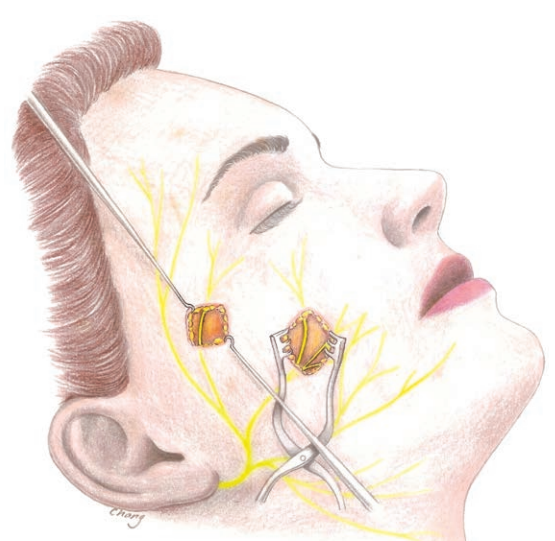

Fig. 1. Surgical technique of the first stage. Selection of donor zygomatic branches for the upper and lower eyelids.

through these incisions. However, it was sometimes difficult to individualize the branches through the nasolabial incision. In such cases, co-contraction of the nasalis muscle was allowed if the orbicularis muscle was also contracted. The sural grafts were then passed across the face to bridge the selected facial nerve branches and contralateral eyelids.

When midfacial reanimation was necessary, both sural nerves were used, with two longer grafts for the mouth and lower eyelid and a shorter one for the upper eyelid. No other nerve was needed. If the sural nerves were missing for any reason, the superficial fibular nerves or medial antebrachial nerves could also be used. One graft was passed superiorly at the level of the eyebrows, and the other was passed through the superior lip (Fig. 2). The grafts were coapted to the selected branches of the facial nerve and their distal stumps were placed underneath the eyelid skin and tied with a 4-0 mononylon (Ethilon; Ethicon, Inc., Somerville, N.J.) suture for easy identification.

A preauricular skin flap elevation would have better exposed all branches of the normal facial nerve and is routinely used by other surgeons. However, to avoid hematoma damage to the proximal nerve graft coaptation, we preferred to make small facial incisions to identify and select the branches to use. Moreover, better selection of the facial nerve branches is possible at more distal sites. The branches that innervate the zygomaticus muscles to reanimate free muscle transfers to the midface and those that radiate to the inferior eyelid portion of the orbicularis oculi muscle usually pass beneath the zygomaticus muscle. Indeed, gentle elevation of this muscle using a Senn-Muller retractor allows easy dissection and electrical stimulation of the branches that radiate to the zygomaticus, orbicularis oculi, and nasalis muscles. Using a preauricular incision, an extended dissection must be performed in the face. It is easier to find the branches to the superior portion of the orbicularis oculi through an incision placed at the lateral aspect of the orbit 2 cm above the zygomatic arch to preserve the temporal branch. In cases of recent paralysis or to innervate a muscle transplant in longstanding cases, we used preauricular incisions and flap elevation during the second stage of cross-facial nerve grafting to the zygomaticus and buccal areas. At the second stage, the nerves were already vascularized, which decreased the risk of nonintegration in cases of hematoma. The scar at the lateral aspect of the orbit was completely inconspicuous, and we selected branches that innervated the superior portion of the normal orbicularis oculi muscle. On the face, the incision was more visible, but we could identify the branches radiating to the zygomaticus muscles and the inferior portion of the orbicularis oculi. These branches had almost constant anatomical distribution, ensuring maximal electric stimulation success.

Fig. 2. First stage. Cross-facial sural nerve grafting and microsurgical coaptation using donor branches. Schematic view of the sural nerves to be passed under the skin. A typical shortest blepharoplasty incision at this stage accommodates the nerve stumps at the superior and inferior eyelids.

A progressive Tinel sign was almost always detected along the nerve grafts. In such cases, a 6- to 9-month interval was necessary to allow the axons to reach the paralyzed eyelids. Thereafter, a second surgical procedure was performed. A strip of the healthy side of the platysma was excised and cleaned of any remaining fat and fascia. The harvested muscle strip was outlined on the skin of the neck 2 cm below the projection of the mandibular border, whereas the posterior longitudinal margin of the resection was demarcated in a vertical line descending from the angle of the mandible. Harvest size depended on palpebral fissure size but was almost always approximately 3 × 5 cm. A transverse skin incision was made in the natural crease of the neck.

The eyelids were prepared to receive the muscle graft using two separate incisions placed as in blepharoplasty. The nerve grafts were identified and isolated, the distal neuromas were sectioned out, and the muscle graft was matched to the normal orbicularis muscle belly.

The muscle graft was affixed to the tarsal plates and the surrounding tissues using separate nylon or polypropylene 6-0 sutures. No tension was used to fix the muscle belly. In the medial canthus, the muscles were not set to overlie each other; rather, they ended separately in the upper and inferior eyelids. In the external canthus, the superior and inferior strips were trimmed obliquely and sutured together to form a continuous circular-like muscle similar to the normal orbicularis oculi. The nerve stumps were cleared and the existing fascicles deepened, buried inside the muscle graft, and fixed using one or two 10-0 nylon stitches (Fig. 3).

The muscle was placed over the tarsal plates, mostly in the inferior eyelid, to avoid their eversion on muscle contraction. [**See Figures, Supplemental Digital Content 1**, which shows the surgical steps of the neurotized platysma graft technique, including operative images and schematic designs, preoperative and postoperative clinical results, and postoperative electroneuromyographic results, ***http://links.lww.com/PRS/D830*. See Video 1 (online)**, which demonstrates selecting the superior part of the orbicularis oculi with electric stimulation.]

The skin was then closed using running sutures to end the operation. The postoperative course was similar to that of blepharoplasty. After discharge, the patients were seen at 60-day intervals and no special physiotherapy was undertaken. The first signs of muscular contraction were noted within 4 to 6 months and improved until 1 to 2 years after the second operation.

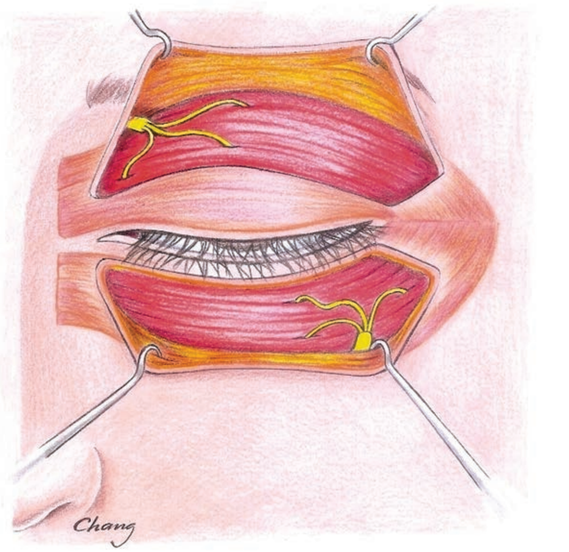

Fig. 3. Second stage. The previously grafted cross-facial sural nerve fascicles are deepened and buried inside the platysma muscle graft. They are then fixed inside the muscle belly using 10-0 mononylon stitches.

RESULTS

Between 1992 and 2015, 38 consecutive patients underwent this procedure; of them, 34 [16 men (47 percent) and 18 women (53 percent)] completed the follow-up. The mean patient age was 36 years (range, 13 to 63 years). The causes of facial palsy were trauma in 11 patients (32.35 percent), cancer in eight (23.53 percent), idiopathic in seven (20.59 percent), congenital in six (17.65 percent), infection in one (2.94 percent), and benign tumor in one (2.94 percent). Excluding patients with congenital absence of orbicularis oculi contraction, the mean period between facial paralysis onset and the first stage of the procedure was 8 years (range, 2 to 38 years). The mean time between the first and the second surgical stages was 8.6 months (range, 6 to 22 months). After evaluation and grading (Table 1), only 10 patients (30 percent) underwent simple canthopexies to adjust the external canthus, and only one (3 percent) with a fair result underwent supportive surgery with cartilage.

The blink reflex was present in all patients. However, the fast blink reflex, in which the eyelids meet even during involuntary blinking, was complete in only one young patient (14 years old). Otherwise, 18 patients (53 percent) showed good results; 13 (38 percent) showed satisfactory recovery. Fair results were obtained in two patients (5.9 percent): one had a poor graft bed, and the other showed postoperative hematoma after the second procedure. Patient data are summarized in Table 2.

The only complication was malposition of the platysma graft in the inferior eyelid. Eversion occurred every time the muscle contracted because the muscle was placed below the tarsal plate; nonetheless, the result was graded as good.

Two examples are illustrated in Figures 4 and 5, and the histopathology of the muscle biopsy is described in Figure 6. [**See Video 2 (online)**, which shows recent postoperative views of the first patient operated on by this technique 25 years ago.]

Histopathology

Histopathologic results are shown in Figure 6.

Electroneuromyography

Electroneuromyography performed 18 months after surgery in two randomized cases showed muscular contraction in the grafted platysma and the origin of its innervation. Electrodes were placed on the patients' eyelids on the normal and paralyzed sides. When stimulation was applied over the trunk of the facial nerves on the

Table 2. Chronologic Data of 34 Patients with at Least 2 Years of Follow-Up*

Patient	Age (yr)	Sex	Side	Cause	First Surgery (mo/yr)	DT (yr)	TBS (mo)	Before FCD	After FCD	Secondary Procedures	Result of Platysma	Observation
1	22	F	L	Developmental	12/1992	22	8	4	0		Satisfactory	Seen last year
2	20	M	R	Trauma, 1991	4/1994	3	7	NA	0	Neck scar revision	Satisfactory	
3	28	F	L	Trauma, 1991	4/1994	3	10	8	0		Good	
4	58	M	R	Cancer, 1992	5/1994	2	6	NA	0		Satisfactory	
5	14	M	L	Developmental	9/1994	14	7	5	0		Excellent	Functional blink reflex
6	23	F	L	Tumor, 1991	9/1994	3	7	NA	0		Good	
7	49	F	R	Cancer, 1990	4/1995	5	7	NA	0	Canthopexy	Satisfactory	
8	38	F	L	Idiopathic, 1992	6/1995	3	6	8	0		Good	
9	26	M	L	Trauma, 1992	7/1995	3	11	NA	0		Good	
10	48	F	R	Idiopathic, 1981	1/1996	15	9	12	0		Satisfactory	
11	25	F	R	developmental	3/1996	25	7	10	0		Good	
12	26	M	L	Trauma, 1993	6/1996	3	8	7	0	Canthopexy	Good	Seen last year
13	29	M	L	Idiopathic, 1990	10/1996	6	6	NA	0		Good	
14	52	F	R	Cancer, 1958	11/1996	38	11	NA	0	Canthopexy	Satisfactory	
15	28	F	R	Infection, 1979	2/1997	18	22	6	0		Satisfactory	
16	62	F	R	Cancer, 1983	4/1997	14	11	8	0	Canthopexy	Satisfactory	
17	25	M	L	Idiopathic, 1995	11/1997	2	11	10	0		Good	
18	49	M	L	Idiopathic, 1966	4/1998	32	7	12	0		Satisfactory	Previous static surgery
19	36	F	L	Idiopathic, 1982	5/1998	16	8	14	0	Canthopexy	Good	
20	44	F	L	Idiopathic, 1983	5/1999	16	9	11	0	Canthopexy	Good	
21	39	M	L	Idiopathic, 1995	8/1999	4	9	12	0	Canthopexy	Good	Seen last year
22	41	F	R	Trauma, 1996	5/2000	4	6	4	3	Canthopexy	Fair	Eyelid scar tissue
23	23	M	R	Trauma, 1996	7/2000	4	9	10	0		Good	
24	48	F	L	Cancer, 1998	5/2001	3	7	NA	0		Satisfactory	
25	24	M	L	Trauma, 1995	3/2002	7	7	6	0		Good	
26	52	F	L	Trauma, 1998	2/2004	6	8	8	4	Cartilage support	Fair	Hematoma
27	24	M	R	Trauma, 1997	5/2006	9	11	NA	0		Good	
28	29	M	L	Congenital/Moebius	10/2007	29	10	5	0		Good	Scarce platysma
29	13	M	R	Developmental	6/2008	13	6	12	0	Canthopexy	Satisfactory	
30	28	F	R	Developmental	2/2009	28	7	8	0		Good	
31	58	M	L	Trauma, 2006	7/2009	3	14	10	0		Satisfactory	
32	63	F	L	Cancer, 2006	11/2009	3	6	12	0	Canthopexy	Satisfactory	
33	42	F	L	Cancer, 2008	10/2010	2	7	6	0		Good	
34	46	M	R	Cancer, 2010	5/2012	2	7	8	0		Good	

DT, denervation time; TBS, time between stages; Before FCD, preoperative forceful closure distance between the eyelids (in millimeters) (retrospective calibrated measurements on preoperative photographs during forceful closure of the eyelids; After FCD, postoperative forceful closure distance between the eyelids (in millimeters) (postoperative clinical evaluation and/or postoperative photographs during forceful closure); NA, not available.

*The distance between the lid margins of the eyelids in forceful closure, before and after neurotization and platysma graft operations, are compared.

Fig 4. Patient 17 in Table 2. (*Above*) Preoperative status, just before the second stage, 3 years after the development of idiopathic paralysis of the left facial nerve in a man who undertook deep diving professionally. (*Below*) Five years after a neurotized platysma graft was implanted into his left eyelid and a pectoralis minor functional muscle flap was placed to reanimate his mouth.

Fig. 5. Patient 21 in Table 2. (*Above*) A 39-year-old man with idiopathic paralysis of the left facial nerve. (*Below*) Two years after the neurotization of a platysma graft onto his left eyelid. (*Below*, *left*) Better positioning of the eyelids and good contraction of the grafted platysma on forceful closure of the eyelid (*below*, *right*).

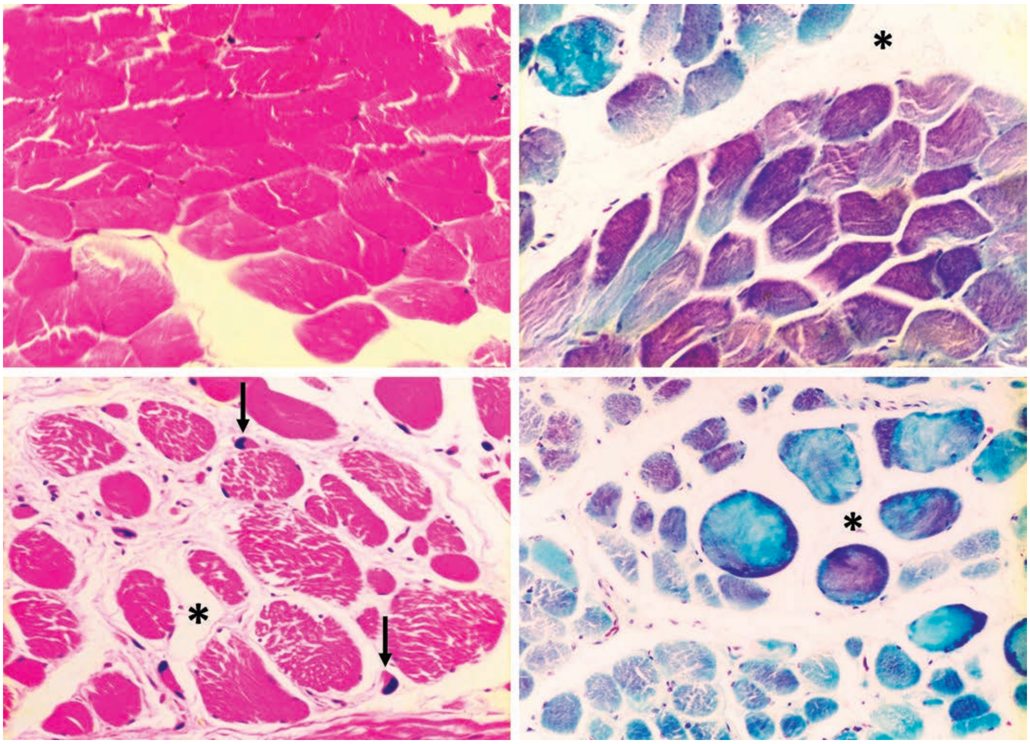

Fig. 6. Histology of the human platysma muscle. (*Above*, *left*) Control muscle fibers of normal human platysma under hematoxylin and eosin staining. (*Above*, *right*) Gomori trichrome staining of normal platysma muscle tissue showing bundles of muscle cells separated by loose connective tissue (*asterisk*). (*Below*, *left*) Hematoxylin and eosin staining of platysma muscle of the same patient after grafting. Staining shows loss of some muscle fibers inside the bundle (*asterisk*) and some regenerating fibers (*arrow*). The same modification seen after trichrome staining (*below*, *right*) (original magnification, × 200). Images *below* are stained platysma samples obtained from the orbicularis area 2 years after grafting and neurotization. The grafted platysma showed muscle bundles containing heterogeneous-diameter fibers with signs of muscle atrophy and regeneration (*below*) compared with normal platysma (*above*). However, fibrosis was not seen between the fibers or bundles (*below*).

nonparalyzed side, the eyelids on both sides contracted (Fig. 7). No muscular response occurred on either side when stimulation was applied to the paralyzed side. The results of both cases showed that the reanimated eyelids were innervated by the contralateral facial nerve.

The study of single motor unit action potentials in the face using coaxial electrodes always showed short duration and low amplitude. However, motor unit action potentials are polyphasic, small, and of short duration. For this reason, it is difficult to differentiate between the facial muscles and identify or compare motor unit action potential tracings because they are very similar. Some motor unit action potentials may have durations similar to those of fibrillation, making them difficult to differentiate. Quantifying these single motor unit action potentials is difficult because quantitative electromyography is limited. Most importantly, here we stimulated the contralateral trunk of the facial nerve and detected reliable responses in the grafted platysma, a phenomenon that did not occur on stimulation of the injured side.

DISCUSSION

Clinical observations revealed that grafted muscle fibers can contract again after a certain period, particularly when a thin layer of muscle is grafted to a highly vascularized bed. For example, defatted mammary-areola complex grafted to a new site in significant breast reductions sometimes contracts after a certain period, perhaps because the remaining muscular fibers are later neurotized. In 1971, Thompson described grafting the extensor digiti minimi muscle onto the healthy orbicularis oculi to reanimate the contralateral paralyzed eyelid.[6] The grafted muscle was revascularized and reinnervated by the receptor bed and recovered some of its contractile function.

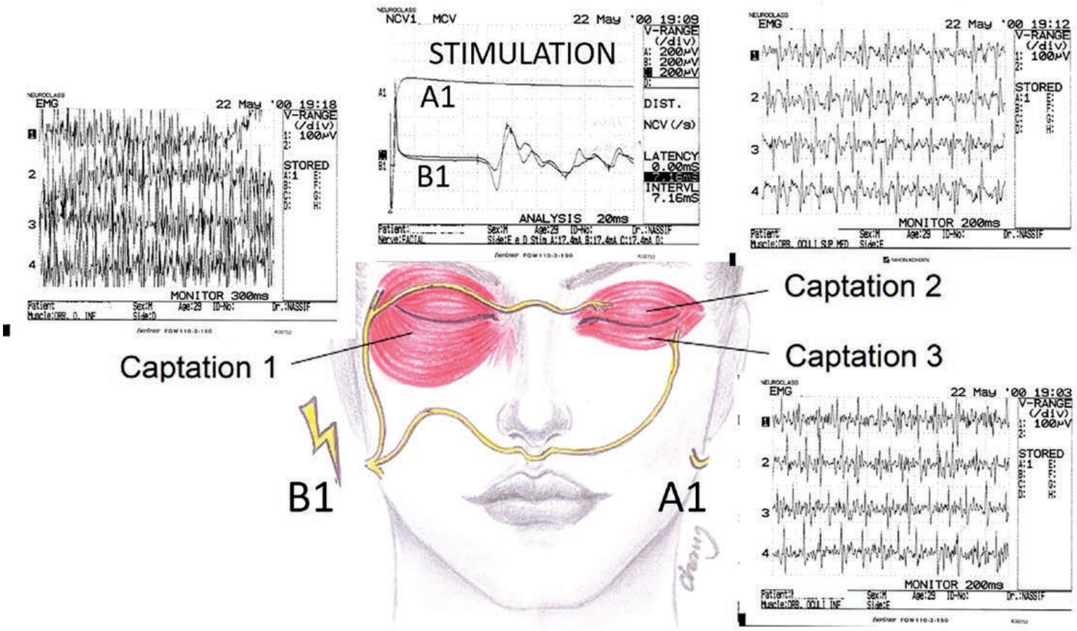

Fig. 7. Postoperative electroneuromyography. Stimulation applied to the facial nerve trunk on the nonparalyzed side with muscle contraction of the lower orbicularis oculi muscle on the same side (captation 1) and contraction of the cross-facial innervated platysma muscle graft on the upper (captation 2) and lower (captation 3) lids of the paralyzed side. Stimulation applied to the facial nerve trunk of the paralyzed side resulted in no coaptation in either eyelid receptor.

The muscle ischemic degeneration and regeneration process has been well described. Zielonko began researching the effect in 1874,[11] followed by Volkmann in 1893[12] and Studitsky and Studitsky and Bosova in 1959 and 1960,[13,14] respectively. In 1961, Mauro described the satellite cell,[15] the precursor cell to newly formed skeletal muscle. Skeletal muscle has an extraordinary capacity for regeneration and adaptation to internal or external changes in its environment.[16] Autografting is the most commonly used procedure to study muscle regeneration, which is comparable structurally and functionally to embryonic muscle development.[16,17] After grafting, the muscle must reintegrate with the host to regenerate and become functional. In this regard, revascularization, reinnervation, and tendon connections are the most important processes,[18] whereas proliferation of myogenic precursor and satellite cells and their differentiation into myoblasts are the most crucial cellular events.[19] Finally, the establishment of neuromuscular synapses is critical to the functional differentiation of a regenerating muscle.[18] In muscle bellies up to 6 g, nearly complete regeneration is common.[19–21] Guelinckx et al. found that most functional deficits are attributable to tenotomy rather than ischemia or denervation.[22]

According to Terzis, the ideal replacement muscle should: (1) be transferable, (2) have adequate tension and excursion, (3) have adequate innervation density, and (4) have the capacity to be arranged into a sphincter configuration.[23] Guelinckx showed that muscle transplantation preserved 70 percent of the maximum isometric tension and conferred a higher resistance to fatigue than muscle transposition,[24] perhaps because the replaced muscle was of the right origin and insertion. The platysma, like the orbicularis oculi, is a facial muscle of expression. It has the same origin—the second branchial arch—and is innervated by branches of the facial nerve. It is capable of automatic, involuntary, voluntary, and reflexive actions.[23] The orbicularis oculi muscle weighs 3.2 g and need not be replaced by more than 6 g of muscle. The platysma is a thin muscle as well, just marginally thicker than the orbicularis oculi, and has adequate fiber length. The range of excursion of the orbicularis oculi is greater than that of the platysma, but the difference is small. Likewise, the density of innervation is lower in the platysma, but the two are otherwise very similar.[23] The eyelids are highly vascularized and therefore suitable as a graft recipient bed. Thus, the platysma could be an ideal muscle graft for eyelid reanimation.

Reinnervation of a denervated muscle by simple implantation of the transected end of a motor nerve into a muscle fiber has been demonstrated in several studies, although this technique is not as successful as neural coaptation.[25–28] Nonetheless, Swanson demonstrated that direct nerve repair has fewer advantages over muscle neurotization as denervation increases.[27] In the present study, the platysma free graft was innervated immediately after transplantation by motor nerve axons that had been provided earlier. Muscle regeneration after ischemia was more intense on reinnervation stimulation.[18]

On histopathologic analysis, the grafted and neurotized platysma muscle showed more severe atrophy than the intact platysma. However, neither fat replacement nor fibrosis was visible. Regenerating muscle fibers were evident, indicating morphologic and functional muscle recovery, and electroneuromyography confirmed functional activity of the grafted platysma muscle under the control of the normal contralateral facial nerve.

Of the two cases scaled as fair, one was caused by a poor graft bed and the other by a hematoma on the lower eyelid in the second stage. A third case caused by inappropriate positioning of the muscle graft constituted a complication, although it was scored as a good result. Avoiding surgically induced fibrosis would likely improve the neural and muscular conditions of local grafting, and positioning the muscle graft over, rather than below, the inferior tarsal plate would prevent ectropion of the lower eyelid during contraction.

The limitations of this technique are related to the following: (1) patient age, (2) any other contraindication to the use of contralateral platysma, and/or (3) unavailability of the nerves to be used in the cross-facial nerve grafting procedure. The oldest patient in our series was aged 63 years during the first stage of the technique. The general health status and expectations of patients older than 65 years should be well evaluated to justify two surgical procedures with unpredictable results. Indeed, in our small series of patients, the best results seemed to occur in patients aged younger than 50 years.

The advantage of this technique is that it is easier than other operations. Indeed, because the method avoids microvascular anastomoses and the need for neurovascular isolation during dissection of the platysma and posterior coaptation of the nerve, it is safer and more reliable.[29,30] The disadvantage of this technique is that it leaves a scar on the face during the first stage, although this can be prevented with the use of a preauricular incision and elevating the cutaneous flap, as in a face lift, to allow identification of the facial branches of interest. Nonetheless, we prefer to dissect the branches of the facial nerve as distally as possible to ensure that more independent motor units innervate the orbicularis oculi muscle alone.

CONCLUSIONS

The present study confirmed the feasibility and effectiveness of grafted muscle functional recovery and the efficiency of neuromuscular neurotization. The presented surgical technique is safe and effective for treating longstanding facial palsy of the orbicularis oculi muscle. It is the only technique that is easy and reproducible, recovers facial nerve control, and places a similar muscle into the original site of the paralyzed muscle to perform the same function.

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PATIENT CONSENT

Patients provided written consent for the use of their images.

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