

นิพนธ์ต้นฉบับ

The frontalis muscle advancement flap for the treatment of congenital blepharoptosis

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A retrospective analysis of 17 patients with congenital ptosis treated with the Frontalis muscle advancement flap technique was carried out. 65 percent of the patients were females and 35 percent were males. The median age of presentation was 19 years, ranging from 3 to 36 years. Ptosis was on the right side in 53% of the cases, on the left side in 29% and bilateral in 18%. The operative technique was used in all patients with poor levator function. The results were very satisfactory in all patients after a follow-up period of 2-20 months. Complications included post-operative hematoma, and entropion and temporary paresis of the frontal branch of the facial nerve. The indications, techniques, results, complications and problems are discussed in this report.

Key words : *Ptosis, Frontalis advancement.*

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ได้ศึกษาผู้ป่วยโรคหนังตาตกแต่กำเนิดย้อนหลัง ตั้งแต่ 1 มกราคม 2535 ถึง 30 ตุลาคม 2537 ที่มารักษาโดยใช้วิธี *Frontalis advancement flap* เป็นจำนวน 17 ราย เกณฑ์อายุผู้ป่วยอยู่ระหว่าง 3-36 ปี อายุเฉลี่ย 19 ปี เป็นผู้ชาย 35%, ผู้หญิง 65%, ข้างซ้าย 29%, เป็นทั้ง 2 ข้าง 18% ผู้ป่วยทุกรายมีการทำงานของ *levator muscle* อยู่ในเกณฑ์ต่ำได้ติดตามผลการรักษาทุกราย อยู่ในช่วง 2-20 เดือน ปรากฏว่าได้ผลเป็นที่น่าพอใจ ผลแทรกซ้อนจากการผ่าตัด ได้แก่ ภาวะเลือดออกคั่งใต้หนังตา, ภาวะหนังตาม้วนเข้าใน และภาวะอ่อนแรงชั่วคราวของกล้ามเนื้อ *Frontalis* ผู้รายงานได้อภิปรายเกี่ยวกับข้อบ่งชี้, เทคนิคของการทำ, ผลแทรกซ้อนและปัญหาต่าง ๆ ร่วมด้วย

Blepharoptosis, or drooping of the upper eyelid, is a congenital or acquired condition in which the levator palpebrae superioris is unable to lift the upper lid. Blepharoptosis can occur in varying degrees. The action of the levator muscle may be insufficient, or it may be absent completely. The various operative procedures for the correction of congenital blepharoptosis may be classified into two groups:

(1) Shortening the levator palpebrae superioris muscle and its aponeurosis (by resection or plication).

(2) Transferring the action of the frontalis muscle to the underdeveloped or paralyzed levator muscle (by fascia graft suspension or direct muscle flap advancement). For severe cases with fair to poor levator function, the Frontalis muscle advancement to the tarsus is an effective technique in which the frontalis muscle acts directly to raise the eyelid.

We have used the direct frontalis advancement flap technique since 1992 and would like to report the results herein.

Materials and Methods

Seventeen patients (6 males and 11 fe-

males) with congenital blepharoptosis underwent the Frontalis advancement operation during the period 1992-1994 (table 1). The patients ages ranged from 3 to 36 years, with a mean of 19.2 years. Six patients were children with an average age of 9.6 years. The degree of drooping was estimated by comparing the lid margin level on the cornea with that on the normal side. In the three patients with bilateral ptosis, the levels were compared with the average level which was approximately 2 mm below the upper limbus. Average ptosis was 4 mm. (ranging from 3 to 6 mm). Ptosis was "severe" in 12 eyelids with the lid margin drooping 4 mm more. The levator function was measured by the excursion of the upper lid margin when the thumb was pressed against the patient's brow and the patient was asked to look down or up for excursion of levator muscle action which ranged from 0 to 3 mm. with a mean of 1.5 mm. All the eyelids were considered to have "poor" levator function (< 4 mm). During operation, local anesthesia was used for adult patients and general anesthesia was reserved for children. The average length of postoperative follow-up was 10 months, ranging from 2 to 20 months.

Table 1. Summary of patients with Blepharoptosis.

Number of patients	17 (20 lids)
Age (yr)	3-36 (mean=19.2)
Sex	6 male/11 female
Affected side (Rt:Lt:Bilat.)	9:5:3
Amount of ptosis (mm)	
moderate (< 4)	8 lids
severe (> 4)	12 lids
Levator function (mm)	
poor (< 4)	20 lids
fair (4-10)	0 lids
Follow-up period (mo.)	2-20 (mean=10)

Surgical Technique

The action of the frontalis should be examined pre-operatively since this technique is not applicable if the muscle cannot contract. This operation is usually performed on patients sedated with local anesthesia.

1) The lid creases are marked for symmetry. The incision cuts through the lid skin and orbicularis muscle, exposing the tarsal plate (Fig. 1A)

2) The skin of the lower margin of the incision is freed from its underlying tissue and that part of orbicularis muscle attached to the tarsus is removed, thus exposing the lower margin of the tarsal plate. (Fig. 2A)

3) A suprabrow incision about 2 cm long is made over the skin just above and parallel to the middle third of the brow through the orbicularis muscle to the orbital septum. Care should be taken to not injure the supraorbital nerve and vessels emerging from the supraorbital notch at the junction of the inner and middle thirds of the supraorbital margin.

4) The upper margin of the suprabrow incision is lifted upward to the Frontalis muscle aponeurosis. A wide undermining is made with scissors between the skin and the Frontalis muscle.

5) A horizontal incision 2.5 to 3 cm. long is made at the lower margin of the frontalis muscle aponeurosis. Again, care is necessary to preserve the supraorbital nerve and where is the anatomical location of the nerve and vessels emerging from the supraorbital notch. The incision should be limited to within the lateral extremity of the brow to avoid injury to the frontal branch of the facial nerve. Xylocaine is injected between the frontalis and the periosteum of the frontal bone before the dissection is performed. A vertical incision

through the frontalis is made cephalad from the medial extremity of the horizontal muscle transection. this incision is parallel to the muscle fiber, thus forming a 3 cm. wide L-shaped frontalis muscle flap (Fig. 1C).

6) A tunnel beneath the preseptal orbicularis is then created (Fig. 1D).

7) The caudal portion of the frontalis flap, held by forceps, is brought down through the tunnel to the anterior surface of the tarsal plate. The muscle is then fixed to the middle portion of lower tarsus by three mattress sutures of 6-0 polypropylene (Fig.1E). The tension is set with the patient's eyes in primary gaze.

In the case of bilateral ptosis, the position of the lid margin is placed at the upper border of the limbus. In patients with unilateral ptosis, the lid is raised until the position and contour of the ptotic lid margin are the same as those of the opposite lid margin. Caution should be used to avoid over correction.

8) The dermal-tarsal sutures are affixed to create a lid crease and prevent entropion.

9) The skin incision is closed with single-layered percutaneous sutures and the suprabrow incision is closed in two layers.

Results

Postoperatively, these 17 patients (20 eye lids) did not exhibit ptosis in either primary or upward gaze, regardless of the extent of levator function. The lid folds appeared symmetrical and natural. The depression of the medial forehead, resulting from the flap advancement, was slight and disappeared by the end of the first post-operative month. The scar at the upper border of the eye brow was barely visible. The average post-operative lagophthalmos of 1-2 mm. usually disappeared

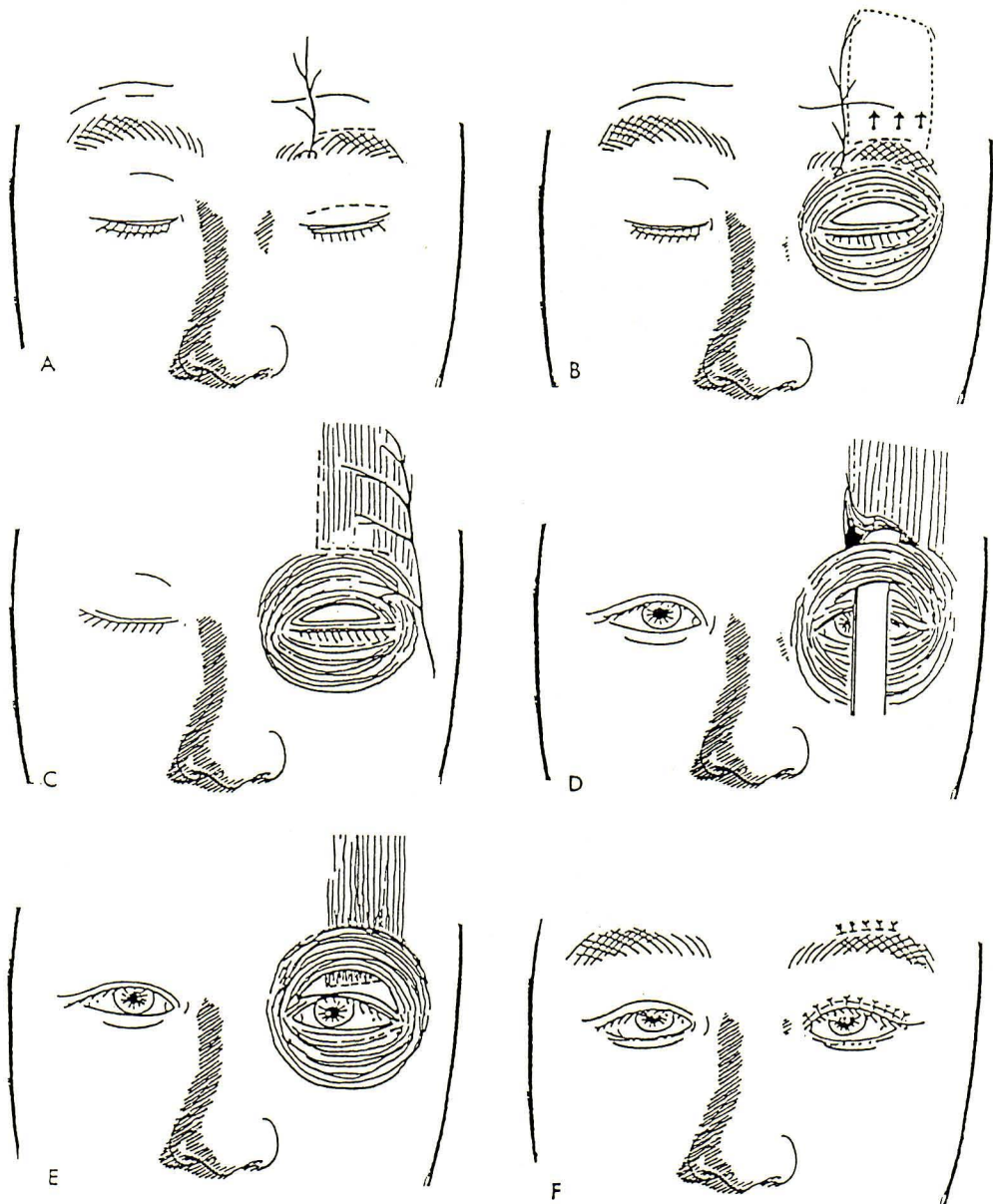


Figure 1 A. Design of Frontalis muscle advance to the upper eye lid : 1, lid fold incision; 2, suprabrow incision; and 3, supraorbital nerve and vessels.
B. The lower part of the orbicularis muscle attached to the tarsus is removed, exposed the lower margin of tarsal plate. Through the suprabrow incision, a wide undermining is made between the skin and the frontalis muscle.
C. Through an angular incision at the lower part of the frontalis muscle, another wide undermining is made between the undersurface of the frontalis muscle and the periosteum of the frontal bone.
D. A tunnel is made underneath the orbicularis muscle.
E. The caudal part of muscle held by a forcep is passed through the tunnel to the anterior surface of the tarsal plate. The muscle is fixed by three mattress suture.
F. All skin incisions are sutured closed.



A



B

Figure 2. (A) pre-operative unilateral blepharoptosis.
(B) post-operative 3 months.



A



B

Figure 3. (A) pre-operative bilateral blepharoptosis.
(B) post-operative 3 months.

within 3 months. There were no instances of detachment of the flap, exposure keratitis, infection, or loss of brow hair. There were three avoidable complications that occurred after Frontalis advancement surgery. Two patients developed postoperative hematoma which was treated conservatively. Entropion, the most frequent complication in the initial use of this technique, developed in three of our patients. During re-operation it was found that the position of the frontalis muscle was fixed to the anterior surface of the tarsal plate at too high a level and could be

the cause of entropion when the frontalis contracted to raise the lid. The entropion disappeared after releasing and resetting it to the lower tarsal plate. One patient simultaneously developed temporary paresis of the frontal branch of the facial nerve and entropion. The patient was treated conservatively by releasing the sutures. The action of the frontalis muscle gradually improved and returned to normal within three months. A second Frontalis advancement procedure was undertaken with satisfactory results.

Discussion

The direct use of frontalis muscle action for correction of blepharoptosis is not a novel technique. In 1901, Fergas⁽¹⁾ used an eyebrow incision to develop a flap of frontalis muscle that was transposed inferiorly and sutured to the anterior surface of the tarsus. In 1916, Robert⁽²⁾ introduced a "muscle substitution" technique using three vertical strips of frontalis through a large L shaped incision on the forehead. The inferiorly based middle strip was sutured to the tarsus and the two adjacent flaps were advanced to reinforce the central one. These procedures were not widely accepted until 1982 when Song and Song⁽³⁾ reported 30 patients successfully corrected by frontalis transposition to the tarsus. Its use has been reported as well in acquired ptosis and recurrent ptosis after previous frontalis suspension. Complications or problems with their techniques were not documented and few clinical photographs were presented.

The procedure described herein is basically that of Song and Song. However, we would like to emphasize three important technical refinements that differ from the original technique.

1) The frontalis muscle acts like a window blind that tugs the eyelid straight up. Its action differs from the levator, because of its origin, which pulls the eyelid up and back. Therefore, the insertion of frontalis muscle on the tarsus should be on the lower half of the tarsal plate instead of on the upper border of the tarsal plate as recommended by Song⁽³⁾ or Han⁽⁴⁾. This is necessary for the prevention of entropion.

2) We used the dormal-tarsal suture to fix the lower flap for prevention of entropion.

3) The frontalis was dissected instead of the infrabrow incision. This approach facilitated

the identification of the Frontalis muscle and the flap could then be easily raised.

In our experience, this technique of Frontalis advancement has three merits over the Frontalis suspension using autogenous fascia or silicon rods:

(1) The lower margin of the Frontalis muscle aponeurosis that had been sutured to the anterior surface of the tarsal plate healed with the tarsus. Thus, a firm and permanent anchorage was obtained.

(2) Frontalis advancement, in comparison with fascial suspension, has a location of donor site in the field of primary surgery.

(3) The likelihood of overcorrection was minimal when compared with the Frontalis suspension technique.

Conclusions

Our experience with 17 cases of blepharoptosis corrected by the Frontalis advancement technique between 1992-94, have been described. This is the first detailed report of follow-up in Thailand. In view of our results in this series, we recommend this procedure for patients with unilateral or bilateral congenital ptosis with poor levator function since it provides good Frontalis action and is very satisfying in long-term follow-up.

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