Selective Marginal Mandibular Neurectomy for Treatment of the Marginal Mandibular Lip Deformity in Patients with Chronic Unilateral Facial Palsies

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Background: For unilateral facial palsies, reanimation techniques such as cross-facial nerve grafting with free muscle transfer have been very successful at improving symmetrical lip elevation when smiling. However, these procedures do not address the residual asymmetry with respect to lip depression resulting from an uncorrected marginal mandibular nerve palsy. Techniques that do address this residual lip asymmetry have had variable results. Selective neurectomy of the unaffected marginal mandibular nerve has largely been abandoned as a treatment since it has been reported to result in severe oral functional and cosmetic deficiencies. The authors argue that selective marginal mandibular neurectomy is a reliable technique for treatment of the marginal mandibular lip deformity that does not compromise oral functionality.

Methods: Thirteen patients with unilateral facial palsies underwent selective marginal mandibular neurectomy of the unaffected side; the procedure was performed by the principal investigator. These patients were then evaluated on the basis of symmetry with smiling and oral functionality. Twelve of the patients were contacted and questioned with a standardized questionnaire. Twelve of the patients were evaluated independently for symmetry with smiling using randomized preoperative and postoperative photographs.

Results: Eleven of the 12 patients reported either improvement or no change in oral competence. Ten of the 12 patients reported either improvement or great improvement in symmetry with smiling. Improvement in symmetry with smiling was independently observed 77.2 percent of the time.

Conclusion: These results support selective marginal mandibular neurectomy of the unaffected side in patients with unilateral facial palsies as a means of improving symmetry with smiling without compromising functionality. (*Plast. Reconstr. Surg.* 116: 1223, 2005.)

Unilateral facial palsies can be either focal or complete. While focal unilateral facial palsies affect an isolated facial region within a facial side, complete unilateral facial palsies affect an entire side of the face. Facial palsies, in general, can be attributed to either idiopathic or identifiable etiologies, such as trauma, tumors, viral infections, and iatrogenic causes. Regardless of etiology, the goal of all surgical correc-

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tions for facial palsies is to re-establish complete facial movement that automatically exhibits the complete spectrum of human expression. The reality, however, is that surgical correction of facial palsies cannot completely restore the capability of spontaneous emotional facial expression. Facial movement is always weaker than that on the normal side. Furthermore, it is usually gross and not refined or regionalized. Lastly, it is often associated with synkinetic and dyskinetic muscle activity.[1,2]

The formulation of a treatment strategy for unilateral facial palsies must recognize these limitations, as unrealistic expectations will undoubtedly lead to patient dissatisfaction. With this understanding, a treatment strategy should consider several essential factors, including the patient's concerns, an accurate assessment of the facial nerve and facial muscle viability, and a realistic determination of what can be reconstructed, focusing on clearly defined, muscle-specific objectives. These objectives generally include corneal protection, oral continence, and reconstructing a symmetrical smile.[1,2]

Several strategies for reconstructing a symmetrical smile have been described for unilateral facial palsies. For unilateral facial palsies resulting from acute traumatic injury to the facial nerve or its branches, surgical techniques such as primary nerve repair and cross-facial nerve grafting provide the best hope for restoration of static and, at times, dynamic symmetry with smiling. For chronic unilateral facial palsies, however, the algorithm is less clear. After 12 to 18 months of disuse, degeneration of neuromuscular junctions renders nerve repairs, nerve transfers, and nerve grafts ineffective. Static reconstructive techniques, such as fascia lata slings, are very effective at restoring oral sphincter tone and facial symmetry at rest. However, the static nature of the reconstruction makes them an inappropriate choice for recreating dynamic symmetry with smiling.[1–9]

Cross-facial nerve grafting with free muscle transfer was first used successfully by Freilinger in 1975 as a means of improving dynamic symmetry with smiling in patients with chronic complete unilateral facial palsies.[1,10] The procedure was originally described as a two-stage reconstruction. The first stage entails anastomosing a nerve graft to a buccal branch of the facial nerve on the unaffected side and banking the distal end of the graft on the affected side. This is to be followed 9 to 12 months later by a free muscle transfer anastomosed to the now-regenerated nerve graft to the affected side. The free muscle flap, which is now innervated by a buccal branch of the contralateral facial nerve, extends from the zygomatic region of the affected side to the ipsilateral modiolus. Stimulation of the buccal branch of the unaffected facial nerve (with smiling, for example) causes the free muscle flap to contract, resulting in lip elevation on the affected side. Various muscle flaps have since been described, and recent innovations have combined the technique into one stage, eliminating the need for a first-stage cross-facial nerve graft.[1–4,7–12]

Regardless of which method is used, free muscle transfers have proven to be very successful at restoring symmetrical lip elevation with smiling in patients with chronic complete unilateral facial nerve palsies. What is not improved by these procedures, however, is the residual palsy with respect to lip depression. As these free muscle transfer techniques do not address the lip depressor aspect of smiling, they generally leave the patient with a residual postoperative asymmetry with respect to lip depression (Fig. 1). This residual lip depressor asymmetry is known as the marginal mandibular lip deformity.[13–15]

FIG. 1. Patient with a chronic complete left-sided facial palsy who underwent two-stage cross-facial nerve grafting with free gracilis transfer. Postoperatively (*right*), there is significant improvement with lip elevation (*gray arrows*) as compared with preoperatively (*left*). However, the uncorrected lip depressor imbalance results in a lip asymmetry known as the marginal mandibular lip deformity (*black arrows*). Reprinted from Ueda, K., Harii, K., Asato, H., et al. Neurovascular free muscle transfer combined with cross-face nerve grafting for the treatment of facial paralysis in children. *Plast. Reconstr. Surg.* 101: 1765, 1998.

The marginal mandibular lip deformity is not limited to patients with chronic complete unilateral facial palsies who have undergone cross-facial nerve grafting with free muscle transfers. In its purest form, the marginal mandibular lip deformity is also seen in patients with chronic focal unilateral facial palsies that are isolated to the marginal mandibular nerve itself or the lip depressors that it innervates. Techniques in use today that address the marginal mandibular lip deformity, regardless of etiology, often require extensive surgery, may leave unsightly scars, and have had variable and often temporary results. Among these techniques are static procedures such as wedge resection of the affected lip, reanimation procedures such as digastric muscle and free muscle transfers to the affected side, and deanimation procedures such as botulinum toxin injection and myectomy of the intact lip depressors.[1,13,15–17]

Selective marginal mandibular neurectomy of the affected side is another deanimation technique that attempts to restore symmetry of lip depression with smiling by weakening the normal, unaffected side.[2,3,14,15] It is not in widespread use today, however, because of a lack of predictable and lasting results, as well as concern for functional and cosmetic consequences.[13,16,18]

In 1976, Clodius[19] reported permanent cosmetic improvement in five patients who underwent selective marginal mandibular neurectomy for correction of the marginal mandibular lip deformity. There was no assessment of functional outcome, however. In 1982, Conley and colleagues discouraged the use of marginal mandibular neurectomy, claiming it caused significant functional and aesthetic deficiencies.[13,16] In 2002, Ferreira[18] recommended avoiding the procedure for most patients, arguing that total paralysis of the lower lip can change the smile into an awkward one. Our review has not shown this to be the case. We argue that marginal mandibular neurectomy of the unaffected side in patients with facial palsies is a reliable technique for treatment of the marginal mandibular lip deformity without compromising oral functionality.

PATIENTS AND METHODS

Study Design

A retrospective review was performed of 13 patients with unilateral facial palsies who underwent selective marginal mandibular neurectomy performed by the senior author between 1996 and 2002. Patients were interviewed via telephone questionnaire to evaluate oral functionality, symmetry, and patient satisfaction. Oral functionality was evaluated from the patients' own assessments of preoperative versus postoperative speaking, eating, and maintenance of secretions, utilizing a standardized questionnaire. Patient satisfaction was assessed by the patients' own opinions as to their satisfaction with the overall cosmetic and functional results.

Symmetry with smiling was assessed from the patients' own impressions of the preoperative state versus postoperative results. Symmetry with smiling was further assessed by an independent review of randomized preoperative and postoperative patient photographs of 12 of the patients, analyzed by 12 medical staff secretaries with no medical background or prior knowledge of the patients or the procedures. Preoperative and postoperative photographs for each patient were randomized and placed side by side and shown to the evaluators. The evaluators had no knowledge of what procedures, if any, were performed. For each patient, each evaluator looked at the pair of patient photographs and decided which photograph, if any, showed a more symmetrical smile. The results for all 12 evaluators were then averaged.

Thirteen patients were identified who satisfied the above criteria. There were nine female and four male patients. Patient ages ranged from 5 to 59 years, with a mean age of 29.1 years. Three patients had chronic focal unilateral marginal mandibular lip deformities, with 10 having chronic complete unilateral facial palsies. The three patients with chronic focal unilateral marginal mandibular palsy with lip deformities underwent neurectomy alone, while those with complete unilateral palsies underwent a two-stage cross-facial nerve graft with free serratus anterior muscle transfer, with selective marginal mandibular neurectomy performed during the first stage. Twelve patients had preoperative and postoperative photographs available for evaluation, and 12 patients were contacted for the telephone questionnaire. Mean time to follow-up was 24.4 months for the photographs and 32.5 months for the questionnaire.

Surgical Technique

The selective marginal mandibular neurectomy is performed through an extended preau-

ricular incision either as a one-stage procedure for chronic focal unilateral marginal mandibular lip deformities or during the first stage of a two-stage cross-facial nerve graft with free muscle transfer for chronic complete unilateral facial palsies. The technique involves microdissection, identification, and resection of only those branches responsible for the deformity. The intact lip depressors responsible for the deformity are marked preoperatively with the patient smiling. The nerve branches that innervate these muscles are then identified intraoperatively by selective stimulation with a nerve stimulator. These nerve branches are then resected in 2-cm segments (Fig. 2). In the cases that involve a two-stage facial reanimation procedure, a sural nerve cross-facial nerve graft with microscopic anastomosis to the buccal branches is also performed.

RESULTS

From the questionnaire, with respect to symmetry with smiling, nine of the 12 patients contacted reported improved symmetry, with one reporting great improvement.

FIG. 2. Selective marginal mandibular neurectomy involves microdissection, identification, and resection of only those branches responsible for the deformity. The intact lip depressors responsible for the deformity are marked preoperatively with the patient smiling. The nerve branches that innervate these muscles are then identified intraoperatively by selective stimulation with a nerve stimulator. These nerve branches are then resected in 2-cm segments (*inset*).

With respect to eating, all 12 of the patients responding claimed no change in eating, while 11 of the 12 patients reported no change in speaking or the ability to maintain secretions (Table I). For patient satisfaction, eight of the 12 patients reported being satisfied, while three of the 12 patients claimed to be very satisfied. One patient questioned consistently reported cosmetic as well as functional deficits. This patient developed a postoperative reaction to Dextran after the stage 2 free muscle transfer that resulted in a hematoma on the affected side. The resulting deficits, therefore, were a direct result of these complications on the affected side and were unrelated to the first-stage selective marginal mandibular neurectomy on the unaffected side.

From the independent evaluation of symmetry with smiling, the postoperative photographs showed improved symmetry 77.2 percent of the time, while the preoperative photographs showed improved symmetry 7.6 percent of the time. There was no difference between preoperative and postoperative symmetry 15.2 percent of the time (Table II).

DISCUSSION

The marginal mandibular lip deformity is the result of a breach in the balance of the bilateral dynamic balance of the lip depressor muscles that normally produces symmetry with smiling.[13–15] This may occur as the result of a congenital or chronic focal unilateral marginal mandibular nerve palsy, or a myopathy of the lip depressors that it innervates. It may also occur as a postoperative residual effect in patients with a chronic complete unilateral facial palsy who have undergone smile elevation correction alone with a free muscle transfer technique, leaving an uncorrected lip depressor imbalance resulting in a residual marginal mandibular lip deformity (Fig. 1).

TABLE I
Functional Results

	Worse	No Change	Improved	Greatly Improved
Symmetry with smiling	1	1	9	1
Oral competence				
Eating	0	12	0	0
Speaking	1	11	0	0
Secretions	1	11	0	0

From the standardized survey, nine of the 12 patients contacted reported improved symmetry, with one reporting great improvement. All 12 of the patients responding claimed no change in eating, while 11 of the 12 patients reported no change in speaking or the ability to maintain secretions.

TABLE II
Independent Evaluation of Symmetry with Smiling

Patient	More Symmetrical Preoperatively (%)	More Symmetrical Postoperatively (%)	No Difference in Symmetry (%)
1	0	92	8
2	0	100	0
3	0	100	0
4	0	92	8
5	0	100	0
6	0	50	42
7	0	100	0
8	0	58	42
9	16	42	42
10	0	100	0
11	50	17	33
12	17	75	8
Average	7.6	77.2	15.2

From the independent evaluation of symmetry with smiling, the postoperative photographs showed improved symmetry 77.2 percent of the time, while the preoperative photographs showed improved symmetry 7.6 percent of the time. There was no difference between preoperative and postoperative symmetry 15.2 percent of the time.

There are three strategies for correcting the marginal mandibular lip deformity (Fig. 3). Static reconstruction and reanimation procedures focus on the paralyzed or affected side, whereas deanimation procedures target the normal or unaffected side. Static reconstruction procedures, such as wedge resections, are somewhat effective at improving oral sphincter tone as well as symmetry with smiling. However, they result in noticeable scars, which significantly compromise the cosmetic result. Procedures that attempt to reanimate the affected side include transfer of the anterior belly of the digastric muscle as well as free muscle transfers, which include the latissimus dorsi and extensor digitorum brevis transfers.[4,13–15] These procedures clearly result in an improvement in smile symmetry. However, the improved symmetry that these procedures provide does not appear to be the result of a true functional dynamic reanimation of the affected side, as there appears to be no improvement in lip depression there when compared with preoperatively (Fig. 4). Comparisons of preoperative and postoperative photographs in these patients do not show active excursion of the transferred muscles. This is especially the case when the anterior belly of the digastric muscle, which is not innervated by the facial nerve, is used.[4,8,9,12]

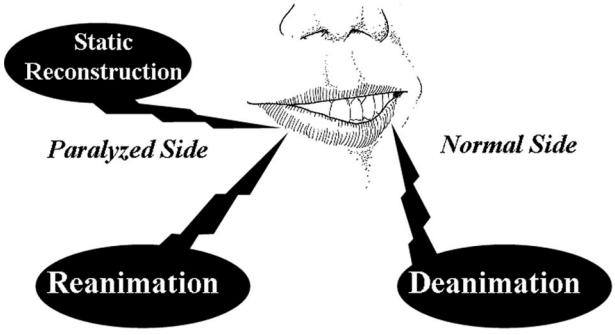

FIG. 3. There are three strategies for correcting the marginal mandibular lip deformity. Static reconstruction and reanimation procedures focus on the paralyzed or affected side, whereas deanimation procedures target the normal or unaffected side. David W. Low provided the original drawing for this study.

If these procedures do not actually work by reanimating the affected side, then it is not clear why these procedures effectively restore lip depressor symmetry. Some of these reanimation procedures may provide a static rebalancing of the lip depressor forces rather than a dynamic one. For transfer of the anterior belly of the digastric muscle, postoperative scarring at the muscle transfer site may statically counteract the dynamic pull of the intact lip depressors on the unaffected side. Other reanimation techniques, such as free muscle transfers, may, in fact, effectively restore lip depressor balance through deanimation, just as we are describing with our series. The improved balance seen with free muscle transfers may be the result of a functional denervation of the lip depressors on the unaffected side, since innervation to a transferred free muscle flap requires a neurectomy of a facial nerve branch on the unaffected side before neural anastomosis. Regardless of their true mechanisms of action, "reanimation" procedures that effectively correct the lip depressor asymmetry seen in the marginal mandibular lip deformity do so with extensive surgical procedures, conspicuous neck scars, and donor deficits.

Deanimation procedures attempt to restore smile balance and symmetry by weakening the

FIG. 4. Procedures that attempt to reanimate the affected side, such as transfer of the anterior belly of the digastric muscle and free muscle transfers, clearly result in improved smile symmetry. However, the improved symmetry does not appear to be the result of a true functional dynamic reanimation of the affected side, as there appears to be no improvement in lip depression compared with preoperatively (*arrows*). (*Left, above and below*) Preoperative and postoperative photographs of a patient who underwent transfer of the anterior belly of the digastric muscle on the left side to correct lip depressor asymmetry. (*Center, above and below*) Preoperative and postoperative photographs of a patient who received an extensor digitorum brevis free flap on the left side to correct lip depressor asymmetry. (*Right, above and below*) Preoperative and postoperative photographs of a patient who underwent latissimus dorsi free flap transfer on the left side to correct lip depressor asymmetry. Photographs on the left and in the center were reprinted from the *British Journal of Plastic Surgery*, volume 53, Tulley, P., Webb, A., Chana, J. S., et al. Paralysis of the marginal mandibular branch of the facial nerve: Treatment options, pp. 378-385, copyright 2000, with permission from the British Association of Plastic Surgeons. Photographs on the right were reprinted from Takushima, A., Harii, K., Asato, H., and Yamada, A. Neurovascular free-muscle transfer to treat facial paralysis associated with hemifacial microsomia. *Plast. Reconstr. Surg.* 109: 1219, 2002.

normal, unaffected side. Included in these procedures are myectomy, botulinum toxin injections, and selective neurectomy. Myectomy provides an effective and lasting means of improving symmetry with smiling. However, in our experience, it often results in a divot-like

contour irregularity, and there is a significant risk of damaging the mental nerve branches when the depressors are dissected out for resection. Botulinum toxin injections are also effective at improving symmetry with smiling, and the fact that they are nonsurgical is very appealing to many patients. However, the temporary effectiveness makes them suboptimal for patients who desire a permanent solution.[3,13–17]

Selective marginal mandibular neurectomy works by denanimation to correct the imbalance of lip depressor forces that cause the marginal mandibular lip deformity. Compared with the described reanimation techniques, selective marginal mandibular neurectomy is performed through an inconspicuous preauricular incision, thereby avoiding any obvious scars. Furthermore, it is a less extensive operation than the described muscle transfer reanimation techniques. Lastly, it lacks the donor deficits and contour irregularities seen with other techniques.[3,19]

Our review supports the selective marginal mandibular neurectomy as an effective means of correcting the marginal mandibular lip deformity in patients with chronic focal unilateral facial palsies. Figure 5, *above*, shows a 59-year-old woman with a marginal mandibular lip deformity resulting from a focal unilateral marginal mandibular nerve palsy on the right. The patient underwent a selective marginal mandibular neurectomy on her left side. Postoperatively, she is left with no asymmetric lip deformity. Figure 5, *below*, shows a 30-year-old woman with a marginal mandibular lip deformity resulting from a focal marginal mandibular nerve palsy on the right. She underwent a selective marginal mandibular neurectomy on the left side. Eighty-five months later, the patient had no deformity.

Selective marginal mandibular neurectomy of the unaffected side also appears to be an effective means of preventing the marginal mandibular lip deformity in patients with complete unilateral facial palsies who will undergo smile elevation correction with a free muscle transfer. Figure 6, *above*, shows a patient with a right-sided complete facial palsy who underwent the first stage of the two-stage procedure, which consisted of a cross-facial nerve graft and marginal mandibular neurectomy on the left side. Ten months later, the patient has no residual depressor deformity. In Figure 6, the patient has yet to be corrected with a second-stage free muscle transfer. Figure 6, *below*, shows a 14-year-old girl with a complete facial palsy on the right who had completed both stages of the two-stage reconstruction. She underwent a stage 1 cross-facial nerve graft with selective marginal mandibular neurectomy on the left and a stage 2 free muscle transfer correction on the right. Thirty-eight months later, the patient had no residual lip depressor deformity. This is to be compared with other reported results, such as the patient shown in Figure 1. This patient had a complete facial palsy on the left and underwent a two-stage cross-facial nerve graft with free gracilis transfer for correction, but did not undergo a selective neurectomy. Although he has an excellent result with respect to commissure elevation, he was left with a residual asymmetric depressor deformity.

FIG. 5. Selective marginal mandibular neurectomy is an effective means of correcting the marginal mandibular lip deformity in patients with chronic focal unilateral facial palsies. (*Above, left and right*) A 59-year-old woman with a marginal mandibular lip deformity underwent a selective marginal mandibular neurectomy on the left. Note the preoperative asymmetry compared with postoperatively. Postoperatively, she had no asymmetric lip deformity. (*Below, left and right*) A 30-year-old woman with a marginal mandibular lip deformity underwent a selective marginal mandibular neurectomy on the left. Note the asymmetry preoperatively as compared with postoperatively. Eighty-five months later, she had no deformity.

Further analysis of the effectiveness of selective marginal mandibular neurectomy as treat-

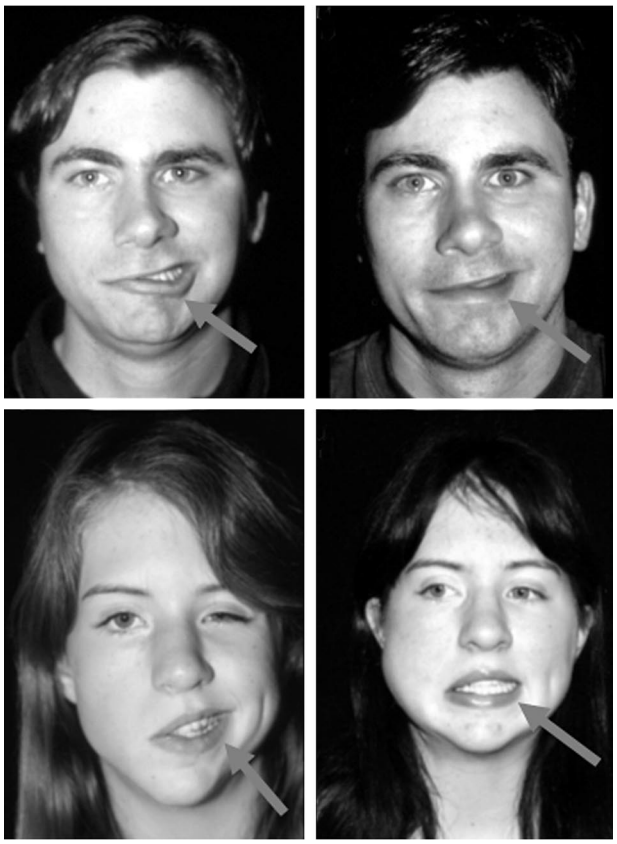

FIG. 6. Selective marginal mandibular neurectomy of the unaffected side is an effective means of preventing the marginal mandibular lip deformity in patients with complete unilateral facial palsies who will undergo smile elevation correction with a free muscle transfer. (*Above, left and right*) A patient with a right-sided complete facial palsy underwent the first stage of the two-stage procedure, consisting of a cross-facial nerve graft and marginal mandibular neurectomy on the left side. Ten months later, the patient had no residual depressor deformity. (*Below, left and right*) A 14-year-old girl with a complete facial palsy on the right completed both stages of the two-stage reconstruction. She underwent a stage 1 cross-facial nerve graft with selective marginal mandibular neurectomy on the left and a stage 2 free muscle transfer correction on the right. Thirty-eight months later, the patient had no residual lip depressor deformity. Note the comparison between this patient's postoperative results and those of the patient shown in Figure 1. The selective marginal mandibular neurectomy clearly prevents the residual asymmetry with lip depression. Reprinted from *Operative Techniques in Plastic and Reconstructive Surgery*, volume 6, Bartlett, S. P. Smile reconstruction using the serratus anterior muscle, pp. 190-196, copyright 1999, with permission from Elsevier.

ment for the marginal mandibular lip deformity was provided by the patients themselves, as well as by independent reviewers. A total of 83.3 percent of the patients questioned reported either improvement or great improvement in symmetry with smiling (Table I). This is consistent with the independent reviewers' judgment that symmetry with smiling was improved postoperatively 77.2 percent of the time (Table II).

As it is true that several patients in this study who had subjective improvement in smile symmetry underwent free muscle transfer reanimation procedures to the affected side as well as marginal mandibular neurectomies of the unaffected side, it may be difficult to discern which of the procedures actually accounts for the improvement. However, the patients in our study who underwent free muscle transfers in addition to marginal mandibular neurectomies clearly showed a marked improved when compared with previously reported patients who underwent free muscle transfer alone (Fig. 1 and Fig. 6, *below*). Furthermore, all three patients in our study who underwent marginal mandibular neurectomies alone for isolated deformities showed improved symmetry and were satisfied with their results (Fig. 5).

Functionally, our data show that selective marginal mandibular neurectomy does not appear to result in any significant postoperative oral functional deficits in patients who lacked them preoperatively. Only one patient surveyed complained of decreased oral competence as a result of the surgery. However, this patient's deficits were a result of complications with the second-stage free muscle transfer on the affected side and were unrelated to the selective marginal mandibular neurectomy. This patient remained the only one in the series who was dissatisfied with the results. The other 11 patients surveyed claimed to be either satisfied or very satisfied.

The precision with which the selective marginal mandibular neurectomy is able to correct the lip depressor imbalance of the marginal mandibular lip deformity without impairing oral functionality can be better understood by looking at the perioral neuromuscular anatomy. The perioral musculature consists of 21 muscles, 10 of which are paired and bilateral. The orbicularis oris, which is the central sphincter contractor muscle, consists of two layers. The deeper layer acts to compress the lips against the teeth, thereby maintaining oral continence. The superficial layer plays a role in articulation and facial expression. The orbicularis oris muscle receives bilateral innervation from the buccal branches and the marginal mandibular branches of the facial nerve.[9,13,16,20,21]

The orbicularis oris is surrounded by the paired sphincter expander muscles, which consists of the elevator-retractor group and the

depressor-retractor group. Of the depressor-retractor group, the depressor labii inferioris, the depressor anguli oris, and the mentalis are each innervated by the marginal mandibular branch of the facial nerve. The depressor anguli oris acts to draw the lip downward and laterally, the depressor labii inferioris acts to evert the vermilion border, and the mentalis acts to protrude the lower lip and wrinkles the skin of the chin. The platysma is the only lip depressor-retractor that is innervated by the cervical branch of the facial nerve. As it is contiguous with the depressor anguli oris, it plays a role in drawing the lip downward and laterally.[13,20,21]

The characteristic imbalance seen with a marginal mandibular lip deformity can be described as an inability to draw the lip downward and laterally, as well as an inability to evert the vermilion border. These functions are normally performed by the depressor anguli oris and the depressor labii inferioris, respectively. Bilateral loss of these functions should theoretically have no effect on oral functionality, provided that the loss of function is limited to these muscles. So long as the orbicularis oris and mentalis are intact, oral competence should be maintained.[20,21]

As all lip depressors, with the exception of the platysma, receive either some or all of their innervation from the marginal mandibular branch of the facial nerve, the most difficult task would seem to be how to selectively ablate only those nerve branches that are responsible for the deformity while avoiding those that are not. In fact, we found this not to be the case. Using selective stimulation with a nerve stimulator, it is readily apparent intraoperatively which branches are responsible for the deformity and which branches are not (Fig. 7). We found the most difficult task consistently to be finding and ablating all the nerve branches that are responsible for the deformity. Avoiding those nerve branches that maintain oral competence has never proven to be a problem, especially in light of the fact that the orbicularis oris receives a significant innervation from the buccal branches of the facial nerve.

In our earliest cases of selective marginal mandibular neurectomy, we would identify via nerve stimulation only a single branch of the marginal mandibular nerve that appeared to cause the deformity and concluded that ablation of that nerve branch alone would be corrective. However, we would then find out postoperatively that, although no functional deficits were reported, these patients continued to display a significant asymmetric lip depressor deformity. As we performed more of these procedures, we became aware that multiple branches were responsible for the deformity. We have concluded that one can and should destroy all innervation to the lip depressors responsible for the deformity. It is our opinion that this can be done with impunity so long as the other branches to the mentalis and the orbicularis remain intact. In recent cases, we have also denervated the cervical branch of the facial nerve to remove any residual platysma activity that may contribute to the deformity.

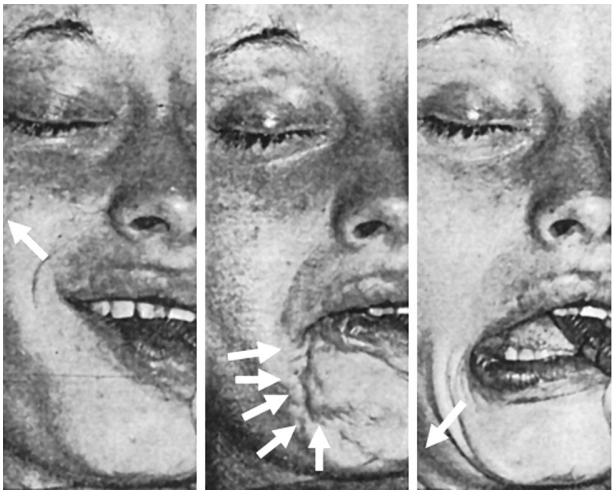

FIG. 7. Using selective stimulation with a nerve stimulator, it is readily apparent intraoperatively which branches are responsible for the deformity and which branches are not. (*Left*) Selective stimulation of lip elevators. (*Center*) Selective stimulation of lip depressors not responsible for the marginal mandibular lip deformity. (*Right*) Selective stimulation of lip depressors responsible for the marginal mandibular lip deformity. Reprinted from the *British Journal of Plastic Surgery*, volume 29, Clodius, L. Selective neurectomies to achieve symmetry in partial and complete facial paralysis, pp. 43-52, copyright 1976, with permission from the British Association of Plastic Surgeons.

CONCLUSIONS

Our review supports the assertion that selective marginal mandibular neurectomy is a safe and effective means of treating the marginal mandibular lip deformity in patients with focal and complete chronic unilateral facial palsies. It is performed without a donor deficit or conspicuous scarring. It does not appear to result in any functional oral consequences when only those nerves responsible for the deformity are identified and selectively ablated. Lastly, the

degree to which dynamic lip depressor symmetry with smiling is restored appears to be directly correlated to the degree to which all nerve branches responsible for the deformity are ablated.

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