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New trends in management of facial nerve paralysis

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ABSTRACT

Facial paralysis is an unsatisfactory pathology to treat, and the results of neural reconstruction are unsatisfactory. Fortunately spontaneous recovery is common. We will talk about the new trends in the management of Facial nerve Paralysis, which not include its Diagnosis but also its Treatment in this article which we hope to be useful for patients and of course for E.N.T. Doctors or any Doctors concern with this subject. The aim of this study will be focused on new trends in diagnosis and treatment of lower motor facial nerve Paralysis. The primary use of gracilis free tissue transfer in the head and neck region is in the form of a muscular free flap for the dynamic rehabilitation of long-standing permanent facial paralysis. When combined with cross-facial nerve grafting or used as a single-stage reconstruction, free tissue transfer offers the best prospect for restoring spontaneous emotional facial expression. Benefits of this muscle over other free flaps used for dynamic facial reanimation include consistent anatomy with large caliber vessels, ease of harvest, a 2-team approach, reliability, and acceptable donor site morbidity. Drawbacks include excessive bulk, skin tethering, and a donor site scar that may be minimized with minimally invasive techniques. Secondary procedures to refine the results are often necessary to achieve a good final result. Ultimately, the choice of muscle for dynamic facial reanimation depends on the surgeon's experience and comfort level.

Keywords- Facial nerve paralysis, diagnosis and treatment, doctors.

INTRODUCTION

Facial expression is such important part of non verbal human communication that any paralysis or even deficiency of facial movements tends to not only be immediately noticeable ,but provide a serious social stigma for the patient .Paralysis is due to the interruption of the facial nerve along its long course through the temporal bone or in the face. The most common cause is idiopathic Bell's palsy for which no clear cause has been shown, although there is a frequent association with viral upper respiratory tract infection (Gliden DH, et al 2004).

Of the many possible treatments which have been recommended at one time or another, the only one which has stood the test of time is a short course of Cortisone. Bear in mind that it is always difficult to assess clinical results in a pathological process of which we do not understand the aetiology &whose outcome is so unpredictable (there is frequently a spontaneous recovery) (Jackson CG et al., 1999).

Facial paralysis is an unsatisfactory pathology to treat, and the results of neural reconstruction are unsatisfactory. Fortunately spontaneous recovery is common. We will talk about the new trends in the

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management of Facial nerve Paralysis, which not include its Diagnosis but also its Treatment in this essay which we hope to be useful for patients and of course for E.N.T. Doctors or any Doctors concern with this subject (Douglas RS, et al 2003).

The aim of this study will be focused on new trends in diagnosis and treatment of lower motor facial nerve Paralysis.

Management of Facial Nerve Paralysis

Medical Treatment:

There are no medications specifically approved to treat Bell's palsy. Underlying medical conditions that lead to facial nerve disorder are treated specifically according to the specific condition that is responsible for the damage to the nerve. Steroid medications (corticosteroids) are the best treatment for Bell's palsy, and it is recommended that all patients be treated. The usual amount is one milligram per kilogram body weight of prednisone (or steroid alternative) per day for 7 to 14 days. Recently, antiviral medications like acyclovir (Zovirax) given in conjunction with steroids have been demonstrated to increase recovery. Doses of the antiviral agent will vary with the drug chosen. (D.K. Binder et al.,2010).

Prednisolone is used in all patients with facial palsy of less than 72 hours and don't have absolute contraindications for steroid therapy.

Dose of steroids:-

1. 60 Mg per day for 5 days , reduced by 10 Mg / day for 5 days OR
2. 25 Mg twice daily for 10 days.
   Both have total 10 days duration.

Botulinum Toxin Therapy (BOTOX):

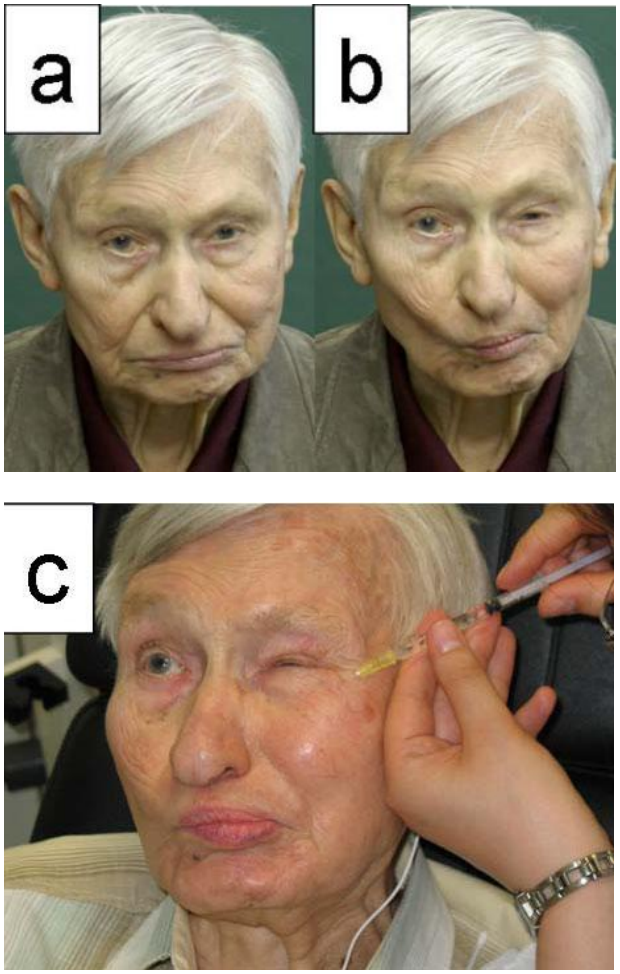
Management of synkinesis and hyperkinesis can include botulinum toxin injection. This technique yields good results in the control of these sequelae of reinnervation procedures but must be repeated approximately every 3 months. Usually, 5-10 units are injected initially to control eyebrow spasm, and an additional 10-20 units are injected into the zygomaticus muscle and then repeated with an adapted dose as needed. (Ito H, Ito H, et al.,2007)

Eye Care:

The most common complication of facial nerve paralysis, regardless of cause, is corneal desiccation and exposure keratitis , In addition to lagophthalmos, lower lid ectropion, and diminished lacrimation, there is often altered corneal reflex, the result is a significant risk of corneal ulceration, scarring, and permanent visual loss, especially in the absence of a normal Bell's phenomenon. (Alam D. et al ., 2011).

Management of facial paralysis should include liberal eye lubrication, use of a protective moisture chamber at night, and protective eyewear during the day, if recurrent ophthalmologic conditions warrant treatment or recovery of facial function is likely to be delayed, early eyelid reanimation is recommended, eye closure may be restored using an upper eyelid gold weight implant, a palpebral spring, or a lateral tarsorrhaphy. (Alam D. et al ., 2011)

Figure (1): Patient with oro-ocular synkinesia after severe Bell's palsy of left side; Pictures taken at rest (a) and with pursed mouth and involuntary synkinetic closure of the left eye (b). Treatment of the synkinesia with botulinum toxin injection into the orbicularis oculi muscle (c) (© 2010 Volk et al; licensee BioMed Central Ltd.)

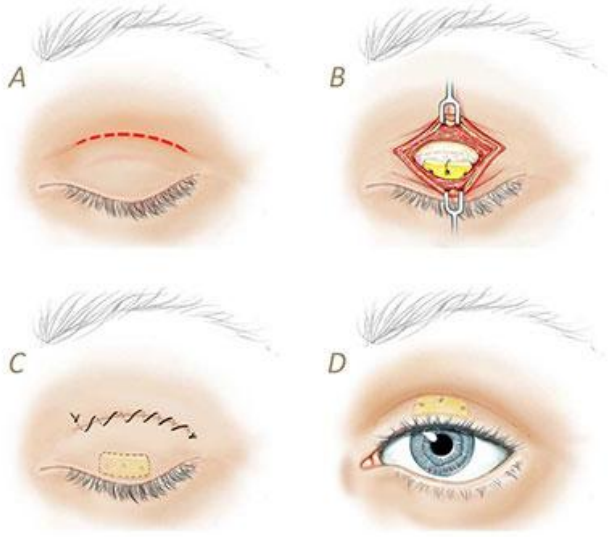


A. Gold weights and palpebral springs provide better eye protection, are easily reversible, and have become the procedures of choice. Temporary upper lid weights applied with adhesive tape are now available for short-term corneal protection.
B. Palpebral springs are technically more difficult to insert than gold weight implants.
C. Tarsorrhaphy is avoided when possible as it limits the visual field, provides incomplete

corneal coverage, and results in a significant additional cosmetic deformity (Alam D. et al ., 2011).

D.

Figure (2): Gold weights and palpebral springs(Alam D. et al ., 2011)



Surgical Options and Overview:

* Approaches of facial nerve surgery:

1-Middle Fossa Approach:

An incision is made above the ear and the brain with its dense covering is elevated. Bone over the facial nerve can be removed to allow decompression or inspection. This allows exposure of the nerve in the internal auditory canal, at the geniculate ganglion and into the middle ear.

2-Mastoid Approach:

Through an incision behind the ear, bone over the facial nerve can be removed as it passes across the middle ear and mastoid.

When surgical intervention is planned, the surgeon must remember that informed consent and preoperative consult are imperative to the physician and patient. Also, the physician must inform the patient that his or her face will never be symmetrical or have a normal balance. The patient's facial appearance is impaired mainly by loss of muscle tone on the affected side, but it is also influenced by severe contraction on the opposite, healthy side, options include direct coaptation, interposition nerve grafting, cross-face nerve grafting, and microneurovascular free tissue transfer.

If direct anastomosis of the facial nerve stumps is impossible, use an interposition nerve graft. Donor nerves for this procedure are the ansa hypoglossi, sural nerve, and medial cutaneous antebrachial nerve. Use of these nerves as donor nerves for either interposition grafting or cross-facial nerve grafting is described extensively in the literature (Alam D et al., 2011).

**Balancing and adjustment procedures:

*Indications:

After these dynamic facial reanimation procedures (active motion restoration), balancing and adjustment procedures are performed to give the face the final desired symmetry. These operations are static procedures, thus providing the face with more symmetry and balance at rest. Because of different patient opinions on further operations, these finishing steps should be made following mainly the patients' own desires of symmetry. (Jackson CG, et al.,1999)

Examples of these ancillary "touch-up" procedures are operations on the depressor anguli oris muscle group, enhancement of the nasolabial fold, and static eye procedures, such as upper eye lifting, static sling placement, and partial cervicofacial rhytidectomy.(Jackson CG, et al.,1999).

**Follow-up:

During all operative stages, the importance of clinical follow-up care cannot be overemphasized. For example, in cross-facial nerve grafting, use the sign of Tinel (paraesthesia when tapping on the regenerated end of the graft) for monitoring the nerve regeneration along the graft. However, these techniques are not available in all centers and require a second operation to remove the implanted devices.

#1-Surgery for Acute Facial Nerve Palsy:

Acute facial nerve palsy (injury not older than 1y) must be subclassified as acute nerve injury secondary to direct trauma or injury due to facial surgery (inadvertent transection or sacrifice for oncologic reasons)

Thoroughly evaluate the patient presenting with trauma to the facial nerve for the possibility of immediate reconstruction. The patient may need to undergo emergent surgical exploration in cases of penetrating trauma. However, the surgeon must decide if direct anastomosis of the proximal and distal stump is possible (microneurorrhaphy) or if interposition nerve grafting is necessary,it Includes: (Barr JS, et al ., 2011)

1-Surgical Decompression:

- Indications: (controversial) Gantz et al.,1999 suggest consideration of if ENoG reveals >90% weakness within two weeks after onset and no voluntary movement on EMG.
- Timing: most effective if performed within 2 weeks of onset.

- Technique: typically requires a transmastoid and middle cranial fossa approach with decompression of the tympanic segment, geniculate ganglion, labyrinthine segment, and meatal foramen.

2-Direct coaptation:

Perform direct coaptation of the injured stumps using microsurgical technique and without undue tension to minimize scar formation, which can hinder axonal regeneration .Fascicle sutures are theoretically possible, but no evidence supports the superiority of this technique compared with the epineural suture .However, synkinesis, facial spasm, and mass movement remain frequent complications in the rehabilitation of the facial nerve (Barr JS, et al.,2011).

3-Interposition nerve grafts:

If tension-free coaptation cannot be performed, consider the use of an interposition nerve graft.The great auricular nerve often can be used. This nerve is harvested using an incision made in an imaginary line drawn from the mandibular angle posterior to the mastoid tip. The great auricular nerve mainly provides sensation to the postauricular and the posterolateral cervical area. (Jackson CG, et al., 1999).

If, for any reason, the great auricular nerve cannot be harvested or if the length is not sufficient, use the sural nerve as a donor nerve for interposition. The sural nerve supplies the lateral aspect of the calf with sensation and usually is harvested by several small incisions cranial from approximately 1cm posterior to the lateral malleolus. Its major advantage vis-à-vis the great auricular nerve is its length, as up to 35cm can be harvested easily (Jackson CG, et al., 1999).

Other options include the ansa hypoglossi and the medial cutaneous antebrachial nerve. The ansa hypoglossi often is used when a combination of parotidectomy and neck dissection is performed. In this case, no new skin incision is needed, and the oncologically sacrificed distance of the facial nerve can be adapted exactly to the donor nerve harvest length (ansa hypoglossi). Also, the transfer of partial ansa hypoglossi nerve to the facial nerve can be performed with good results. A partial nerve transfer can reduce donor nerve complications (difficulties with speech and mastication) (Barr JS, et al .,2011).

In conclusion, direct nerve repair using neurorrhaphy techniques yields better results than interposition nerve grafting .Regenerative impulses yield an axonal length gain of approximately 1mm/day; muscle tone and movement is regained approximately 6-9 months after grafting (Barr JS, et al., 2011).

#2-Surgery for Chronic Facial Nerve Paralysis:

Clinically, facial nerve paralysis is considered chronic when its onset or the time of injury dates back more than 1 year. Two types of procedures are used in the surgical treatment of chronic facial nerve paralysis: dynamic and static reanimative procedures (Barr JS, et al.,2011).

Dynamic techniques include all surgical procedures that enable the patient to actively move facial or grafted muscles.

Static techniques include operations performed to optimize symmetry and reduce complications (eg, lip wedge resection,sling placement, partial cervicofacial rhytidectomy, upper lid blepharoplasty, lateral canthopexy) (Barr JS, et al.,2011).

When considering surgical intervention in chronic facial paralysis, carefully evaluate the patient's remaining potential for spontaneous recovery by electromyography (EMG), and ENog. (Barr JS, et al., 2011)

1-Static procedures:

I-Indications:

If the patient is not compliant enough to undergo several operative procedures, as is often necessary in microneurovascular tissue transfer or cross-facial nerve grafting, offer static procedures, such as sling placements (temporalis sling, Gore-Tex sling) or cervicofacial rhytidectomies to improve static symmetry of the face. The same decision should be made if the patient is in bad health or at higher risk (eg, diabetes, old age, multimorbid state).

II-Sites & Technique:

1-In the upper third of the face, a frequent problem is lack of eye closure and ectropic lower eyelid; placement of upper-lid gold weight is performed as a static procedure. For lower-lid ectropion, wedge excision of the lateral lower eyelid and lateral canthopexy are possible static procedures. Cosmetic impairment as found in ptosis of the eyebrow can be corrected with partial forehead and brow lifts (Brandt MG, et al ., 2010).

2-The midthird of the face is probably the most challenging region in facial reanimation. In this area, staple static procedures such as slings (either temporalis sling or Gore-Tex sling) and cervicofacial rhytidectomy, or more complex reconstruction such as tissue transfers or cross-facial reinnervation procedures, can be performed. Base decision making on the patient's personal needs of restoration and, most importantly, on the patients' general health (Brandt MG, et al ., 2010).

3- Lower lip paralysis can be corrected with a static sling. The sling usually is harvested from the anterior thigh fascia and adapted to the lateral orbicularis oris muscle and the zygomatic arch. Gore-Tex slings are described in the literature as well. They also yield excellent results in static facial reanimation (Brandt MG, et al ., 2010).

4-Moreover, "common" aesthetic procedures, such as partial cervicofacial rhytidectomies, cheiloplasty, and brow lift, can be offered to the patient as ancillary or "touch-up" procedures for the restoration of the paralyzed face.

5-Downward deviation of the lateral lip aspect often requires lateral lip wedge resection. This procedure often must be combined with static sling procedures or deep plane face lift to gain acceptable results in facial symmetry (Brandt MG, et al ., 2010).

Follow-up:

For static procedures, clinical examination is the basis of follow-up care. Closely monitor overcorrection, since gravity and skin laxity should equalize facial hemispheres by approximately 6 months postoperatively.

2-Muscle transposition techniques:

There are two types of these techniques :-

1- Muscle transfer :
(temporalis muscle and masseter muscle)
2- Free muscle flap :
(grasilis muscle and pectoralis minor muscle)

Some studies have shown that these complications can be minimized by transposition of only approximately one half of the hypoglossal nerve.Also, jump grafting (interposition), with the use of the hypoglossal nerve to coapt the facial nerve by interposition of a nerve graft, has been described in the literature with good functional results (thus reducing the occurrence of complications of the hypoglossal-facial nerve transfer). However, studies have demonstrated the masseter nerve to be a superior donor nerve (Barr JS, et al., 2011)

Follow-up:

For interposition or cross-facial nerve grafts, the Tinel sign (tingling sensation along the distribution of specific nerve as a result of percussion over the nerve) can be observed along the course of the regenerating nerve, approximately 1mm/day. Nerve conduction studies also can be used as adjunct studies (Barr JS, et al., 2011).

3-VII-VII transfer:

(this technique only used with or in conjunction with free muscle transfer)

A well-known technique is the coaptation of the contralateral buccal branch to the ipsilateral facial nerve, a procedure that is termed VII-VII transfer. This technique requires 2 operations (Barr JS, et al., 2011).

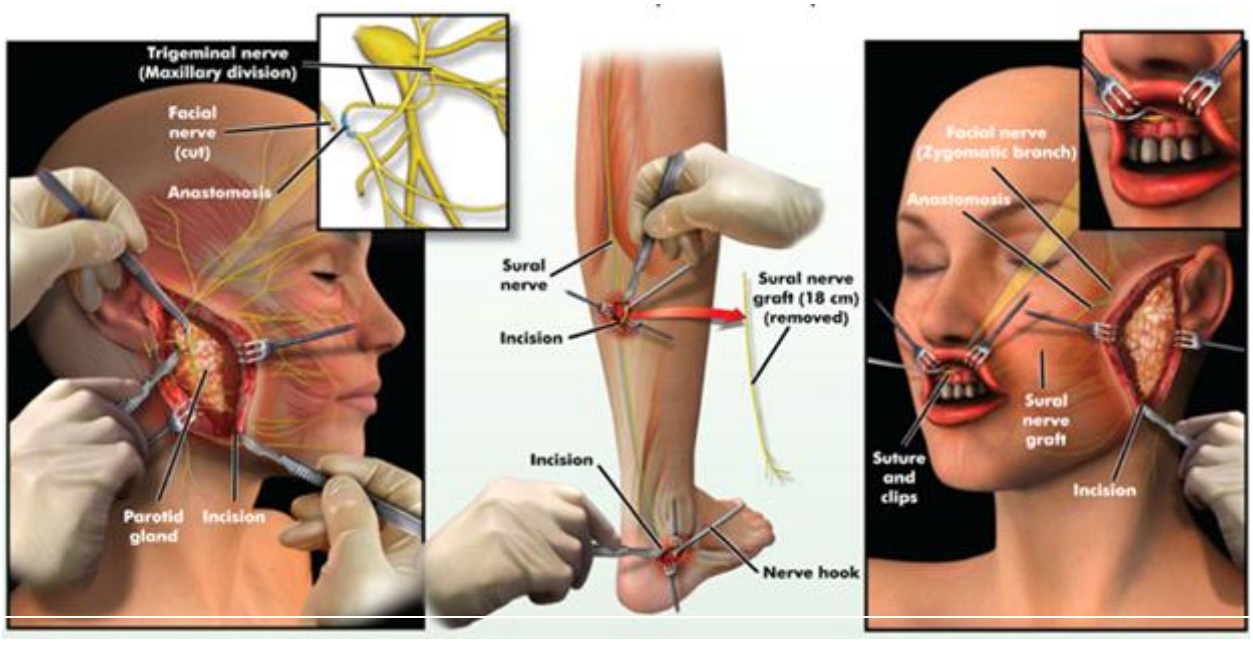
Primarily, (first step), a sural nerve graft is coapted to the contralateral buccal branch, then tunneled through the upper lip and usually left in the subcutaneous tissue. This is performed to allow axonal regeneration in the sural nerve.

Closely monitor the patient for axonal regeneration using the Tinel sign. The patient experiences dysesthesia upon tapping on the estimated end of the regenerated axons. However, the results of this technique are not favorable; additionally, the patient is at risk of losing innervation of the contralateral midface (Barr JS, et al.,2011).

Second step: (muscle transfer (gracilis muscle and pectoralis minor muscle).

4-Muscle transposition:

Figure (3):VII-VII Transfer. (Barr JS, et al.,2011)



I-Definition:

Muscle transposition also can be offered for the dynamic restoration of the paralyzed face. The temporalis muscle often is used for this transposition technique. Another muscle for possible transposition is the masseter muscle, which is not used frequently due to the concomitant complications in mastication and speech.(Some authors describe useful masseter muscle transposition in the case of massive buccal volume loss) (Boahene KD, et al .,2011).

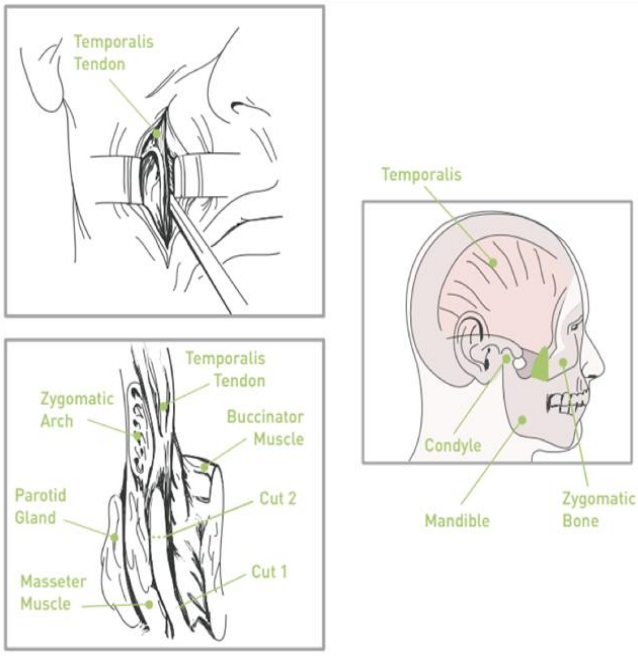
II-Indication:

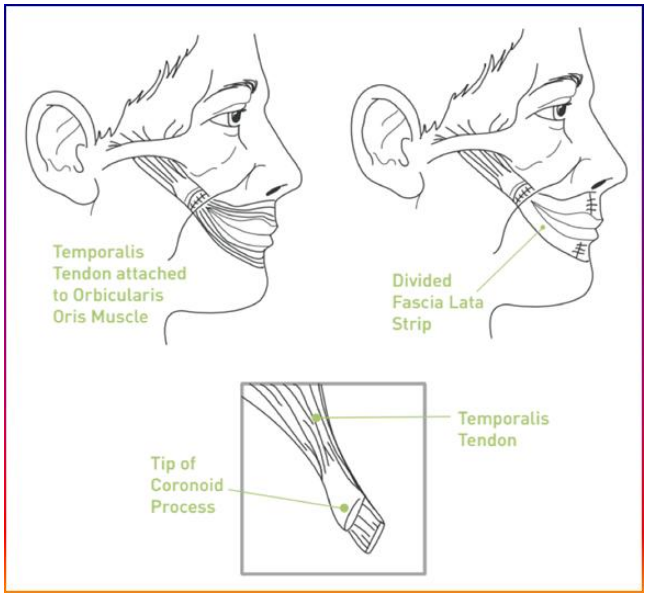
The temporalis muscle transposition operation can be performed when the distal stump and the corresponding motor end plates are found electrophysiologically not to be viable. Advantage of this procedure is the adjacent volume gain.

III-Technique:

Elevate a temporofascial flap using a hemi-coronal skin incision. Incise a strip of approximately 2cm and rotate it distally through a preformed subcutaneous tunnel down to the mesiolabial fold. Here, connect the flap to the upper lateral part of the orbicularis oris muscle. Overcorrection is of the utmost importance because of possible postoperative tissue laxity (Boahene KD, et al .,2011).

Figure (4): Muscle transposition (Barr JS, et al., 2011).





**New Trends In Surgery Of Facial Nerve Paralysis:

1-Endoscopically assisted facial suspension

Static suspension remains an option for certain patients with facial paralysis. Endoscopically assisted facial suspension obviates the need for a counter-incision at the oral commissure to distally inset the fascia lata graft as described in the standard technique. The endoscopic technique is simple, allows secure placement of perioral fascial strips, and can be performed as an outpatient.

Rehabilitation and reanimation of the paralyzed face remains difficult, despite many described static and dynamic procedures ,the goals in the treatment of facial paralysis are to achieve resting symmetrical facial tone and to create spontaneous synchronus symmetrical animation with the non-paralyzed side, dynamic methods of facial reanimation are the preferred approaches for reconstruction ,if dynamic methods are not feasible or not necessary ,it can be indicated to use static techniques to suspend the midface and protect the orbit ,usually ,autogenously tissues such as fascia lata or alloplastic materials as GORE-TEX are used (Hadlock TA, et al .,2011).

Instead of using these techniques, we decided to use an endoscopic approach, as in aesthetic facial surgery, to suspend the soft tissues of the paralyzed half-face.

2. Microneurovascular free tissue transfer:

**Indications:*

Microneurovascular free tissue transfer frequently is used after tumor surgery of the face, thus restoring voluntary facial movement and at the same time reconstructing and/or filling the soft tissue defect. Generally, initial microneurovascular free

tissue transfer yields excellent results in postoperative movement of the face, mastication, and speech (Hadlock TA, et al .,2011).

*Advantages:

The advantage over muscle transposition is the possibility of reconstruction of spontaneous facial musculature movement by coaptation to the proximal facial nerve stump. Free tissue transfer also can be useful to restore large volume defects that could not be reconstructed easily with the comparable "low-volume" temporalis muscle transposition. The gracilis muscle free flap and the latissimus dorsi muscle flap are frequently used muscles for microneurovascular free tissue transfer (Barr JS, et al .,2011).

*Technique:

1-After dissection of 2 muscle paddles originating from 1 neurovascular paddle of the thoracodorsal vessels and nerves, the graft is transferred up to the face and fixed to the zygomatic arch, lateral corner of the mouth, and second paddle from the lateral canthus to the medial, thus reanimating both the middle part of the face (smile reconstruction) and the upper part (eye closure).

2-Harvest the gracilis muscle using a groin-to-middle thigh incision running medially to the tibia. After identification of the gracilis muscle, separate the adductor longus muscle. The vascular pedicle usually is found when the adductor muscle is retracted laterally. Then make an incision on the superior part of the gracilis muscle as needed for reconstruction of the recipient site. Thereafter, transect the vascular pedicle and bring the muscle flap up to the face. (Barr JS, et al .,2011)

3-After suturing the inferior part of the gracilis muscle, the lateral aspect of the orbicularis oris muscle, pull the superior part cranially, giving until the desired muscle tension is reached, and consecutively suture it to the zygomatic arch. Coapt the donor nerve (anterior obturator nerve) to the recipient proximal stump of the facial nerve or the end of the sural crossover nerve graft. Other donor nerves, such as the ansa hypoglossi or the motor branch of the masseter muscle, also are used.

*Complications with speech and swallowing must be accepted by the patient; he or she also needs to learn to activate the transferred muscle by clenching the teeth or swallowing.

The rectus abdominis muscle free flap can be harvested in a standard fashion as needed, either with or without a skin paddle. Muscle transfer and preparation depend on the needed tissue volume and length. Donor vessels are the inferior epigastric artery and vein. Place the muscle flap in an oblique position and afterward suture it to the lateral aspects of the orbicularis oris muscle and the zygomatic arch, as previously described. (Barr JS, et al .,2011). Overcorrection is essential in the gracilis muscle free flap and the rectus abdominis muscle free flap. The gracilis muscle flap and the rectus abdominis muscle flap can be harvested with a skin island, thereby providing coverage of even large tissue defects after radical tumor surgery. (Barr JS, et al .,2011).

Another excellent muscle for free microneurovascular transfer is the pectoralis minor muscle. This muscle, originating from the third, fourth, and fifth ribs, has the major advantage in that it has a strong tendinous insertion, which makes it ideal for a "pull-up" muscle for the restoration of a smile. Moreover, the pectoralis minor muscle has a dual nerve supply (the lateral and medial pectoral nerves), making single-stage smile and eye closure restoration possible by splitting the flap. Excellent functional results for smile reconstruction using the pectoralis minor muscle have been described in the literature.(Barr JS, et al .,2011).

Follow-up;

In microneurovascular transfers, follow-up care involves close monitoring in the hospital with Doppler signals and thorough examination of the flap. Capillary refill and the pinprick test can be used to assess flap viability. As mentioned before, thermocouple devices can be used for free tissue transfer follow-up care, but this technique is available only at some hospitals.

2. *Gracilis Tissue Transfer*

A-Indications:

The gracilis free flap has been primarily used as a muscular, rather than a musculocutaneous, free flap because of the questionable consistency of musculocutaneous perforating vessels over the distal third of the muscle. The muscle itself has been shown to recover function within a few months. Concerns have been raised about the reliability of the overlying skin paddle. However, Yousif et al described excellent results in using the transverse gracilis myocutaneous flap in select patients.They demonstrated that a large skin paddle can be harvested along with the muscle (Hadlock TA, et al ., 2011).

Moreover, in an anatomic study by Lykoudis et al, the cutaneous perforators were found to lie in the proximal third of the muscle.In the clinical setting, Doppler is used to map the cutaneous perforators to ensure reliability. Alternatively, in settings in which cutaneous coverage is required, the gracilis free flap may serve as a recipient bed for skin grafts. (Hadlock TA, et al .,2011).

The most common indication for gracilis free flap in head and neck reconstruction is for dynamic

reanimation of the mid face and, occasionally, for the eye and forehead of the patient with permanent long-standing or congenital facial paralysis. In these 2 types of facial paralysis, the native facial musculature is absent because of either severe atrophy or congenital causes. In cases of long-standing secondary facial paralysis, a branch of the contralateral normal facial nerve via a cross-facial nerve graft is used for neural input. In cases of congenital facial paralysis, an alternative nerve graft (trigeminal or hypoglossal nerve) can be used for neural input. Less common indications include reconstruction of total or near-total glossectomy defect, repair of full-thickness scalp defects due to surgery or trauma, and soft tissue filling for surgical defects (eg, orbital exenteration) (Hadlock TA, et al .,2011).

B-Preoperative Evaluation:

A history is obtained with specific focus on whether any prior trauma or surgery related to the upper thigh occurred. When questionable, the main vascular pedicle can be evaluated with Doppler ultrasonography or angiography. In patients with no relevant past history, no investigation is required. If a skin paddle is to be used, then the perforator can be mapped preoperatively or intraoperatively. When used as part of a staged reanimation procedure, a positive Tinel sign can confirm cross-facial nerve growth through a previously placed reversed nerve graft. This sign is considered positive when paresthesias occur as a result of tapping the preauricular nerve graft stump. Cross-facial nerve regeneration typically takes 6-9 months. (Hadlock TA, et al .,2011).

C-Technique:

The donor site is prepared and draped in the usual fashion. Draping should include the pubic symphysis and the medial condyle of the femur. Circumferential exposure of the thigh is desirable. Premarking the patient in the standing position can aid in identifying the muscle when supine. The patient is positioned supine with the hip externally rotated. The leg is abducted, and the knee is slightly flexed. (Hadlock TA, et al .,2011).

A10-cm longitudinal incision is made on the posterior-medial thigh 10 cm below the pubic symphysis within a line drawn between the adductor tubercle and the medial condyle of the femur. The incision can also be made about 4-5 cm below the adductor line. Dissection is performed through subcutaneous tissue to expose the muscular fascia. The neurovascular pedicle is located at the upper part (anterior) of the upper third of the muscle. Neural and vascular pedicles are dissected approximately 10 and 6 cm, respectively. Blunt finger dissection is used to free the distal muscle. A second small incision approximately 10 cm above the knee is made, and the lower part of the muscle is bluntly dissected. (Hadlock TA, et al .,2011).

After the muscle is dissected, marking sutures are placed at 1-cm intervals along its length to aid in reestablishing normal resting length and tension after transfer. Reserve a minimum of 1 cm on each end for suture placement, thus making the harvested length 2 centimeters longer than the needed functional length. Suturing the ends of the muscle with an absorbable suture in a running fashion is also helpful to prevent anchoring sutures from pulling through. (Hadlock TA, et al .,2011).

After the distal portion of the muscle has been transected, the muscle is withdrawn through the subcutaneous tunnel, and the aponeurosal attachment to the pubis is separated. Hemostasis is achieved, and after assuring adequate pedicle length, the neurovascular pedicles are transected. The muscle can be divided into 2 functioning units, if desired, for eye and midfacial reanimation, although this practice is not recommended by most surgeons. (Hadlock TA, et al .,2011).

The upper third of the muscle (6-8 cm) is the part that is typically used for facial reanimation. In most cases, thinning of the muscle is necessary to avoid excessive bulk. One method of avoiding excessive bulk or skin tethering postoperatively is to use the anterior third to half of the muscle and preserve the investing layer of fascia. For forehead reanimation, removing the investing fascia and performing multiple partial cross cuts parallel to the direction of the muscle fibers (separating the muscle bundles) can accomplish the necessary thinning and broadening that is required (Hadlock TA, et al .,2011).

If the gracilis is to be harvested as a myocutaneous tissue, the skin perforator is marked with a Doppler after the leg is prepared. The perforators are usually consistently present in the proximal portion of the muscle. The skin paddle can be fashioned in a longitudinal or transverse fashion and can be as large as 10 cm X 20 cm (Hadlock TA, et al .,2011).

The wound is closed in the standard fashion. Even if the myocutaneous flap is used, the leg can be primarily closed. When muscle is transferred to the face, reestablishing normal resting muscle tension is important to ensure maximum muscle survivability and function. Position the neurovascular pedicle on the deep aspect to avoid damage if debulking procedures are required later. A nerve stimulator may be useful for estimating transferred muscle function in situ (Hadlock TA, et al ., 2011), Gracilis tissue transfer **(**Hadlock TA, et al ., 2011).

CONCLUSION

The primary use of gracilis free tissue transfer in the head and neck region is in the form of a muscular free flap for the dynamic rehabilitation of long-standing permanent facial paralysis. When combined with cross-facial nerve grafting or used as a single-stage reconstruction, free tissue transfer offers the best prospect for restoring spontaneous emotional facial expression. Benefits of this muscle over other free flaps used for dynamic facial reanimation include consistent anatomy with large caliber vessels, ease of harvest, a 2-team approach, reliability, and acceptable donor site morbidity. Drawbacks include excessive bulk, skin tethering, and a donor site scar that may be minimized with minimally invasive techniques. Secondary procedures to refine the results are often necessary to achieve a good final result. Ultimately, the choice of muscle for dynamic facial reanimation depends on the surgeon's experience and comfort level.

**Physical Rehabilitation:

The basis of physical rehabilitation is physical therapy. The physical therapist should teach the patient how to innervate the facial muscle efficiently after nerve transfer and grafting. Also, the patient should be encouraged to exercise the facial musculature to gain maximum strength of muscle pull. Nerve stimulation can be used postoperatively; however, electrical stimulation does not constantly demonstrate evident improvements.

**Surgical Complications

1-Hearing Loss:

All patients notice some hearing impairment in the operated ear immediately following surgery. This is due to swelling and fluid collection in the mastoid and middle ear. This swelling usually subsides within 2 to 4 weeks and the hearing returns to its preoperative level. In an occasional case, scar tissue forms and results in a permanent hearing impairment. It is rare to develop a severe impairment (Barr JS, et al .,2011 and Radha Krishnan D and Aditya M.G.V, 2015).

2-Dizziness:

Dizziness is common immediately following surgery due to swelling in the mastoid and irritation of the inner ear structures. Some unsteadiness may persist for a few days postoperatively. On rare occasions, dizziness is prolonged.

3-Related to Middle Fossa Approach:

The middle fossa approach to the facial nerve, absolutely necessary in some cases, is a more serious operation.

Hearing and balance disturbances are more likely following this surgery. Permanent impairment is, nonetheless, uncommon. (Barr JS, et al .,2011).

4- Hematoma ;

Collection of blood under the skin incision develops in a small percentage of cases, prolonging hospitalization and healing. Re-operation to remove the clot may be necessary if this complication occurs.
5-A cerebral spinal fluid leak ;

Leak of fluids surrounding the brain develops in an occasional case. Re-operation may be necessary to stop the leak.

6-Infection ;

Is a rare occurrence following facial nerve surgery. Should it develop, however, after a middle fossa approach, it could lead to meningitis, an infection in the fluid surrounding the brain. Fortunately, this complication is very rare. (Barr JS, et al .,2011)

7-Temporary paralysis of half the body ;

Has occurred following a middle fossa operation, due to brain swelling. This complication is, however, extremely rare.

8-Complications Related to Hypoglossal-Facial Anastomosis;

A hematoma (collection of blood under the skin incision) develops in a small percentage of cases, prolonging hospitalization and healing. Re-operation to remove the clot may be necessary of this complication occurs. Infection is a rare occurrence following hypoglossal-facial anastomosis.

9-Complications Related to Botlinum Toxin Injection;

Botulinum toxin is a safe therapy when administered in the appropriate dosage by experienced physicians. Side effects are generally transitory, well tolerated and amenable to treatment. Persisting complications are distinctly rare and serious side effects are uncommon (Barr JS, et al .,2011).

10-Complications Related to Facial Reanimation Surgery;

*** Eye:** Risks and complications can occur after eye surgery and should be discussed with the ophthalmologist.
*** Mouth:** Infection at the incision sites may occur and can usually be treated with antibiotics. Readmission to the hospital and re-operation is rarely required.
***A hematoma :** (collection of blood under the skin incisions) develops in a small percentage of patients.

Re-operation to remove the blood clot is rarely needed.

***Temporalis muscle retraction**: occurs in some patients with weak facial tissues. The sutures between the muscle and the weakened tissue cannot hold adequately and the temporalis muscle retracts into the cheek. Re-operation is needed to reattach the temporalis muscle to the mouth tissues. Usually, scar tissue from the first operation provides adequate anchoring of the temporalis muscle for reattachment.

Fullness over the cheekbone occurs in all patients. This results from the temporalis muscle as it passes to the mouth. While this is noticeable, rarely is it objectional. Further revision surgery is required in some patients. Because of individual variability, it is impossible to predict healing results exactly. To achieve the desired results, minor touch-up or fine tuning surgery may be required after complete healing has occurred (Barr JS, et al .,2011).

Conflict of Interests:

The authors declare that there is no conflict of interests regarding the publication of this paper.

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