Static Facial Slings
Approaches to Rehabilitation of the Paralyzed Face

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KEYWORDS

• Static facial slings • Facial paralysis • Allografts • Tensor fascia lata
• Percutaneous suture–based sling

KEY POINTS

- Facial paralysis is a physically and emotionally devastating condition for patients.
- Patients with facial paralysis benefit from cosmetic and functional improvement through the use of current facial rehabilitation techniques, including static facial rehabilitation.
- Static facial rehabilitation can be achieved through the use of autologous tissue grafts (tensor fascia lata), allografts (AlloDerm), synthetic grafts (Gore-Tex and expanded polytetrafluoroethylene), and permanent suspension sutures.
- A novel technique for midface suspension uses percutaneous suture–based slings.

INTRODUCTION: SURGICAL APPROACHES TO FACIAL PARALYSIS

Facial paralysis is a serious condition that can lead to significant cosmetic and functional impairment with a significant impact on the patient's quality of life. The causes for facial paralysis are widespread,[1] ranging from iatrogenic injury during surgical procedures to congenital conditions such as Moebius syndrome. Work-up of patients with facial paralysis includes a detailed history, physical examination, and electrodiagnostic studies to evaluate any potential for return of facial nerve function. A long-standing facial nerve paralysis leads to significant facial asymmetry, leading to significant functional and social impairment. Complete facial nerve paralysis can affect various aspects of the forehead, eye, midface, mouth, and neck. Each of these anatomic locations can be treated either with procedures targeting the facial nerve or with separate targeted surgical procedures to improve both cosmesis and function of a given area. There is a plethora of surgical procedures designed to address facial paralysis depending on the acuity of the paralysis and the anatomic structure being targeted.[2]

There are 2 types of surgical approaches to address facial paralysis. The first includes dynamic procedures that regain the ability of volitional movement of the face. Dynamic procedures involve restoring active movement and functionality to a paralyzed face, either through procedures to restore the function of an injured facial nerve or by restoring function with local or distant innervated muscle flaps.

Dynamic procedures involving free functional muscle transfer provide the opportunity for excellent functional rehabilitation outcomes of the paralyzed face. As an inherently more complex procedure, it has longer operative times and

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higher intraoperative complication rates for high-risk patients compared with static rehabilitation techniques. Frail patients with extensive medical comorbidities may not be suitable candidates for free muscle transfer or other dynamic procedures. In some instances, dynamic procedures are not a viable option. Tumor ablation of the parotid or mastoid region may leave the patient with deficiencies in neurovascular structures or muscle that make dynamic procedures more difficult.[3]

The main goal of static rehabilitation of the paralyzed face is to improve facial symmetry and to improve static functions of the face, such as oral competence. Static facial procedures offer shorter surgical times and immediate results, but lack the ability to restore voluntary movement. Appropriately selected surgical procedures can improve facial symmetry and cosmesis either as an alternative to or in conjunction with dynamic procedures. Furthermore, dynamic rehabilitation does not address all aspects of facial symmetry, which are better addressed by static rehabilitation. For these reasons, static facial slings are an excellent surgical choice in a select subset of patients. Surgical procedures that allow for static rehabilitation of the midface are the focus of this article.

STATIC REHABILITATION OF THE PARALYZED MIDFACE

Patients with facial paralysis often have marked asymmetry of the midface, nasolabial fold, and mouth. This asymmetry creates cosmetic concerns that have been shown to adversely affect the patient's quality of life, and even cause psychological distress.[4] Patients who have facial paralysis are at a distinct disadvantage because they are unable to conceal their impairment, which often leads to social debilitation.[5] In addition, patients with marked asymmetry of the mouth may have poor oral competence, resulting in dysphagia and drooling with resultant poor functional outcomes. Correction of the midface offers patients improved cosmesis and functional outcomes. Preoperative examination, including facial asymmetry at full contraction and at rest, is vital for assessing the appropriate surgical technique and implant material. Surgical markings with the patient upright helps to reduce the effect of gravity intraoperatively for patients laying supine.

A static sling refers to a surgical technique that suspends the nasolabial fold and the oral commissure up to the region of the zygomatic arch and temporal fascia. There are 4 commonly described materials to provide the support: autologous tissue grafts, allografts, synthetic grafts, and permanent suspension sutures. The ideal implant is readily accessible, inexpensive, biocompatible, durable, predictable, easy to manipulate, and resistant to infection. However, none of the available grafts perform all of these functions perfectly, so the advantages and disadvantages of each choice must be weighed before selecting an implant for a particular patient. Besides the risk profile of a particular static sling, consideration of postoperative treatments such as radiation may influence the choice of static sling.[3] A brief description of different static sling options is given later.

Autologous Tissue Grafts

There are several options for autologous tissue grafts. The options range from the palmaris longus tendon[6] to the tensor fascia lata (TFL). TFL grafts have been successfully used to suspend the nostril, lips, lateral commissure, and lower eyelid.[7] The advantages of TFL and other autologous grafts include ease of harvest, predictable surgical outcomes, as well as abundant tissue to work with if harvested correctly. Autologous grafts have the benefit of transferring biological material from the same patient, therefore significantly decreasing the long-term risk of extrusion, infection, or rejection. The main disadvantages are increased surgical time and donor site morbidity. There is evidence that TFL grafts may undergo resorption postoperatively, but data are limited.[8] Several techniques have been described for the harvest of TFL. Minimally invasive techniques allow for harvest of the TFL through smaller incisions,[9] and newer techniques have described similar results without the use of specialized instruments.[10]

Synthetic Slings

Expanded polytetrafluoroethylene (ePTFE; more commonly known as Gore-Tex, Gore & Associates, Flagstaff, AZ), has been successfully used to address midface suspension in patients with facial paralysis. The main advantages of synthetic materials is that they are readily available, convenient, they shorten surgical time, and there is no donor site morbidity. The use of ePTFE as an implantable graft has been well documented, because it was initially used as a vascular graft.[11] It is microporous because of the structure of microfibrils, which allows greater biocompatibility and integration into host tissues. ePTFE is available in a variety of different sizes and thicknesses (1 mm and 2 mm), allowing reconstructive surgeons many choices when using different surgical

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