Surgical Correction of Facial Paralysis:
A Plea for Better Reconstructions

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EACH YEAR brings new refinements to the surgical correction of facial palsy. No one surgeon or one method of repair may claim success in all varieties of facial weakness. Combined contributions of many may now be used with benefit to those afflicted with a sagging cheek, watering eye, and drooling lips. Many surgeons continue to use technics of earlier decades—and thus fail to achieve optimal correction.

Between 1949 and 1965—187 patients with facial palsy were treated at the Johns Hopkins Hospital. As limitations were noted in the results obtained, new methods were tested. No attempt is made to review the sequence of, and reasons for, the many changes in technic. Instead, general principles learned from the treatment of these patients are described.

The best surgical repair for facial palsy is a poor substitute for the normal delicate balance and play of the small muscles in the human face—but *an acceptable balance of the face at rest, active closure of the eye, and some voluntary control of the lips and cheeks should be obtainable in all instances.*

Nature of the Problem

When the facial nerve is injured, the denervated muscles become flaccid and atrophy soon begins. The patient complains of a "heavy" feeling in the face. He may bite his cheek when chewing, epiphora develops, and saliva or food may escape from the corner of his mouth when he least expects it. Speech is affected and breathing is impeded through the nostril on the side of the palsy. Facial expressions are grotesque, and the patient is beset with an awesome sense of deformity and suicide is not uncommon.

With time, shrinkage of facial muscle fibers is associated with an increase of connective tissue. These changes may close off the terminal sheaths of Schwann and obliterate the motor end plates. When this happens, reinnervation can no longer occur, but until that time the possibility of nerve repair by grafting must be considered.

How may one determine clinically that it is not too late for nerve grafting to have some chance of success? Collier[7] properly stressed that testing of the facial muscles with faradic (interrupted current derived from an induction coil) or galvanic (continuous) electricity does not give a reliable estimate of the excitability of muscle or nerve. The "reaction of degeneration" provides no guidance regarding the possibility of regeneration of the nerve.

Electromyography is valuable to detect fibrillation action potentials. These spontaneous fibrillations may be found as long as denervated muscle fibers are still contractile. When present, neurorraphy or nerve grafting may be of value. If nerve reconstruction is successful or if spontane-

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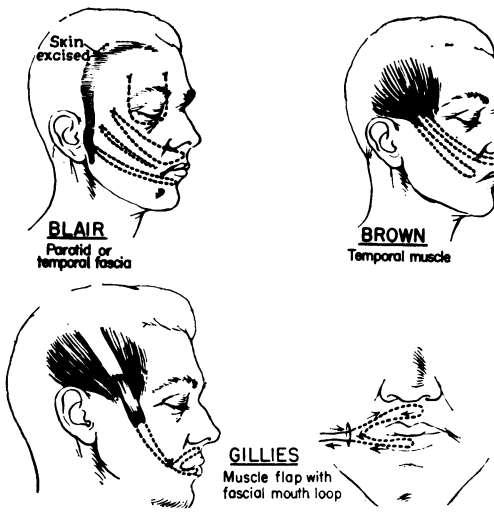

FIG. 1. Some of the major methods of correcting facial paralysis in use during the past decade. Blair pointed out the value of combining skin excision with static support. Brown obtained a slight lifting action with the temporal muscle, and Gillies attempted to increase this using an inferiorly based temporalis muscle pedicle joined to a loop of fascia placed within the lips.

ous regeneration of the nerve occurs, the number of fibrillation potentials will slowly decrease and be replaced by motor unit action potentials (if the muscles are tested serially). Most patients who have facial paralysis for longer than six months will, by electromyography, show that reinnervation has occurred in a few muscles but that most have lost fibrillation action potentials. In such instances nerve repair is hopeless, and other types of reconstructive operations are indicated as soon as is practical. Electromyography is thus of particular value in evaluating the prognosis in cases of Bell's palsy of over six months' duration.

Early decompression of the facial nerve has been advocated to aid recovery after Bell's palsy. Portions of the bony canal within the temporal bone are removed to give the edematous nerve more space. Some cases of Bell's palsy may respond to this decompression. Its value is hard to judge as similar recoveries follow without such treatment.

If facial palsy goes uncorrected for many months, muscle atrophy is increased by overstretching of the fibers. This results both from the action of gravity and the struggles of the patient to "make up" for the loss in facial control by overactivity of the muscles on the non-paralyzed side. Pathologic tonus and an inverse state of contractility may develop on the two sides of the face. This "overactivity" on the normal side consistently returns to normal if the paralyzed side is surgically supported and reanimated.

Methods of Correction

In established facial paralysis, reconstructive efforts should be directed toward: 1) facial nerve repair or transfer of hypoglossal or phrenic nerves to face; 2) static support of soft tissues; 3) muscle transfers to the eyelids; 4) muscle transfers to elevate and retract the corner of the mouth; 5) neurotomies or myomectomies to reduce movements of the normal side of the face and mouth; and 6) muscle transfers to draw the paralyzed lower lip downward.

Facial Nerve Repair. Nerve suture, nerve grafting, and nerve transfers are desirable, *in that order,* when anatomically possible, and when the muscles continue to show prominent fibrillation potentials on electromyography.[7] If the proximal end of the facial nerve is not available for grafting, nerve transfers have been used. The spinal accessory nerve has been divided and sutured to the distal trunk of the nerve. This transfer is unsatisfactory because of the troublesome facial grimace likely to appear whenever the patient attempts to lift his shoulder. The hypoglossal-facial and phrenic-facial anastomoses[21] are more satisfactory, but serve primarily to restore muscle tone. If used, such nerve anastomoses should be supplemented by dynamic muscle transfers to the face.

Static Support of Soft Tissues. A. *Skin.* When paralyzed facial skin is drooping and stretched, it may be improved by meloplasty excisions anterior to the ear, by

forehead and brow-lifting excisions, and by direct cheek trims in the nasogenial groove [10, 18] (Fig. 1).

B. *Facial Muscle.* Paralyzed facial muscles may be shortened by excision or pleating as advocated by Niklison.[17] These small atrophic muscles hold sutures poorly, and some recurrence of the deformity may be encountered.[8] To be effective, excisions must be extensive, and the author reserves this interesting technic for correction of lesser assymetries after dynamic support has been obtained.

C. *Fat and Fascia.* Subcutaneous fat of the cheek may be lifted with slings of fascia lata,[3, 4, 13] tendon,[19] tantalum,[2, 22] or plastic ribbon and attached to the temporal fascia or zygoma (Fig. 1, 2). Fascia may be attached to the bony supraorbital ridge or frontalis muscle for support of the lower eyelid. When fascial slings to cheek and eyelids are used as the only technic to correct facial palsy, results are disappointing due to recurrence of facial sagging. This sagging is pronounced in over 50% of the patients. Ragnell[19] described initial results as "good . . . using Blair's method of facial sling suspension" but he stated that they, "soon deteriorated . . . to all appearances because of absorption of the loops" (Fig. 3, 4). Champion[2] stated, "The most likely explanation of failure" (of fascial loop static suspension) is that the fascia, under tension, tends to pull through the limited and delicate muscles of the lip." We agree with this analysis.

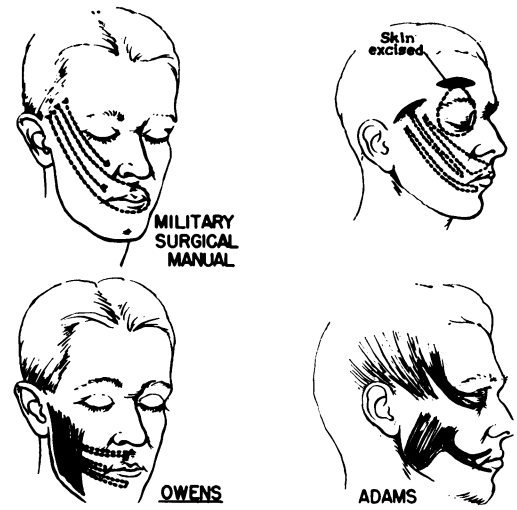

FIG. 2. Additional methods that were proposed between 1945 and 1955 to correct facial paralysis. Adams was one of the first to suggest transferring masseter and the temporalis muscles into the corner of the mouth and eyelids, respectively. He did not use the inferiorly based temporalis muscle pedicle for the eyelid transfer, and his masseter muscle transfer contained a much smaller proportion of the muscle than is now recommended.

Muscle Transfers for Eyelid Animation. Eyelid support and voluntary closure may be gained by segmental temporalis muscle transfers[6] in combination with tarsorrhaphy (Fig. 5, 6), Z-plasty of the inner

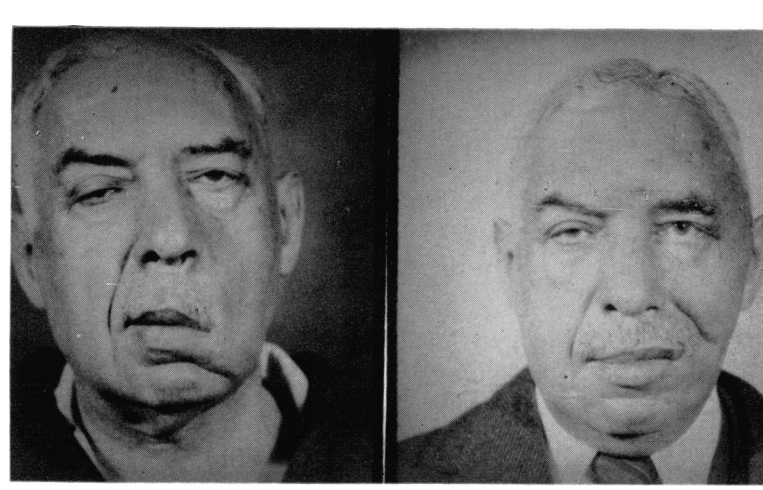

FIG. 3. The pre- and three-year postoperative appearance of the face utilizing a masseter muscle transfer to the left corner of the mouth and a superiorly based temporalis muscle pedicle to the upper eyelids. Eyelid closure was sufficient, but not complete, and this arrangement of the temporal muscle does not prove as effective as the inferiorly based muscle pedicle (turned down over the zygoma). Despite limitations, the patient was well pleased with the result.

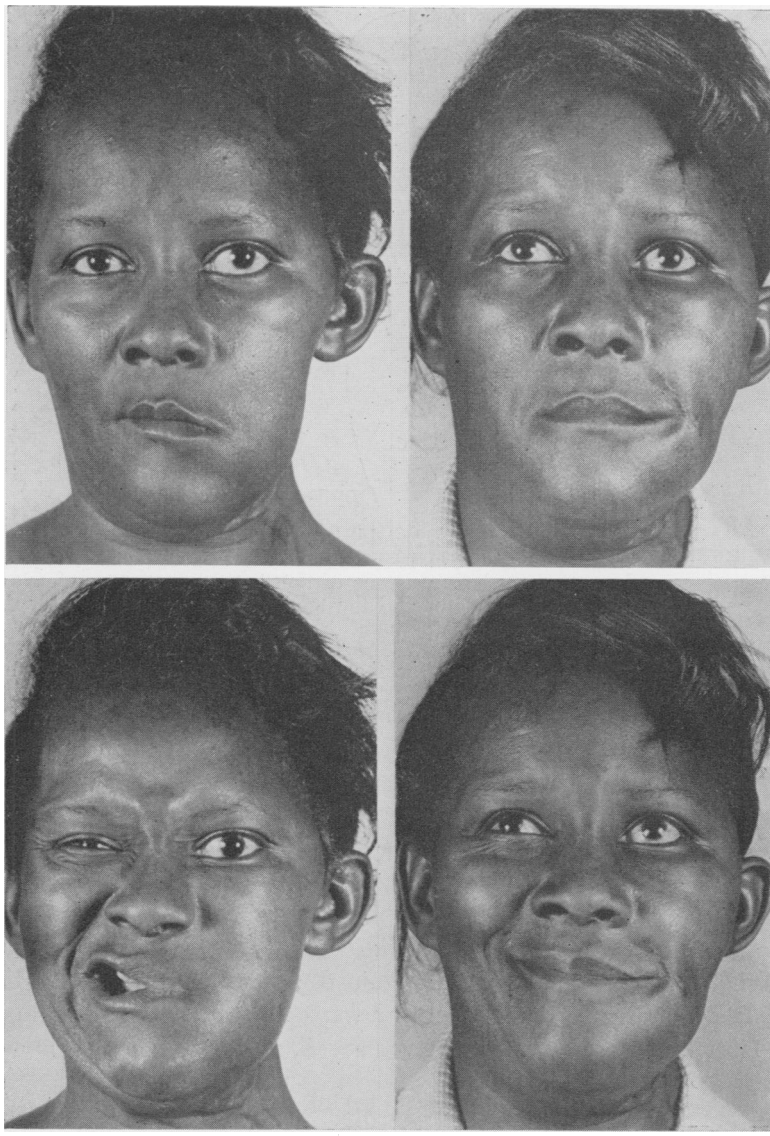

FIG. 4A and B. The pre- and one-year postoperative results on a patient with total fascial paralysis resulting from parotid carcinoma with parotidectomy and radical neck dissection. Transfer of the masseter muscle to the left corner of the mouth was carried out four months after parotidectomy. In 4A are pre- and postoperative views with the face in repose; in 4B, pre- and postoperative views with patient attempting a broad smile. A loop of fascia was placed around the lip through mucosal incisions, but this seemed to limit the degree of lift to the left angle of the mouth by the masseter muscle transfer.

canthus,[10] and slitting of the lower lid canaliculus.[15]

Muscle Transfers for Animation of the Corner of the Mouth. When the masticator branches of the fifth cranial nerve are not paralyzed, the masseter or temporalis muscles may be used as strong elevators of the corner of the mouth. Two methods are practical: *A.* The temporalis muscle may be turned down from its origin in the temporal fossa to overlie the zygomatic arch and be attached near the corner of the mouth[11] (Fig. 1). I prefer an osteotomy of the coronoid tip with a shifting of this button of bone and the attached insertion of the temporalis muscle to the angle of the mouth. The attachment may be made with a loop of fascia lata. Leaving the temporal muscle with a cephalic pedicle at the normal origin of the muscle gives greater excursion to the transfer (Fig. 5), than does the Gillies method. *B.* Alternatively, the masseter muscle may be elevated from the lower border of the mandible[14] and at-

tached to the corner of the mouth (Fig. 6A, 6B). This is desirable if the temporalis muscle is to be used for eyelid animation, as the average patient is able to contract the masseter and temporalis muscles independently. Many patients have had difficulties in contracting separate sections of the temporalis muscle when we used one portion of that muscle to lift the corner of the mouth and another to close the eyelids.

The muscles of mastication may be transferred and sutured directly to the paralyzed muscles or may be attached first to a fascia lata [10] or tendon sling which,[19] in turn, is woven into the atropic muscle fibers at the corner of the mouth. The temporalis and masseter muscles may be approached through either intra-oral [5] or extra-oral incisions (Fig. 7A, 7B), but care must be exercised not to damage their motor nerves during dissection or by undue traction in the process of making the new attachments.

Neurotomies and Myomectomies. Facial symmetry of the lips may be improved by reducing overactivity of those muscles on the non-paralyzed side of the face. Section of the cervical (or marginal) branch of the opposite facial nerve has been advocated by Niklison.[17] Myomectomy (section of portions of the muscle bellies) [8] gives a similar result and may provide more accurate control of excessive lip movement. One to three centimeter sections of the quadratus labii superioris caninus, zygomaticus, or risorius muscles may be excised to control excessive lateral and upward pull on the non-paralyzed angle of the mouth. This produces few unpleasant side effects at the upper lip, but when the same principle is applied to the non-paralyzed *lower lip* by resecting portions of the triangularis and quadratus labii inferioris, improvement in symmetry is accompanied by a troublesome immobility that leaves the lower lip covering the lower teeth even when the patient smiles. This weakness also leads to difficulty in pronouncing labial consonants.

Neurotomy and myomectomy corrects overactivity and achieves some increase in lip symmetry, but hypomimia and a mask-like appearance remains. A more dynamic correction would be desirable. *No plastic surgeon is happy with the concept of further reducing function in a face that is already deficient in motor control.* The author has reported experiences [9] utilizing a transfer of the anterior belly of the digastric muscle to the paralyzed lower lip (Fig. 11) to avoid neurotomy and myomectomy on the normal side.

FIG. 5. This method of fixation is used for the McLaughlin type of lateral tarsorrhaphy with removal of lash hairs of the lateral one centimeter of the lower lid and approximation of tarsus to tarsus by means of a mattress suture tied over small soft rubber catheter. This tarsorrhaphy may be released at the time of a temporalis muscle transfer to the upper and lower eyelids (see Figure 9A).

Author's Present Surgical Approach to Facial Palsy

With surgically produced and non-reairway, a fascia lata sling may be also placeable losses of the facial nerve (such as *en bloc* resection of parotid gland and

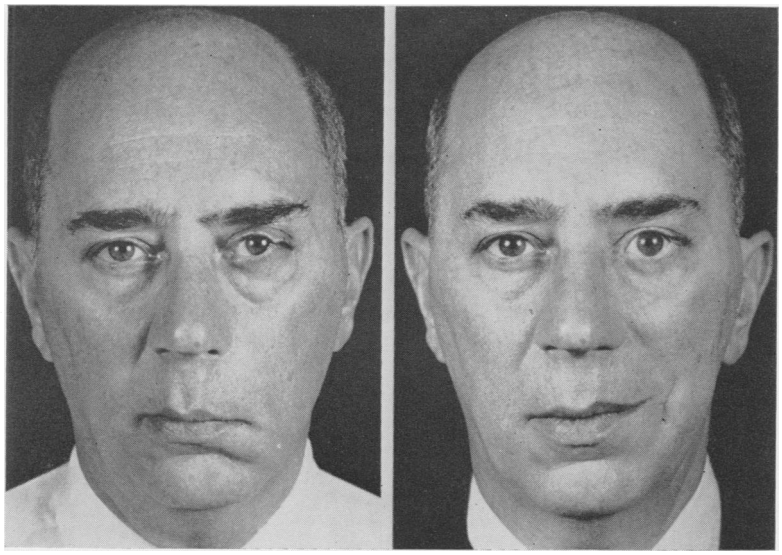

FIG. 6A. On the left is the patient six months after removal of an accoustic neurinoma with loss of fifth, seventh, and eighth cranial nerves. Corneal anesthesia is present. On the right is the face in repose fourteen months following masseter muscle transfer into the side of a fascial sling running from temporal fascia to the left corner of the mouth.

facial nerve for carcinoma), it is often desirable *immediately* to transfer the masseter muscle into the paralyzed corner of the mouth. If there is a reduction in nasal looped about the muscle just lateral to the nostril base and then attached through a drill hole in the inferior margin of the zygoma. This will widen the base of the nose and relieve breathing. If the patient wears an upper denture that might be dislodged by the tension on such a fascial band, the attachment should be made in a more cephallic direction into the temporal fascia. With resection of a parotid gland, correction of palsy may be carried out through the surgical wound and adds only about twenty minutes to the operation. In closing the wound, all loose or excessive skin is excised just anterior to the ear. If the facial nerve branches to the eyelids are resected with the tumor, lateral tarsorrhaphy by the improved method described by McLaugh-

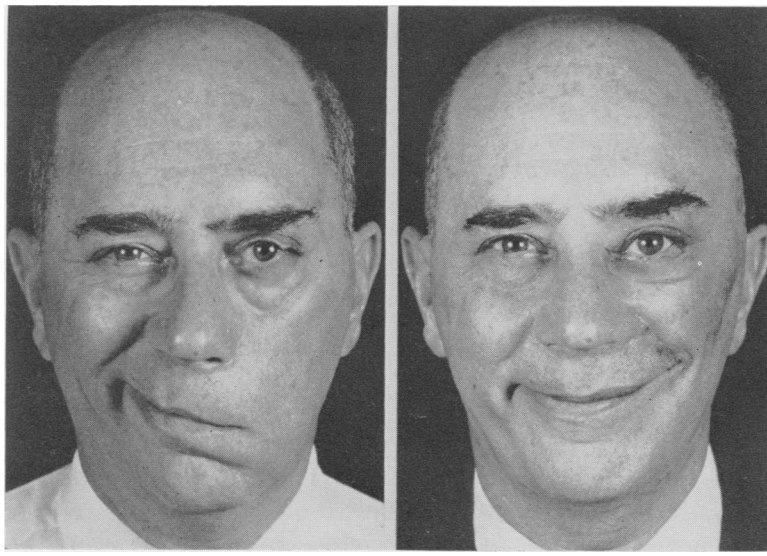

FIG. 6B. The pre- and postoperative effect when the patient tries to smile broadly. By not using the often recommended rigid fascial loop that encircles his lips, more lift of the corner of the mouth may be obtained.

lin in 1950 is performed.[15, 16] At a later operation, young patients benefit from having the temporalis muscle transferred to the eyelids[1] and the digastric muscle transferred to the paralyzed lower lip.[9]

If facial nerve palsy follows brain operations, as in removal of an acoustic neurinoma, the patient is allowed to recover from the initial effects of the craniotomy before correcting the facial palsy. In such patients the sensory branch of the fifth cranial nerve is often damaged and protection to the cornea is more critical than in paralysis of only the facial nerve. Tarsorrhaphy is carried out at the time of nerve division if possible. In many neurosurgical patients, the greater superficial petrossal nerve has also been damaged. This nerve carries sympathetic fibers to the lacrimal gland, and its loss results in a marked (ten-fold) decrease in tear production. Such "dry eyes" create the most difficult types of facial palsy to correct. Only recently have we been able to give these patients comfort and function by combining muscle transfers to the paralyzed lids with punctal occlusion to conserve the small amount of remaining tear production. Dr. David Knox of our ophthalmology department has developed ingenious methods of temporarily plugging the canaliculi for a short (24-hour) test period before recommending permanent punctal occlusion.

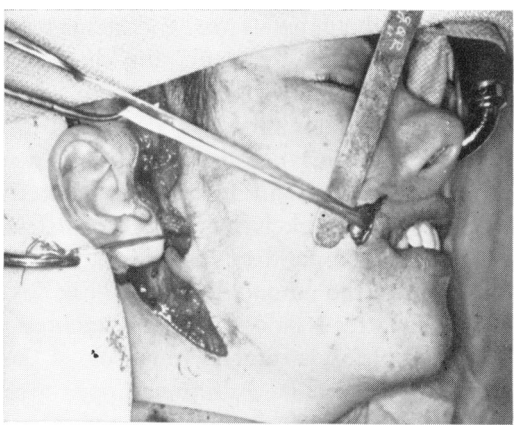

FIG. 7A. When one excises facial skin with seventh nerve palsy, this incision is used as an external approach to the temporalis muscle transfer. The cheek has been reflected forward, a drill role has been placed in the tip of the coronoid process, and steel wire passed through this for fixation. The coronoid is then cut free from the mandible. A one-centimeter-wide strip of fascia lata (taken from the thigh) has been passed about a large bundle of paralyzed lip muscle that is located a few millimeters above and lateral to the commissure of the mouth. The two ends of the fascia will next be passed subcutaneously back to the drill hole in the coronoid process.

FIG. 7B. The degree of slight overcorrection obtained by tightening the fascia to produce a gentle smile. Excess facial skin is advanced posteriorly and removed at the preauricular incision.

With long-standing complete facial paralysis, a two-stage correction has provided our best results. At the first operation, through an intraoral incision, a one-centimeter button of the coronoid tip is cut free from the mandible with a Joseph nasal saw. Originally a drill hole was placed in this coronoid "bony button" and threaded with a loop of fascia lata. It is simpler and more satisfactory to pass the fascia through the fibers of the temporalis tendon just proximal to their attachments into the coronoid process. When grafts of fascia lata were first inserted through intra-oral incisions, we feared infections might result from salivary contamination; but with good preoperative mouth hygiene, this has not been a

FIG. 8A. Actual size of the temporalis muscle bundle used by the author for eyelid closure. Note the inferior position of the muscle pedicle. Divided strips of temporal fascia are reflected from the anterior surface of the muscle to lengthen the transfer. They may be seen on the moist sponge. The muscle approaches the external canthus from above the eyelid level in order to improve closure. Excision of some skin at the incision produces a satisfactory lift of the eyebrow at the time of closure.

problem. A second small external skin incision is next made just lateral to the corner of the mouth, a bundle of lip muscle at least one centimeter in diameter is freed, and the fascia loop (also one centimeter wide) encircles this muscle twice before *returning* to the coronoid tip by a separate tunnel.

Some surgeons [10, 19] advocate placing a figure-of-eight fascial loop around the oral stoma at a preliminary operation. These loops are then used as firmly anchored attachments in the lip to which fascia slings or muscle transfers may be attached at a second operation some weeks later. Such preliminary fascial loops result in undesirable dimpling of the midline tissues of the lips if inaccurately placed. Fascial lip-loops are also non-stretchable and *limit the ability* of the transferred or normal muscles *to widen the corners of the mouth in smiling* (Fig. 3A, 3B). I have had better results by looping the fascia twice around living bridges of lip muscle that are elevated along the nasogenial groove between the base of the nostril and the level of the lip commissure. Any attempt merely to *suture* the fascia into the paralyzed lip muscles is followed by a pulling-out of these sutures in the early postoperative period and loss of much support.

After a fascia lata graft has been secured to the coronoid tip and looped about muscle at the corner of the mouth, the two ends are returned through the cheek to the intraoral incision and are knotted and lashed so that the temporalis muscle holds the corner of the mouth in modest over-correction. Stainless steel wire (#35) is used to secure the fascia. Mucosal and skin incisions are closed, and the patient is given a soft diet on the second postoperative day.

Some older patients have heavy cheek skin and subcutaneous tissue that may be further supported by combining the coronoid-temporalis muscle transfer with additional fascia lata slings as described by Blair.[3] In this instance the operation is approached through an incision anterior to the ear. The cheek is reflected forward to expose the temporalis tendon and its attachment to the coronoid process (Fig. 7A, 7B). The latter is sawed free and anchored by a loop of fascia directly to muscle at the corner of the mouth. Additional loops give support and even some slight voluntary lifting of the cheek (as pointed out by Brown[4]), but rigidly fixed proximal attachments of fascia tend to pull through the distal delicate lip attachments more than non-rigid dynamic muscle transfers. In 1958 Backdahl and D'Alessio reviewed results of treating facial palsy exclusively with facial sling support. They stated, "Only four of seventeen cases treated with (non-dynamic) fascial slings were satisfied

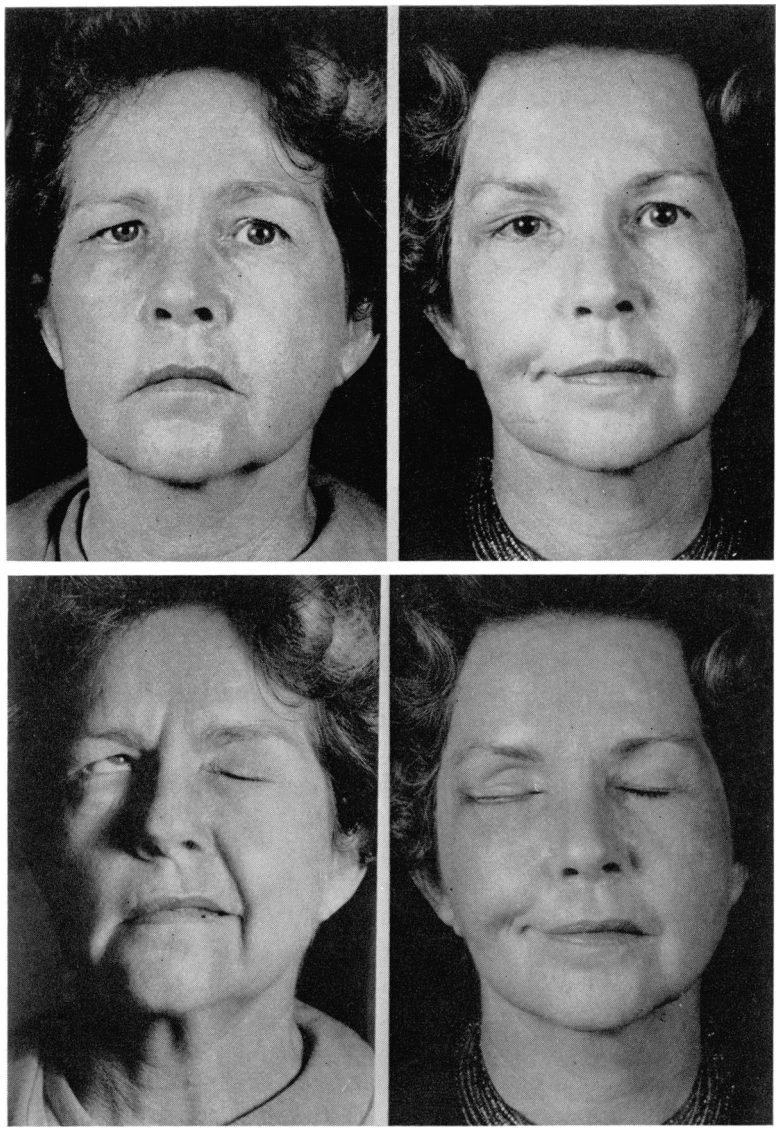

FIG. 8B–E. Comparable pre- and postoperative views of patient in Figure 8A taken one year after operation with the face in repose (8B and 8C) and attempting both a gentle smile and closure of the eyes (8D and 8E). This patient had a coronoid process-temporalis muscle transfer to the corner of the mouth through an intra-oral incision at a second operation (after the eyelid transfer). She is now able to control eyelid closure and smiling independently.

with their results, as most showed return of sagging or an embarrassing furrow (in nine cases) that developed along the course of the sling." [2]

Whether or not fascial slings are used in combination with dynamic muscle transfers, a "facelifting type" of skin excision in the temporal region and just anterior to the ear will improve results in most adult patients (Fig. 7B). A tarsorrhaphy may be added at this time.

After the cheek and mouth have been supported and given some voluntary movement, the paralyzed eyelids are treated at a second operation. The anterior third of the temporalis muscle is exposed through an incision in the temporal fossa above the zygomatic arch. A ten-millimeter-wide strip of the thin, firm fascia over the temporalis muscle is first cut free from its caudad attachments at the zygomatic arch and reflected in a cephalad direction to the point where it fuses with the periosteum above the muscle fibers. The exposed muscle is

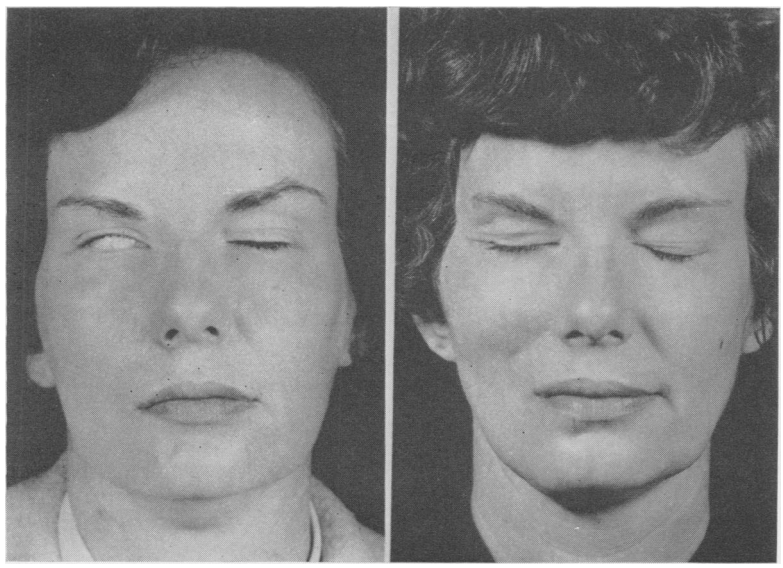

FIG. 9A, B. The preoperative view on the left shows the right facial palsy in a young woman nine months after the removal of an intracranial eighth nerve tumor. She is attempting to close both eyes. Corneal ulceration had developed twice because of defective lid closure. A temporalis muscle transfer was tried, but this incomplete closure of her lids (on left) resulted. The transfer was explored, and the loop shortening technic shown in Figure 10 was devised to improve activity of the eyelids. Complete active voluntary closure of the eyelids resulted as shown in Figure 9B (on the right). The incisions seen on the lower lip represent a recent digastric muscle transfer to restore depressor action of the lower lip.[22]

then elevated from above downward, leaving the strip of fascia attached to the cephalic end as an extension of length (Fig. 8A). The anterior and posterior deep temporal nerves enter the deep surface of the muscle in two or three branches above the external pterygoid muscle at the level of the infratemporal crest. These small motor nerves must be protected from direct injury or stretching. Figure 8A shows how the fascial reflection is split along its length to form two slips. One slip is threaded through the margin of the lower, and one through the upper eyelid. Each is then crossed under the internal canthal ligament and sutured to the other. The lower lid slip is placed under eight millimeters more tension than the upper lid slip. This eyelid transfer works well, even when the coronoid tip has been transplanted previously into the corner of the mouth (Fig. 9B, 9E). In a few such patients very wide smiling is accompanied by an automatic closing of the eye on the side of the temporalis transfer. This is not highly objectionable and some patients independently close the eye without raising the corner of the mouth. If patients are instructed to chew gum vigorously in the three- to six-month postoperative period, greater voluntary control of these transferred muscles may be obtained.

When corneal anesthesia is concurrent with fascial paralysis, the normal sensory warnings of corneal irritation are not experienced by the patient. Instead, he must develop the habit of regular intermittent eyelid closure by contraction of the temporalis muscle. Even in such cases the temporalis transfer to the eyelids has been sufficiently effective that any existing protective tarsorrhaphy can usually be opened. This temporalis muscle transfer restores the "pumping" action to the eyelids that is normally provided by the orbicularis oculi muscle. This pumping movement is needed to move the tears to the puncta of the lids.

On several occasions the eyelids closed incompletely several months after a temporalis transfer, even though the muscle could be seen to contract strongly. One cause was a tendency of the lower lid fascial slip to migrate inferiorly from the lid margin, permitting it to slide beneath "the equator" of the globe on tightening. This complication

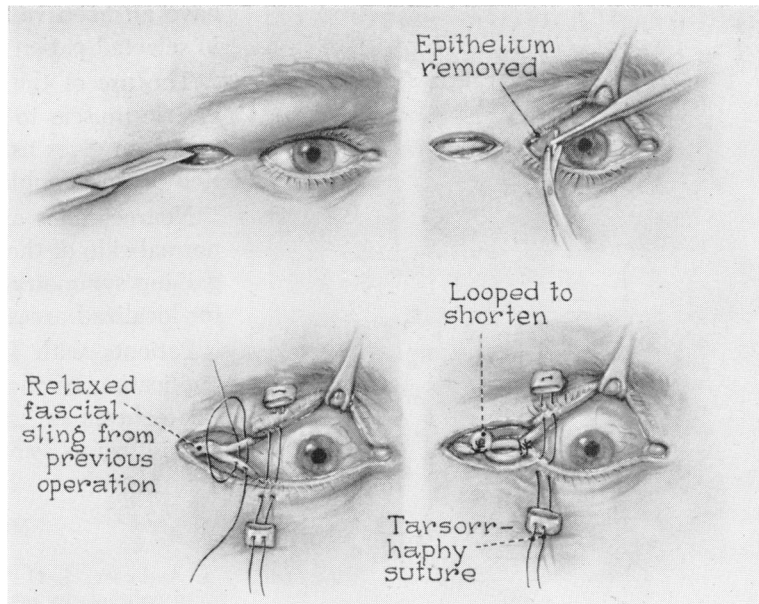

FIG. 10. One cause of failure of a temporalis muscle transfer to the eyelid is lengthening or stretching of the fascial slips in the postoperative period. This operative technic makes it possible to expose the fascia of the previous temporalis transfer under local anesthesia at the external canthus. This allows the surgeon to reduce selectively the length of one or both of the fascial limbs to properly increase closure. If necessary a tarsorrhaphy can be added or revised at the same procedure.

occurred particularly in patients whose natural shape of the orbit tends towards proptosis. It may be largely prevented by suturing the fascia to the tarsus of the mid-lower lid near the lash margin. A single non-adjustable suture at the time of inserting the slip suffices.

A second cause of inadequate eyelid closure after temporalis muscle transfer may be a straightening out or "stretching" of the temporalis muscle and fascial unit after the original suturing. We have devised an operative correction for this. A simple loop shortening of the fascia just lateral to the external canthus will often "take up the slack" and result in excellent eye closure (Fig. 9, 10).

Rubin recently described a one-stage operation in which he uses the entire temporalis muscle to reanimate the eyelids, cheek, and lips. He also applied this principle to bilateral facial palsies.[16]

Many patients are troubled by assymetry of the *lower lip* in speech and smiling even after paralysis of eyelids and corner of the mouth has been nicely corrected by dynamic transfers. In other instances operations or birth defects result in isolated palsy of one lower lip. The author recently described[9] an operation using the anterior belly of the digastric muscle to depress the lower lip (Fig. 11). This digastric muscle transfer may be carried out at the same operation as the transfer to the eyelids.

Summary

Better results are obtained each year in the treatment of facial palsy. Surgeons must learn and use newer technics and not be satisfied with procedures taught years ago if they wish to have excellent results. Muscle transplantations, nerve grafting, and to a lesser extent, selective myomectomies have been outstanding recent additions to the surgical armamentarium.

This report deals with the evolution of the surgical care of 187 patients with facial paralysis treated between 1949 and 1965 at the Johns Hopkins Hospital.

All patients with paralysis of the facial nerve who continued to have function of the motor branch of the trigeminal nerve of that side of the face should obtain "adequate reconstruction" of their deformity. This "adequate reconstruction" includes an acceptable balance of the face at rest, ac-

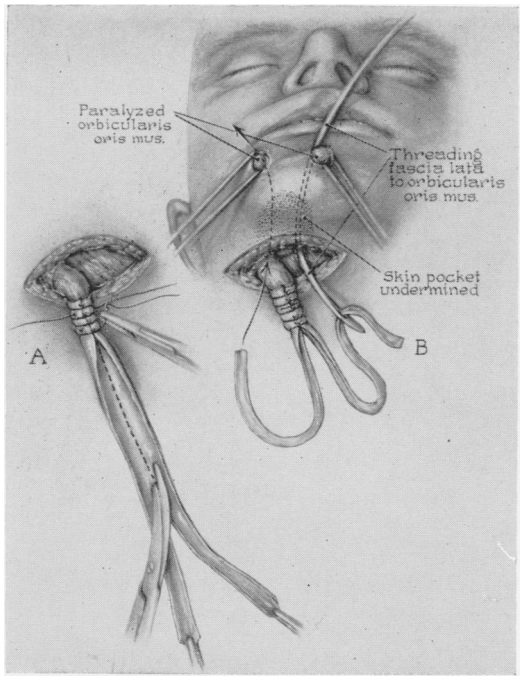

FIG. 11. When the lower lip is paralyzed, the assymetry may be corrected by freeing the anterior belly of the digastric muscle from the mandible. A graft of fascia lata may be lashed to the muscle and split into two tails. Each tail is then threaded subcutaneously to loop about a bundle of the paralyzed lip muscle located near the commissure and just lateral to the midline. The ends of the fascia are returned to the neck incision, tightened with lip in slight overcorrection and sutured. As an alternative, the fascia may be sutured directly to the digastric tendon without freeing the muscle from the mandible. This latter method gives slightly less excursion of the lip.

tive closure of the eyelids, and some voluntary movements of the lips and cheeks on smiling and talking.

Existing "overactivity" of the muscles on the normal side of the face consistently return to normal if the paralyzed side receives sufficient support and reanimation.

As the primary method of correcting established facial palsy; dynamic muscle transfers have great advantages over either hypoglossofascial anastomosis or static support with fascia lata, tendons, or synthetic materials. Static support of cheek, excisions of stretched excessive skin, punctal occlusion to maintain eye moisture, and constructions of the external canthal ligament have all been valuable additional methods in selected patients.

The use of the anterior belly of the digastric muscle to reanimate the paralyzed lower lip gives us the first dynamic correction of this troublesome assymetry.

Neurectomies and myomectomies of the normal side of the face have some value in gaining symmetry—but should be reserved for localized areas.

Patients with facial paralysis need the application of these and other new surgical technics to gain relief from deformity and return to social effectiveness.

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Discussion

Dr. Robert Moran (Washington, D. C.): Dr. Mahorner, Dr. Yeager, members and guests, I feel it is a great privilege to discuss this paper.

First, the young man is one of the plastic men in the United States at an early age. He has sufficient money; he has a lot of imagination; he works hard; and he is bound to go to the top. (Laughter.)

He has covered this subject so well that there is not much I can say. I have a few slides, but they are 35 years old, so they are not up to the photography of the young doctor. The first slide, please.

(Slide.) This patient, 35 years ago, had an adamantinoma of the mandible, ameloblastoma, and I did a resection of the jaw. Ten years later he had recurrence in the intratemporal fossa which involved the 7th, 9th, 10th and 11th nerves and the whole carotid sheath. I cleaned out the whole intratemporal fossa completely. You notice how he closes his lid.

(Slide.) I couldn't understand why he closed his lid, and I remembered Hayes Martin talking about the association with the 5th and all that—and I didn't believe it, but I injected novocain between the two orbicularis, figuring that he may have had some cross fibers, and he did not. Notice how he closes his lid; he closed it completely.

(Slide.) Here he is, closing his lid and opening it without any trouble.

(Slide.) You can't see well, and that is the way it should be. He is standing on his head, and I found out he couldn't close his lid when he was standing on his head (laughter), and then I began thinking about it. Lights, please.

It shows you can do research with just ten cents. (Laughter) You don't need the five million from the government.

Now, this fellow went on for about ten years more. After that I found out all about the animation from the various muscles thrown into the external canthus. Well, you don't need them. All you need to do is tighten up the external canthus by taking out a crescent, and you can attach it to the temporal fascia or just tighten it up.

Now, the first procedure may not have it tight enough, but then you can continue, and everyone will tighten up just the way you want it. Sometimes you have to do a little closure on the external canthus.

Since I found this out some 30 years ago, I haven't done all those muscle transplants to the eye. The eye is easy to close.

Now we come to the proposition that the best result obtained in facial paralysis is some form of the facial nerves. If you do a radical, you usually take all the fibers of the facial except one little nerve. Now there is one little nerve that passes unnoticed, and that is the auricular nerve to the two voluntary branches, to the ear, and to the posterior belly of the occiputal frontalis.

Now, about one person in five can move his ear by practicing—more than that if he continues to practice—but he can make the ear jump a little, and that is the superior and lateral sections of a muscle, which is lower forms of animals is very active. I had a little girl, six years old, who had a total parotid operation for a so-called cancer. I don't think it was cancer, but anyway it was one of those things the pathologists called it. So she had complete loss of the facial, and I got her to stand in front of the mirror every day and eventually she began moving her ear. I put fascia lata strips to hold the face up; I corrected the lid by just a little lateral pull.

Now she can jump that ear about one centimeter, and I intend to hook up the ear to the fascia lata strips to the angle of the mouth—I haven't completed it—but I feel positive. I have put adhesive across, and can see that it will jump. I am sure that is a good procedure in an occasional case.

Once in awhile there will be an injury to the facial nerve and the cervical branch is intact. With the cervical branch intact you can do quite a bit, that is applying the platsyma muscle.

You know in the old days of the belly dances which used to make the bazookas twist around—that was the over-exercise of the platysma. I thought it was quite wonderful, so I started to practice it, and I could make my little things