

Static suspension technique with alloplastic suture material for facial reanimation in facial palsy

Girish Rai¹, Kavitha P Palled^{2*}, Nithya Shree³

¹Senior Consultant, ²Registrar, ³DNB Resident, Dept. of ENT, Head and Neck, Manipal Hospital, Bangalore, Karnataka, India

***Corresponding Author:**

Email: bkkavita001@gmail.com

Abstract

Introduction: Facial paralysis is an unsatisfactory pathology to treat, and the results of neural reconstruction are unsatisfactory and over the last few decades several techniques static and dynamics, have been performed to improve facial asymmetry and functionality after suffering facial paralysis.

Methods: we presenting a case report to evaluate the benefits of a new form of facial suspension, with prolene sutures traction technique. We performed on a patient with partial facial palsy.

Results: six months after surgery, patient have improved facial asymmetry, mastication and speech production which have led to a higher self-esteem and major social interaction.

Conclusions: static facial suspension with prolene sutures is a better alternative to dynamic techniques in patients who don't want or can't undergo more complex surgeries.

Keywords: Facial palsy, Facial nerve, Static suspension, Re-animation.

Introduction

Facial paralysis can result from a wide variety of etiologies including infectious, neurologic, congenital, neoplastic, traumatic, systemic, and iatrogenic causes. Regardless of cause, the management of facial paralysis is complex and often requires multidisciplinary intervention. The evaluation and treatment of facial paralysis is especially intricate because of the wide variation in the potential for regeneration and lack of reliable prognostic indicators for spontaneous recovery. Current management of facial paralysis consists of a combination of pharmacologic therapy, physical therapy for facial neuromuscular retraining, and surgical intervention via dynamic and static techniques for facial reanimation.

The overall effect of facial paralysis on static and dynamic facial appearance, verbal and nonverbal communication, functional issues such as ocular dryness and epiphora, oral incompetence, poor salivation, loss of taste, nasal obstruction, and the resultant impairment in the patient's self-image results in significant global disability, and many patients withdraw from their normal lives.^{1,2} The etiologic factors of facial nerve paralysis are classified under the categories of: birth, neurologic trauma, infection, metabolic, neoplastic, toxic, iatrogenic and idiopathic, and the four most common causes are: trauma, Bell's palsy, iatrogenic, and idiopathic.²

Patients should ideally be assessed and managed by a multidisciplinary team i.e. otolaryngology, plastic surgery, neurosurgery, ophthalmology, psychology, speech and language therapy, occupational therapy and physiotherapy.

The history and physical examination are directed to identify the cause and topographic location of the injury as well as the degree of injury.

Electromyography (EMG) plays a central role in the evaluation of the patient.¹ EMG allows a prognostic evaluation on the probability of spontaneous healing. Magnetic resonance imaging (MRI) is a preferred method of choice in order to localize a lesion of the facial nerve in the brain stem, the cerebellopontine angle and in the intratemporal course of the nerve. It also helps to determine the mimetic muscle volume and fibrosis. After electrodiagnostic studies and imaging studies have been obtained, the surgeon is faced with decision of when and how to proceed with facial reanimation.^{1,2}

In most cases of chronic facial paralysis of greater than 2 yrs. duration, the native facial musculature has atrophied and requires the use of alternative muscles for facial reanimation. Muscle transfer techniques, including regional and free muscle transfer, are the mainstay of dynamic facial reanimation for chronic facial paralysis.

Static facial slings for facial support are typically placed from the zygomatic arch/temporalis fascia to the oral commissure and nasolabial fold. A number of materials have been described for use as the sling material including fascia lata, Gore-Tex, and AlloDerm. In addition, multivector suture techniques have also been described for facial suspension. External nasal valve repair an often overlooked aspect of the patient with facial paralysis is external nasal valve collapse. This can be treated with a fascia lata sling from the alar base to the zygoma/temporalis fascia to stent open the external nasal valve.

Facial paralysis is an unsatisfactory pathology to treat, and the results of neural reconstruction are unsatisfactory. In this article, we will discuss the facial reanimation techniques and focus on static suspension our case.

Surgical Techniques for Facial Reanimation

There are many techniques which have been developed for both facial nerve function and cosmetic deformity restoration. By modifying and combining these techniques, it is possible to achieve successful results with facial reanimation. Facial reanimation techniques generally in the categories of: facial nerve repair and grafting, facial reanimation using cranial nerves, musculofacial transposition (or free muscular transplantation,) static sling techniques, eyelid and muscular positioning procedures, and selective myectomy.³⁻⁵ Static procedures may be very beneficial to provide corneal protection, improve the nasal airway, prevent drooling and improve facial asymmetry at rest. They are potentially indicated in the elderly, the unfit, those unwilling or unfit to undergo prolonged surgery, those with established paralysis without viable facial musculature, as a temporizing measure, with massive facial defects secondary to trauma or cancer extirpation, or after failed microvascular procedures. Static procedures to correct functional disabilities include temporary or permanent tarsorrhaphy; insertion of gold weights, palpebral springs or lid magnets; Müllerectomy; brow lift or suspension; forehead skin excision; unilateral facelift-type procedures; and static slings; Static Facial Suspension;

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) Static facial suspension procedures for those with long-standing paralysis can establish facial symmetry at rest when no viable re-innervation potential exists. It can also be integrated with dynamic procedures such as facial nerve grafting to provide instantaneous restoration of facial symmetry during the postoperative recovery period.

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.

Regional muscle transfer like the temporalis muscle transfer is the most commonly utilized regional muscle transfer for dynamic facial reanimation. Preoperatively, it is important to ensure that the patient has normal trigeminal nerve function and that the muscle is not atrophic. In the classic temporalis muscle transposition, a 1.5-2.0 cm wide strip of temporalis muscle is elevated from the cranium and rotated inferiorly over the zygoma to reach the oral commissure. The vector of this rotation is favorable because it is typically in the smile vector. A variety of

techniques have been described for filling in the depression in the temple created by the muscle transfer including alloplastic implants, fat grafting, and use of the temporoparietal fascial flap for obliteration of the defect.

The workhorse of free muscle transfer for facial reanimation remains the gracilis muscle. The gracilis muscle is a long, thin muscle located in the medial thigh. It is easily harvested and provides an excellent neurovascular pedicle. Its location in the medial thigh permits the use of a two-team approach with one team for flap harvest and one team for preparation of the recipient site. For unilateral facial paralysis, the gracilis muscle transfer is typically done in two stages. In the first stage, a cross-face nerve graft is performed using a sural nerve graft as described above. After 6-12 months, the second stage is performed wherein the gracilis muscle is harvested and transferred to the paralyzed side of the face. Vascular anastomoses are performed to the facial artery and vein or to the superficial temporal vessels. The obturator nerve to the gracilis muscle is coapted to the distal end of the sural nerve graft placed at the first stage. Typically, movement of the muscle is detected by six months but may take up to one year or longer.

Static facial suspension procedures traditionally involve suspension of the mid and lower face with a sling consisting of variable materials. Static facial suspension is usually performed in conjunction with a traditional unilateral face-lift on the paralyzed side for further elevation.^{4,6}

A variety of autologous and alloplastic materials have been used for static facial suspension. They can function as a sling attached from the deep temporalis fascia to the oral commissure without the need for sacrifice of autogenous tissue. Autologous substances (fascia lata and palmaris longus tendon) are immune compatible, but may cause significant donor site morbidity and lead to unpredictable results. Alloplastic materials, such as polytetrafluoroethylene, polypropylene mesh, and silicone rods that tend to form granulomata, are easily stretchable and have a high rate of extrusion and cause wound complications.^{4,6} Numerous studies compare biomechanical properties of different materials used in facial slings to help determine clinical superiority. Alloplastic material like polypropylene suture advantages of their availability are without causing additional donor site morbidity, which is seen in autogenous materials. Although static suspension slings can recreate definition at the nasolabial fold, they do little to evert the upper lip or to lateralize a collapsed ala to its original pre-paralyzed position. This is because elevation can be provided only in a flat, 2-dimensional plane. In addition, asymmetry in the length of the upper lip segments is inevitable owing to stretching of the upper lip segment on the paralyzed side by the superior-lateral pull by the static suspension sling.

The most important complication of this surgery is loss of correction but with our technique this loss of correction easily addressed further tying of suture knot without much morbidity.⁵⁻⁷



Fig. 1: Showing marking of incisions and needle placement



Fig. 2: showing adequate tension of sling over desired site giving immediate post op result with good suture line



Fig. 3: Showing Pre-operative and Post-operative image

Our Surgical Technique

A female who had developed Bell's palsy previously presented to our hospital, and our planned course of action was a static facial suspension using an prolene suture sling. Small stab incisions were given at pre-auricular region and oral commissure, alar base of nose. Subcutaneous tunnel was created from pre-auricular region to alar of nose. A two long horizontal needle passed from tunnel created in subcutaneous plane and two prolene suture material were used to fix upper and lower lips deep tissues by sutures through the tunnels elevated previously in the subdermal plane, It was also fixed at side of alar base of affected side of nose for levator labii superioris alaeque nasi pull, Following that, suture materials passed through the

subcutaneous tunnel and brought out of pre-auricular incision and the suture materials was stretched to the desired tension and with the help of the openings made earlier in pre-auricular region, was fixed to the subcutaneous tissue. Excess skin and tissue was removed and skin closure was done, completing the procedure. Postoperative assessment took place 6 months or longer after surgery to ensure that long-term results were assessed. Evaluation of functional outcome was achieved by patient history.

Conclusion

The reconstructive surgeon has a wide array of surgical treatment options for management of the patient with facial paralysis. An organized, thoughtful approach is necessary when evaluating patients with facial paralysis to ensure that no obvious treatment choices are overlooked. It is important to remember that static techniques of facial reanimation can be used for acute, intermediate, or chronic facial paralysis as these techniques are often important adjuncts to the overall management strategy.

Static facial suspensions are an effective method of correcting facial nerve deficits in cases where nerve repair is not planned or possible. Static suspension procedures address the cosmetic and functional sequelae of facial paralysis. Nerve repair or nerve graft Reanimation techniques may improve facial tone and mobility; however, these procedures typically require multiple, lengthy operations to achieve the desired effect.

Static techniques may be appropriate for patients who are unable to tolerate dynamic reconstruction. These procedures can provide facial symmetry at rest and oral competence, but have no effect on volitional movement.

The use of prolene suture for the construction of facial slings is done for first time in our institute and no supported literature available. The drawback of the use of muscle or fascia transfer for this purpose is that a donor site is required, and requires a separate incision and tissue resection, sometimes at a site remote from the recipient site and which can be avoided in our technique.

When considering this confidence, cost, and lack of complications associated with a suture sling and loss of correction can be addressed easily with further tightening of knot over pre-auricular site at subsequent time with less morbidity. It is seen as a viable and preferable choice in facial paralysis treatment.

References

1. Melvin TA, Limb CJ. Overview of facial paralysis: current concepts. *Facial Plast Surg.* 2008 May;24(2):155-63.
2. Hadlock TA, Greenfield LJ, Wernick-Robinson M, Cheney ML. Multimodality approach to management of the paralyzed face. *Laryngoscope.* 2006 Aug;116(8):1385-9.

3. Sofferan RA. Facial nerve injury and decompression. In: Nadol JB Jr, Mckenna MJ, editors. *Surgery of the ear and temporal bone*. Philadelphia (PA): Lippincott Williams and Wilkins; 2005. p. 435-50.
4. Humphrey CD, Kriet JD. Nerve repair and cable grafting for facial paralysis. *Facial Plast Surg*. 2008 May;24(2):170-6.
5. Volk F. G, Pantel M, Guntinal-Lichius O. Modern concepts in facial nerve reconstruction. *Head Face Med*. 2010;6:25.
6. Mehta P. R, Surgical treatment of facial paralysis. *Clin Exp Otorhinolaryngol*. 2009 March; 2(1):1-5.
7. Tomat LR, Manktelow RT. Evaluation of a new measurement tool for facial paralysis reconstruction. *Plast Reconstr Surg*. 2005 Mar;115(3):696-704.
8. Rose E. Autogenous fascia lata grafts: Clinical applications in reanimation of the totally or partially paralyzed face. *Plast. Reconstr. Surg*. 116:20,2005.
9. Dzwierzynski WW, Sanger JR, Larson DL. Use of Mitek suture anchors in head and neck reconstruction. *Ann Plast Surg*. 1997;38(5):449-454.
10. Morgan AS, McIff T, Park DL, et al. Biomechanical properties of materials used in static facial suspension. *Arch Facial Plast Surg* 2004;6:308-10.
11. Vural E, McLaughlin N, Hogue WR, et al. Comparison of biomechanical properties of alloderm and enduragen as static facial sling biomaterials. *Laryngoscope* 2006;116:394-6.