Advantage of Dynamic Direct Frontalis Muscle Transfer for the Surgical Correction of Severe Blepharoptosis

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ABSTRACT

Blepharoptosis is a common complaint of eyelid disorder. Frontalis suspension is a new method and the surgery of choice for congenital or acquired blepharoptosis with poor levator function (less than 4 mm). Autologous materials frequently used for frontalis suspension include fascia lata, temporalis fascia, and palmaris longus tendon. Synthetic materials used for frontalis suspension include polypropylene, monofilament nylon, polyfilament cable-type suture, polybutylate coated braided polyester, polyester fiber, expanded polytetrafluoroethylene (ePTFE), and silicone. Each of these materials has its own advantages and disadvantages. Direct frontalis muscle flap procedure is a dynamic method of correction of severe ptosis, which is safe, effective, and stable with minimal complications and has a great outcome over time, compared to traditional frontalis sling procedure.

Background:
Blepharoptosis is a common complaint of eyelid malposition in which the upper eyelid is lower than normal in primary gaze resulting in narrowing of the palpebral fissure. This condition can cause both functional and cosmetic problems. Multiple surgical procedures are available including, simple skin excision, LPS resection, frontalis sling, levator advancement, Whitnall sling, frontalis muscle flap, and Mulerectomy. Selection of one technique over another depends on the several factors including the surgeon experience, the degree of ptosis, as well as the amount of levator muscle function. LPS action is measured by amount of lid excursion from extreme downward gaze to extreme upward gaze while negating the frontalis muscle action. Considerations, which helped to develop these surgical techniques, include the need for cosmetically acceptable results, preservation of the normal eyelid crease, maintenance of the normal tear film, and prevention of exposure keratopathy by prevention of over correction.

Frontalis suspension is the surgery of choice for congenital or acquired blepharoptosis with poor levator function (less than 4 mm). Autologous materials frequently used for frontalis suspension include fascia lata, temporalis fascia, and palmaris longus tendon. Synthetic materials used for frontalis suspension include polypropylene, monofilament nylon, polyfilament cable-type suture, polybutylate coated braided polyester, polyester fiber, expanded polytetrafluoroethylene (ePTFE), and silicone. Each of these materials has its own advantages and disadvantages, which include the need for a second operative site and increased surgical time. Also biointegration of fascia lata creates permanence, postoperative adjustment and removal is extremely difficult and harvesting in children under 3 years old is also difficult.

Material & Methods:
A prospective study of 6 patients include 3 males and 3 females (8 eyelids) underwent suspension procedure of frontal muscle flap overlapped with an inferiorly based orbital septum flap, between 2013 and 2015 in Ophthalmology Dept. of VIMS & RC. All patients had severe blepharoptosis with poor LPS action. Patient’s age was in the range of 26 to 43 years old. Two patients had bilateral ptosis and four patients had unilateral ptosis. LPS action ranges from none to less than 4 mm.

Eyelid studies measurements were taken at baseline, 2 months and 6 months after surgery. The presence of complications, flap function and palpebral contour were evaluated.

Operation Method:
Frontalis Muscle Flap
In unilateral ptosis a lid crease is marked at a height symmetric with that of the opposite upper eyelid, while in bilateral ptosis, the lid crease is drawn 5 to 6 mm from the lash line.

To control bleeding, local infiltration anesthesia of lidocaine HCL 2% with 1:100,000 epinephrine is infiltrated along the proposed incision line and nerve block anesthesia to the supraorbital foramen, to keep the movement of the frontalis muscle for observation during surgery.

In a plane between the orbicularis oculi muscle and the orbital septum, a careful submuscular dissection is performed superiorly. On the surface of the orbital septum, a trapezoidal flap on the superior border of tarsal plate is designed.

A suprabrow incision 1.5 to 2 cm superiorly along the margin of upper eyebrow is made about 2.5 cm in length. Injury to the supraorbital neurovascular bundle is avoided by starting the incision at least 5 mm lateral to the supraorbital notch.

The skin and subcutaneous structures are separated from the vertically oriented muscle fibers of underlying frontalis. The submuscular dissection is done till about 1.5 cm above the supraorbital margin of the frontal bone.

Two parallel cuts are made at the medial and lateral sides of the flap, forming a rectangular muscle flap. A tunnel is created above the orbital septum by passing blunt pointed scissors into the lid crease incision to emerge through the incision at the superior margin of the eyebrow.

The orbital septum flap is passed superiority through tunnels and sutured to the anterior surface of the frontal muscle flap with three permanent 5-0 vicryl sutures through the central, medial, and lateral...
The advantages of frontalis muscle flap procedure over the frontalis passing it over a pulley created near the insertion of the orbital septum which involves elevating the innervated frontalis muscle flap, material.

Complications of frontalis muscle flap procedure include: (1) eye - bulbar anesthesia, (2) transient postoperative forehead anesthesia was seen but totally recovered over a period of time. Complications such as eyebrow asymmetry, entropion, orbital hemorrhage and corneal exposure due to lagophthalmos were not seen in our series of patients. But probably we need to do more cases.

Discussion:
In patients having severe ptosis with levator function less than 4 mm inferiorly based orbital septum flap procedure of frontalis muscle flap overlapped with an inferiorly based orbital septum flap

Results:
Ptosis was corrected in all 6 patients with good results in terms of functionality, contour and aesthetic outcome. (Fig.1)

All 8 eyes underwent ptosis correction had a symmetric redundant fold of preseptal skin according to the margin reflex distance-1 (MRD-1) measurement used to evaluate efficacy.

All the patients had incomplete closure of the eyelid for 3-4 months after the operation but experienced normal opening and closing of the palpebral fissure within 6 months. The suprabrow scar merged well with the eyebrows. The only complication was reduced eyelid excursion in extreme upward and downward gaze, which was mainly observed in the immediate postoperative period. Post operative forehead anesthesia was seen but totally recovered over a period of time. Complications such as eyebrow asymmetry, entropion, orbital hemorrhage and corneal exposure due to lagophthalmos were not seen in our series of patients. But probably we need to do more cases.

Conclusions:
Direct frontalis muscle flap procedure is a dynamic method of correction of severe ptosis, which is safe, effective, stable with better corneal protection and very less complications such as no ectropion, no risk of neurovascular injury and has great outcome over time, compared to traditional frontalis sling procedure.

References: