Clinical Investigations

CORRECTION OF PARALYTIC LAGOPHTHALMOS

George E. Anastassov, Regina H. Khater1, Yourii K. Anastassov1
Department of Maxillofacial Surgery, Mount Sinai School of Medicine, New York, USA, 1Division of Plastic and Craniofacial Surgery, St. George University Hospital, Plovdiv, Bulgaria

ABSTRACT
INTRODUCTION: Bell’s palsy causes lagophthalmos of the involved eyelids. Secondary to the atonicity of the eyelids, xerophthalmia, conjunctivitis and epiphora develops. There are dynamic (muscle transfers) and static (gold weights, tarsorrhaphy) approaches to alleviate these problems.

The GOALS of this study are to present a technical note for a surgical method for lengthening the retracted upper eyelid with autogenous temporalis fascia and elevation of the lower eyelid with transplantation of autogenous morselized conchal cartilage graft via standard blepharoplasty incisions.

MATERIAL AND METHODS: The proposed technique is illustrated in details with an example of a patient with paralytic lagophthalmos.

The 4 years follow up of the case operated by this technique shows a stable occlusion of the eyelids with a lowering of the upper eyelid and elevation of the lower eyelid margin.

CONCLUSION: If the paralysis is complete this technique will not accomplish adequate relieve of symptoms. In this cases re-animation of the eyelids with either temporalis muscle transfers or free micro neurovascular muscle transfers are indicated.

Key words: Bell’s palsy, lagophthalmos correction, eyelid surgery, eyelid paralysis

INTRODUCTION
There are numerous causes for inocclusion of the eyelids (lagophthalmos). These can be congenital or acquired. It can be secondary to infection such as herpes simplex virus type 1 (HSV-1), or type 2 (HSV-2), human herpes virus (HHV), varicella zoster virus (VZV), Mycoplasma pneumoniae, Borrelia burgdorferi, influenza B, adenovirus, coxsackievirus, Epstein-Barr virus, hepatitis A, B, and C, cytomegalovirus (CMV), and rubella virus.1,2 It can also be a consequence of a stroke or ischaemia affecting the facial nerve or tumors such as acoustic neuroma or peripheral tumours such as parotid neoplasms and trauma. It can be iatrogenic secondary to blepharoplasty where excessive skin and muscle have been resected or postoperative haematoma have developed.3 Most commonly it is idiopathic. In this case it presents abruptly, sometimes after flu-like symptoms or without any associated symptoms and usually recovers completely. It affects one side of the face. This syndrome of idiopathic facial paralysis was first described more than a century ago by Sir Charles Bell.4 It is the most common condition affecting the cranial nerves.1,2 The condition affects approximately 1 person in 65 in a lifetime.2 The precise etio-pathogenesis is unknown. Bell’s palsy occurs in every decade of life with a mean age between 40–44 years.1 Usually there is at least some form of return of function, which however may be inadequate to protect the eye or restore facial balance. Bell’s palsy can cause aesthetic, functional, and psychological disturbances. Depending on the gravity of the symptoms different techniques are utilized therapeutically. When the paralysis is complete temporalis muscle transfers are utilized.5

This technique, however, doesn’t restore the natural blinking reflex and requires coordination between the dental-occlusal effort and the contralateral palpebral occlusion. The most popular techniques for treatment of lagophthalmos are the insertion of gold weights in the upper eyelid or tarsorrhaphy in severe cases of corneal exposure. Usually the pa-
Figure 1. Pre-operative facial photographs. A: A 49-year-old patient with right-sided Bell’s palsy who presented with complaints of chronic dry-eye symptoms, epiphora and facial asymmetry; B: Close-up of eyelids. Note the poor eyelid occlusion (lagophthalmos).

Figure 2. Surgical technique of cartilage harvesting. A: Incision for harvest of conchal cartilage from the ipsilateral right ear just anterior to the antehelix; B: Elevation of the skin flap from the concha; C: Closure of the donor site. The resulting scar will be inconspicuous.

Figure 3. Right temporal incision for harvest of temporalis fascia. The graft is outlined with a marking pen.

Figure 4. Harvested conchal cartilage and temporalis fascia.
Figure 5. Surgical technique of upper eyelid correction. A: Dissection of upper eyelid and incision through levator aponeurosis and Muller’s muscle; B: Forceps is grasping levator palpebrae superioris muscle; C: Insertion of temporalis fascia after lowering of the upper eyelid margin (see text); D: Suturing of temporalis fascia to levator aponeurosis superiorly and cephalic edge of tarsus inferiorly.

Figure 6. Surgical technique of lower eyelid correction. A: Morselization of conchal cartilage; B: Preparation of lower eyelid prior to graft insertion.
Patients present with complaints of ophthalmological disturbances such as xerophthalmia, epiphora and cosmetic deformity (Fig. 1). The ocular problems are related to the relative shortening of the upper eyelid secondary to the paralysis of the facial nerve and the unopposed action of the m. levator palpebrae superioris (innervated by the oculomotorius nerve) and the Müller’s muscle (innervated by the sympathetic superior cervical chain) which both retract and shorten the upper eyelid. The lower eyelid is weakened and due to the paralysis of the pretarsal portion of the o. oculi muscle becomes everted producing ectropion. The lower eyelid retractors also aid in this effect. Because of the decreased or absent blinking reflex the tear film is poorly distributed and results in epiphora and subsequent xerophthalmia. The way to correct these sequelae is through predictably lowering of the upper eyelid margin and elevating and adequately supporting the lower eyelid margin.6

SURGICAL TECHNIQUE

The patient is marked pre-operatively after measuring of the length of the eyelids on both sides. The upper eyelid should be approximately 2.5 cm to 3 cm in length. In a straight gaze the level of retraction of the eyelids is measured. The margin of the upper eyelid should cover 2 mm of the upper limbus and the lower lid margin should be covering 1-2 mm of the lower limbus. The discrepancy is measured before any local anaesthetic is administered. The upper eyelid incision should be at the level of the upper palpebral crease (8 mm to 10 mm above the eyelid margin). The eyelids are injected with minimal amount of lidocaine 2% with epinephrine 1: 100.000. Next the grafts are harvested. Conchal cartilage is harvested via anterior approach from the ipsilateral ear (Fig. 2). The incision is made just anterior to the antehelix in a semicircular fashion. The cartilage is taken with its posterior perichondrium to aid in its strength. The size of the cartilage graft depends on the size of the lower eyelid and should extend from the inferior edge of the lower tarsus superiorly to the arcus marginalis inferiorly. The skin of the ear is closed with 6-0 prolene and xeroform compressive dressing applied and retained for 48 hours to avoid haematoma formation. On the ipsilateral side a temporal incision is made in the hear-bearing skin care taken to avoid the temporal vessels and the temporo-parietal fascia identified. A strip from the superficial layer obtained from behind the root of the zygoma 40 mm by 10 mm is obtained (Figs 3,4). Haemostasis is achieved and the donor site closed in layers. The upper eyelid is approached through previously outlined incision. The orbital septum is opened and via anterior approach and the expansion of the superior levator muscle is identified, grasped and incised from lateral to medial. The Müller’s muscle is incised and elevated from the upper tarsus. The upper lid margin is then lowered to the previously pre-determined position in balance with the unaffected side while the patient is seated on the operating table. The temporalis fascia is trimmed appropriately and inserted and sutured between the aponeurosis of the levator and the cephalic edge of the tarsus with 8-0 vicryl sutures (Fig. 5). The

Figure 7. Post-operative clinical photographs. A: Balance between both palpebral regions. Note the lowering of the upper eyelid and elevation of the lower eyelid margin; B: 4 year follow-up showing stable occlusion of the eyelid.
lower eyelid is approached via sub-tarsal approach and the dissection is kept preseptal. Care is taken to avoid any damage to the pre-tarsal orbicularis oculi muscle. The arcus marginalis is released and a pocket for the cartilage graft developed and the superior repositioning of the lower eyelid confirmed. Since the cartilage shape is not ideally conformed to the shape of the lower eyelid it is morselized with cartilage morselizer. This brakes the memory of the cartilage and conforms it to the lower eyelid pocket. The perichondrium keeps the morselized cartilage from particulating (Fig. 6). At this time the margin of the lower eyelid must be covering at least 2 mm of the inferior limbus. The conchal cartilage is then secured with 3 to 4 8-0 vicryl sutures. The skin is closed with 6-0 prolene sutures. Temporary medial and lateral tarsorrhaphy is done and maintained for 1 week. Antibiotic and steroid eye-drops are prescribed for 10 days.

DISCUSSION

Gold weights and tarsorrhaphy are well established techniques for alleviation of ophthalmological symptoms caused by Bell’s palsy. The gold weights, however, may extrude through the thin skin of the upper eyelid or cause chronic foreign body sensation, get infected, extrude or cause cosmetic deformity. Placing gold weights in the upper eyelid doesn’t provide benefits to the lower eyelid, which in cases of facial palsy is atonic and retracted and ectropic. Tarsorrhaphy, whether partial or complete causes gaze impairment, inversion of the lid margin, possibly trichiasis and cosmetic defects. There are other techniques available for lengthening the upper eyelid, such as levator palpebrae superioris muscle disinsertion without grafting.\textsuperscript{7,9}

Use of autogenous and heterologous fascia lata or scleral grafts have been described as well.\textsuperscript{7,10} The lower eyelid can also be corrected by insertion of dermal or mucosal free grafts.\textsuperscript{11} Allogeneic materials for support of the lower eyelid such as “Medpor” have also been utilized. We feel that autogenous temporalis fascia is more appropriate than fascia lata due to its thickness and donor site proximity. If there is a need for re-animation of the eyelids with temporalis muscle transfers the fascia is obtained from the same donor site.\textsuperscript{5} It has excellent mechanical properties and doesn’t resorb due to its minimal nutritional demands which are provided by the well vascularized surrounding tissues. Last but not least there is no chance of transmission of infectious diseases as is the case with homologous/heterologous grafts. We also try to avoid implanting foreign bodies in the eyelids where the skin is exceedingly delicate and any potential irregularities secondary to contraction or foreign body reaction become readily apparent. Possible drawback of insertion of conchal cartilage in the lower eyelid may be decreased inferior gaze.\textsuperscript{8} This is due to the relative inability of the lower eyelid to descend while patient is looking down. We have not noticed this with our patients. This may be due to the extensive morselization of the conchal cartilages which is done prior to implantation. In cases where the lower lid is excessively lax (more than 6 mm at pull-test) resection of lateral full thickness tarsal strip may be indicated or/and lateral or medial canthopexy.

In cases where there is incomplete paralysis, where there is still some residual degree of muscle contracture, which is insufficient for eye protection as well as periorbital balance we utilize this technique, which improves these symptoms (Fig. 7). If the paralysis is complete this technique will not accomplish adequate relieve of symptoms. In this case re-animation of the eyelids with either temporalis muscle transfers or free micro neurovascular muscle transfers are indicated.\textsuperscript{5,12} If these options are not available permanent tarsorrhaphy will be required.

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REFERENCES

4. Bell C. On the nerves: giving an account of some experiments on their structure and function which leads to new arrangement of the systems. Phil Trans Roy Soc (Biol) 1821;3:398.
6. Krastinova D, Franchi G, Kelly MBH, Chabolle F.
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КОРРЕКЦИЯ ПАРАЛИТИЧЕСКОГО ЛАГОФТАЛЬМА

Г. Анастасов, Р. Хатер, Ю. Анастасов

РЕЗЮМЕ

ВВЕДЕНИЕ: Лицевой паралич вызывает лагофталм пораженных век. Вследствие атонии век вторично развиваются ксерофталмия, конъюнктивит и эпифора. Существуют динамические (трансфер мышц) и статические (золотые ленты, тарзорафия) методы для лечения этой проблемы.

ЦЕЛЬ: Сделать техническое предложение для хирургической методики с целью удлинения укороченного верхнего века (с применением аутогенной темпоропариетальной фасции) и поднятия нижнего века (с применением трансплантации аутогенного раздавленного конхеального трансплантата с помощью стандартных для блефаропластики инцизий).

МАТЕРИАЛ И МЕТОДЫ: Предложенная методика иллюстрируется детально на примере пациента с паралическим лагофталмом.

РЕЗУЛЬТАТЫ: 4 года спустя у этого пациента наблюдается стабильная окклюзия век с удлинением верхнего века и поднятием нижнего века.

ЗАКЛЮЧЕНИЕ: При полном параличе эта методика не смогла бы привести к адекватному улучшению симптомов. В этих случаях показаны методы с помощью мышечного трансфера (темпоральная мышца) или методы с применением свободной микрохирургической мышечной трансплантации.