

Textbook of Efficient Oculofacial Surgery.

Chapter 18: Upper Eyelid Ptosis Repair with Frontalis Flap

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Abstract

Keywords (5-10): blepharoptosis, congenital ptosis, myogenic ptosis, frontalis advancement, frontalis suspension, frontalis flap

Introduction

Indications/Contraindications

The frontalis flap advancement is a surgical technique that involves the direct transfer of power from the frontalis muscle to the tarsus to elevate the eyelid. It is indicated in cases of severe ptosis with poor levator palpebrae superioris function, as is seen in congenital ptosis.¹⁻³ The frontalis flap can also be used for patients who have failed prior levator advancement procedures.⁴ Poor frontalis function due to facial nerve palsy or prior trauma is a contraindication to frontalis flap advancement.⁵ This technique should also be avoided in patients with myasthenia gravis and those with pre-existing corneal disease who may be at risk of post-operative exposure keratopathy.⁵ A careful ocular surface examination and evaluation for adequate Bell's reflex should be performed prior to surgery.

Brief history

Fergus et al introduced direct transposition of the frontalis muscle onto the lid margin via a brow incision for treatment of eyelid ptosis in 1901.⁶ Song and Song subsequently reintroduced the concept in 1982.⁷ Variations in frontalis flap design have been described since then, with differences in skin incision, extent of dissection, and flap division.^{5,8-12}

The frontalis flap advancement technique described in this chapter is performed with minimal dissection in the pre-septal plane through a single eyelid crease incision. No flap division or posterior dissection under the flap is required, as the loose areolar attachments of the frontalis muscle to the periosteum differ from its firm subcutaneous attachments to the dermis.

Pros and cons

One advantage of the frontalis flap advancement is that it avoids risks associated with various implants used in frontalis suspension procedures, including sling extrusion, infection, and granuloma formation around alloplastic materials.¹³⁻¹⁵ The frontalis flap achieves substantial lift in eyelid height, and can be performed through one aesthetically pleasing incision at the eyelid crease, thus avoiding additional autogenous graft donor site morbidity.^{4,16} Because frontalis muscle matures earlier than fascia lata, frontalis flap advancement can be performed at an earlier age without waiting for sufficient fascia lata to be available for autogenous sling use (usually occurs around age 3).¹⁴

Successful frontalis flap advancement requires recruitment of the frontalis muscle to raise the eyelid. If the patient does not recruit the frontalis pre-operatively, surgical success may be limited. Another limitation to this technique is that post-operative reversal or adjustment is more technically challenging than with a silicone frontalis sling.⁵ There is potential for injury to the temporal branch of the facial nerve if dissection is taken too far supero-laterally.⁴ In the technique described, dissection is limited to the subcutaneous (above the rim) and pre-septal (below the rim) planes, thereby minimizing the risk of injury to the temporal branch of the facial nerve.

Surgical technique
Landmarks and overview

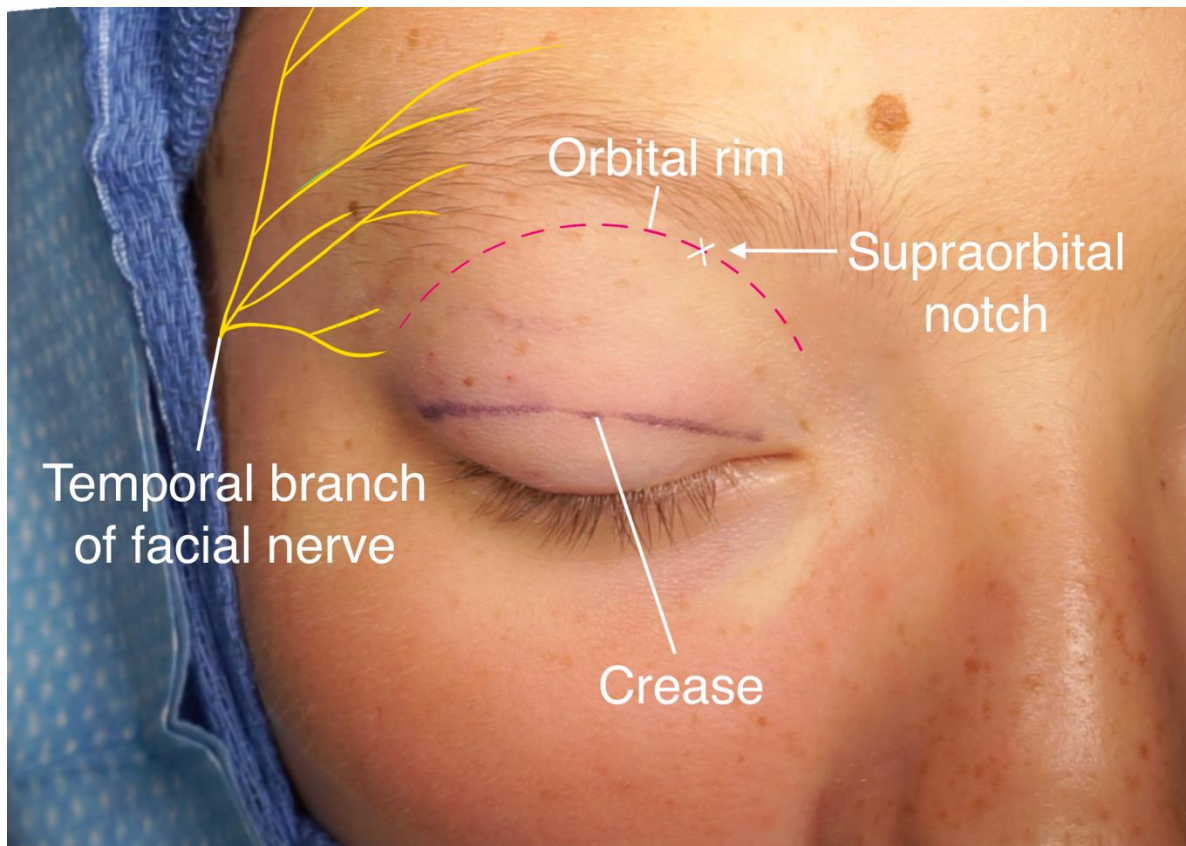


Figure 1. Landmarks and overview. The supraorbital notch is palpated and may be marked. The lid crease is marked for incision. If the crease is ill-defined, the height of the contralateral eyelid may be measured with calipers and used as a reference.



Figure 2. Skin Incision. The skin incision is performed with a #15 blade along the lid crease marking.

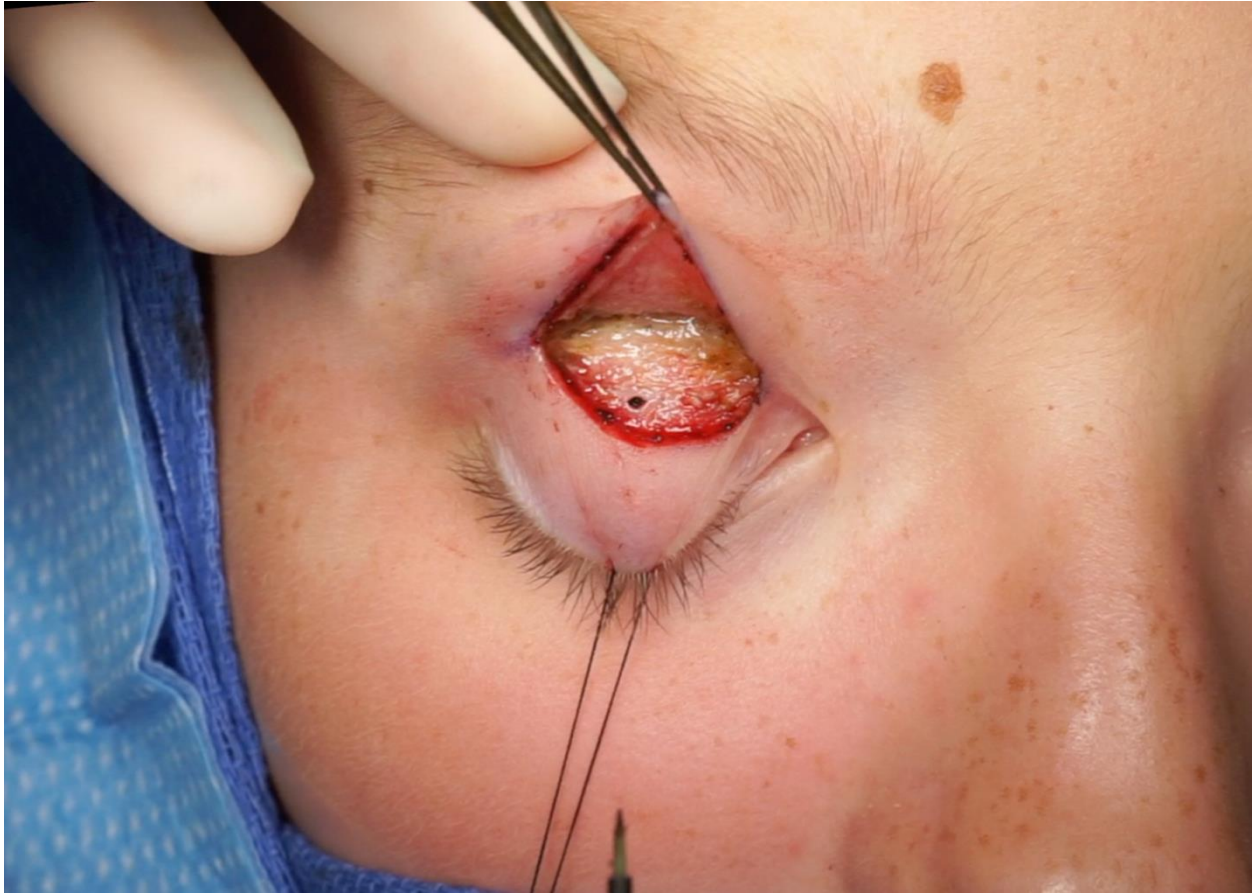


Figure 3. Pre-septal Dissection. Dissection is carried superiorly in a sub-orbicularis/pre-septal plane with Westcott scissors, high temperature cautery, or a monopolar cutting cautery.



Figure 4a. Superior extent of sub-orbicularis dissection. The sub-orbicularis dissection should be carried superiorly to approximately 5mm above the superior orbital rim (straight white arrow). Here, dissection transitions to a subcutaneous plane (see illustration of planes in Figure 4b). Forceps are shown here grasping the frontalis muscle to begin flap development (curved blue arrow).

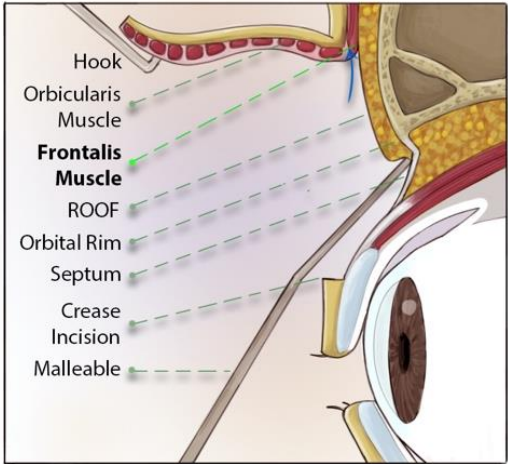
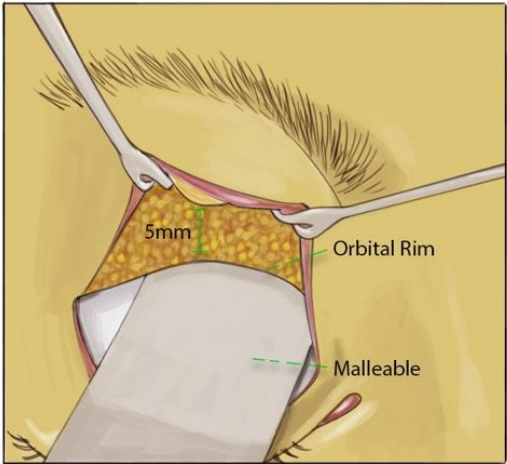


Figure 4b. Cross-section illustrating important tissue planes for flap development. The blue arrow denotes the transition of dissection to the subcutaneous plane approximately 5mm above the orbital rim.

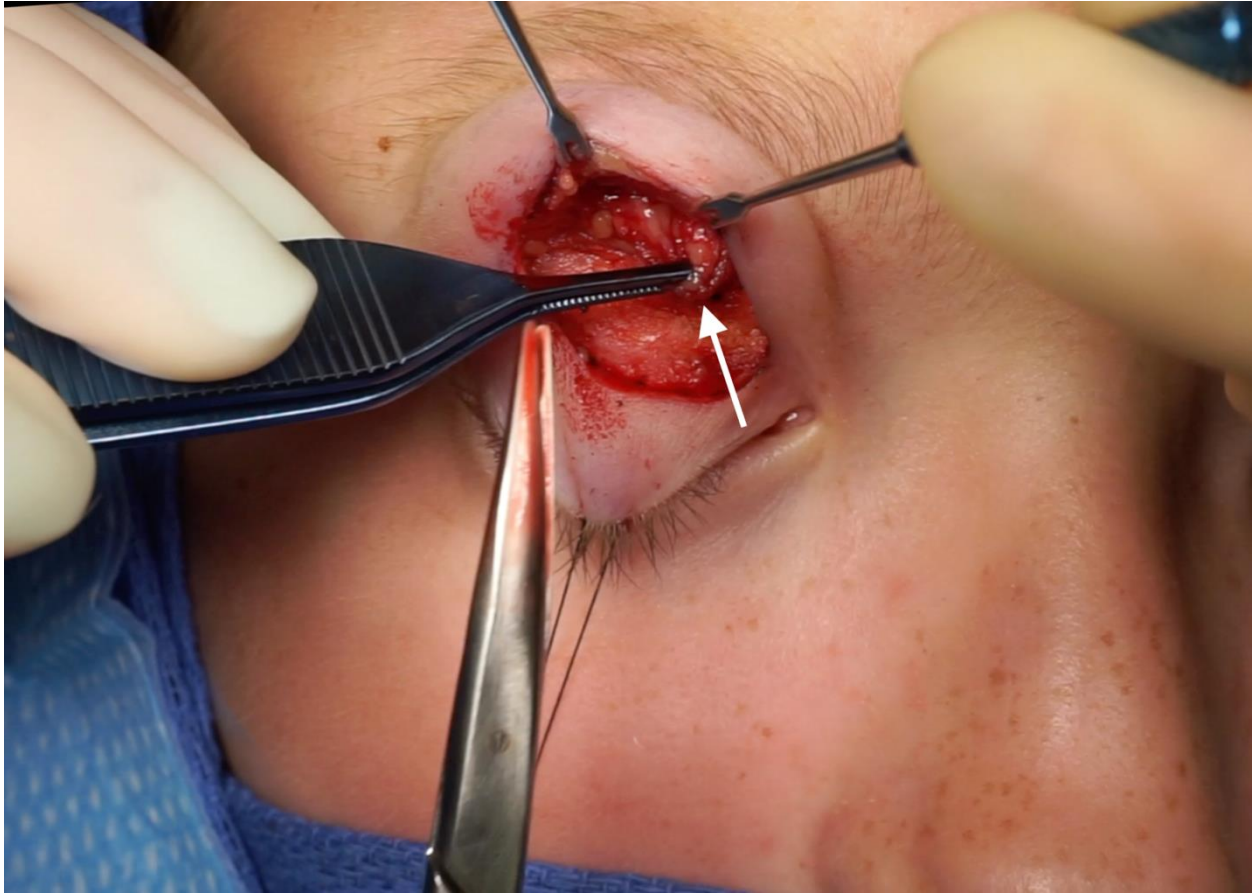


Figure 5. Identification of the frontalis muscle. The frontalis muscle (white arrow) is identified anterior to the retro-orbicularis oculi fat (ROOF) pad.

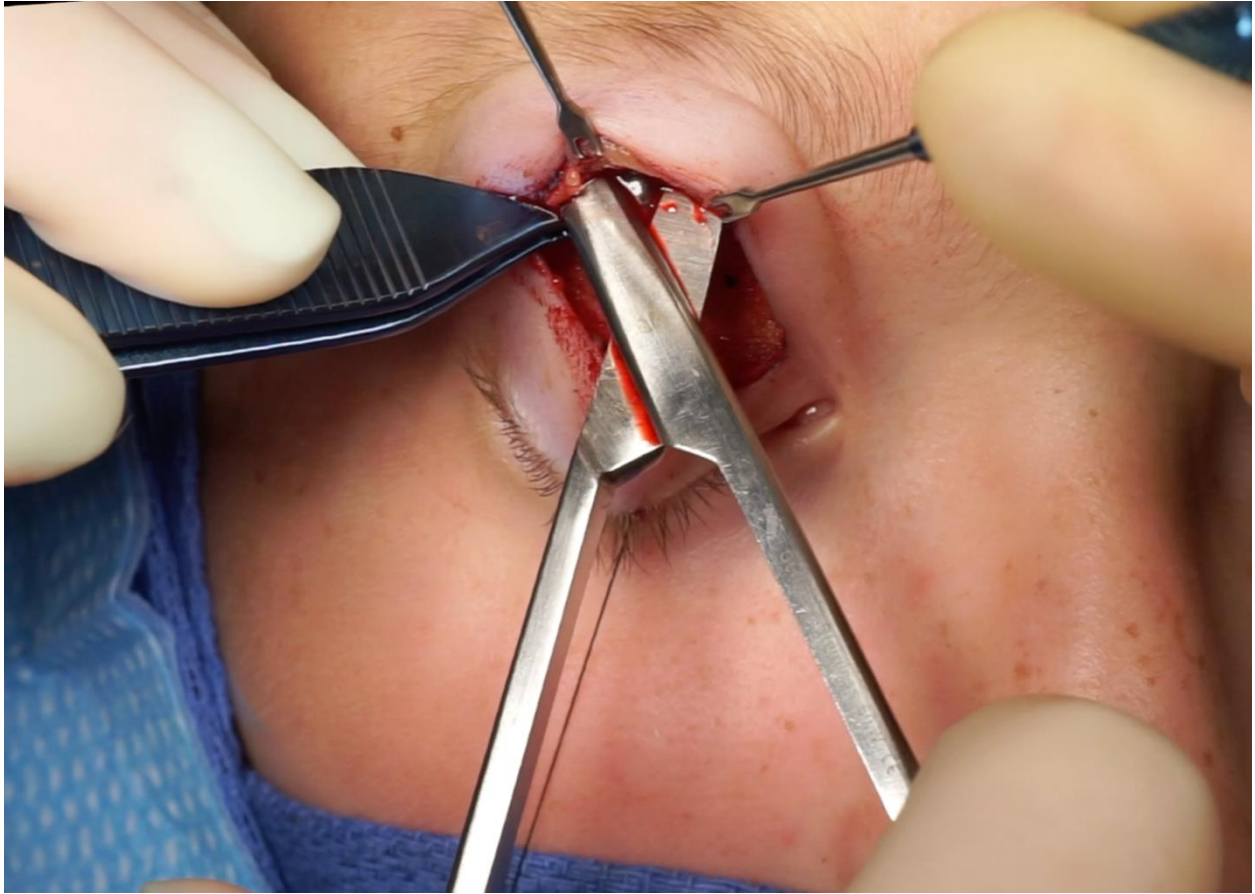


Figure 6. Subcutaneous dissection. Dissection is carried further superiorly in a subcutaneous plane to 1cm above the brow using Stevens scissors. Extreme care should be taken to avoid creating a buttonhole through the skin.

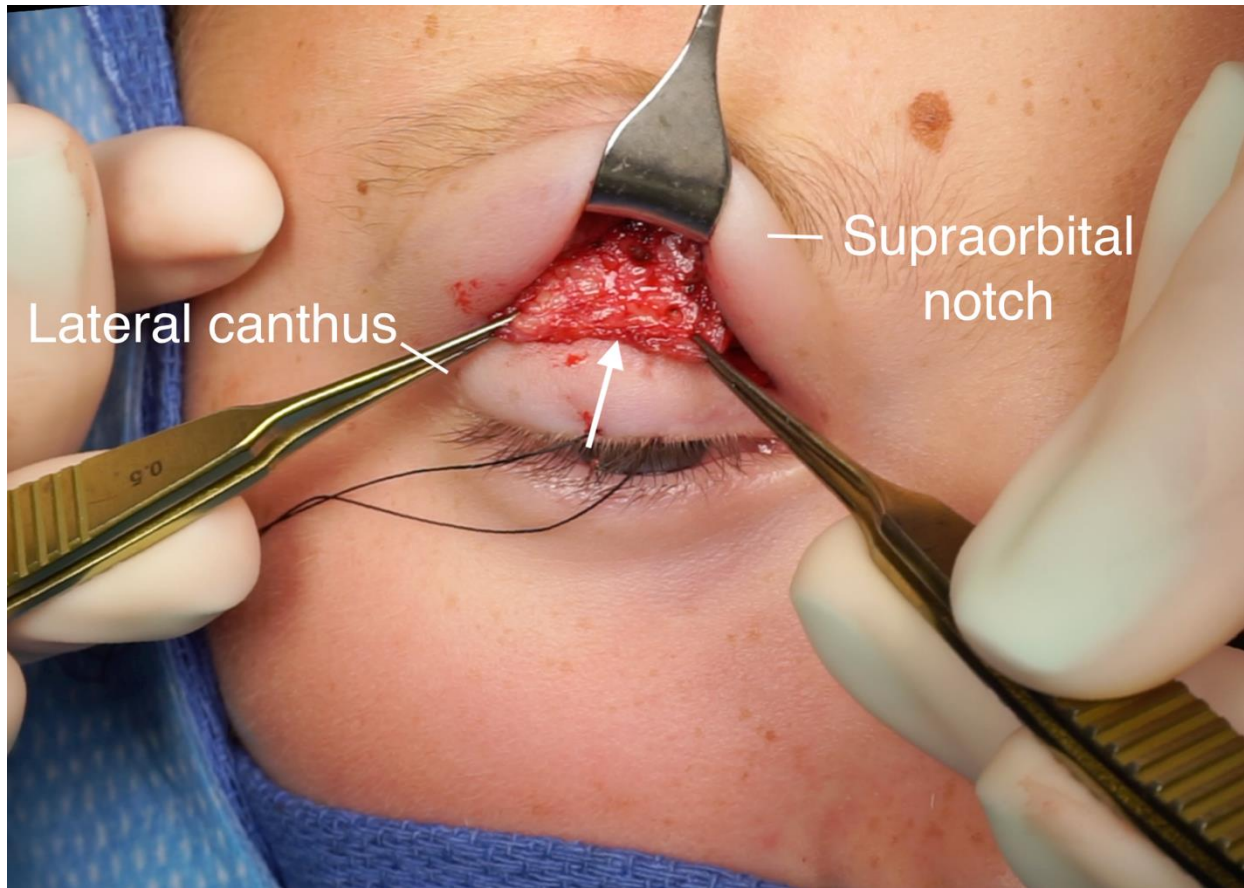


Figure 7. Development of the frontalis flap. Medially, the subcutaneous dissection should end lateral to the supraorbital notch. Laterally, the subcutaneous dissection should end medial to the lateral canthus. Vertical relaxing incisions can be made at each end of the flap but are often unnecessary and may increase the risk of facial nerve branch injury.

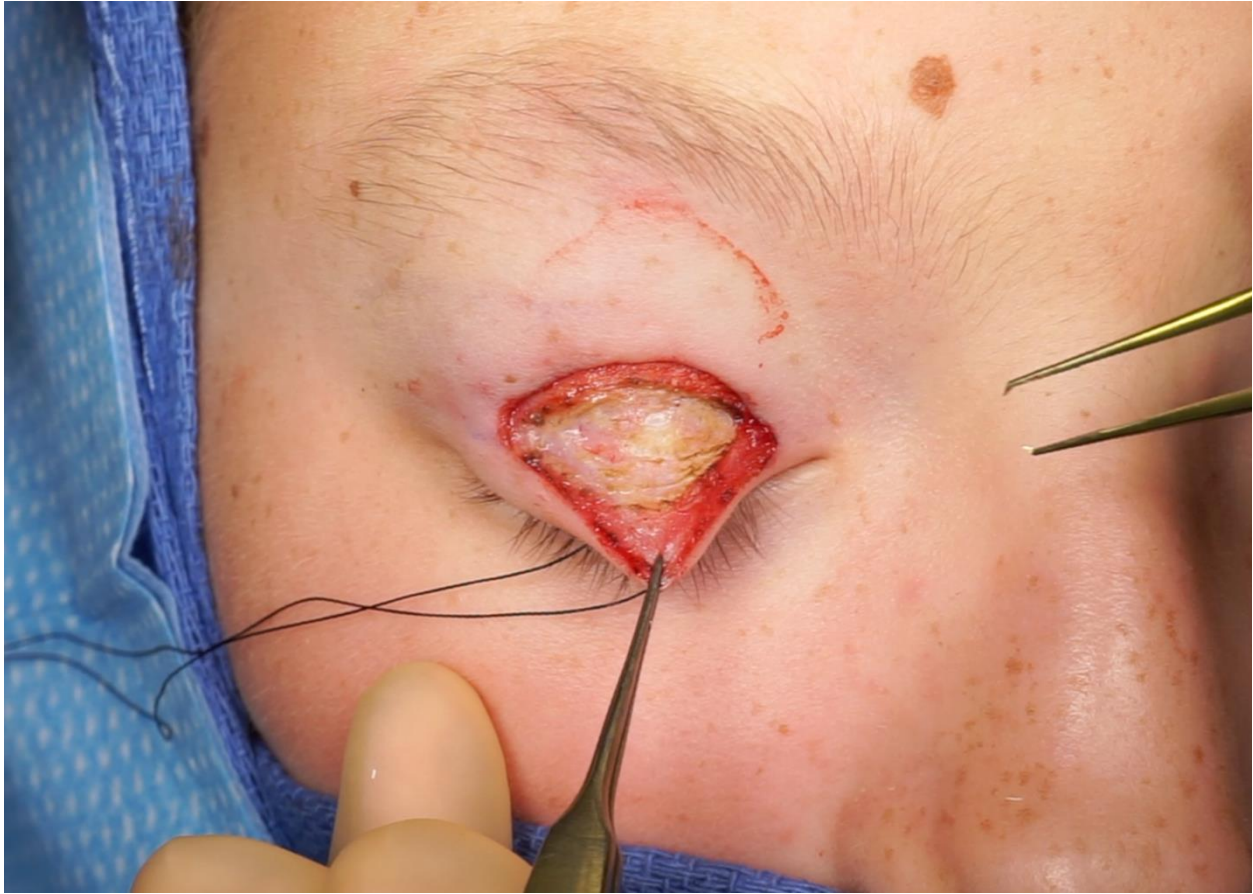
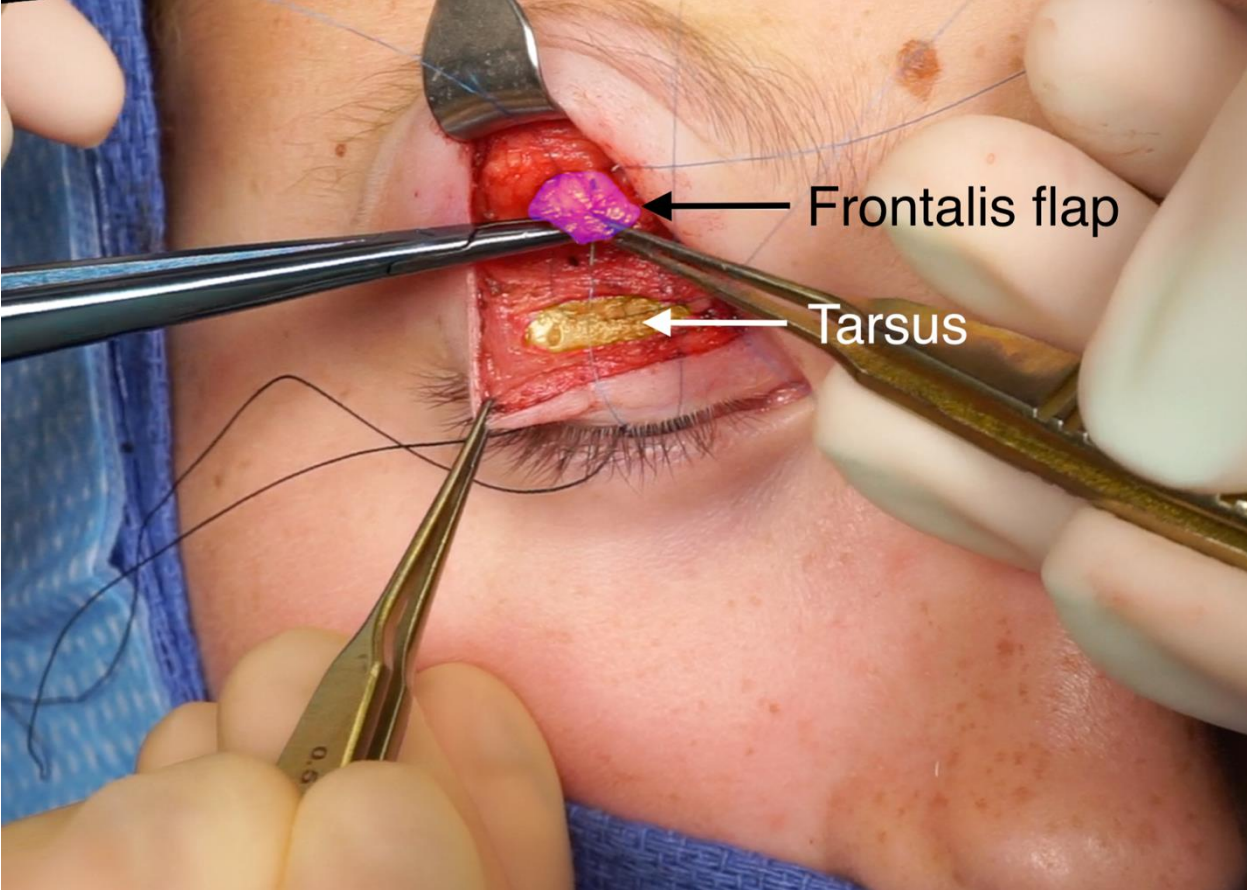


Figure 8. Pre-tarsal Pocket. Dissection is then carried inferior to the incision line in a sub-orbicularis plane using Westcott scissors. When the superior tarsal border is encountered, dissection is continued in a pre-tarsal plane to expose the anterior tarsal surface and create a pre-tarsal pocket for flap advancement.



Frontalis flap

Tarsus

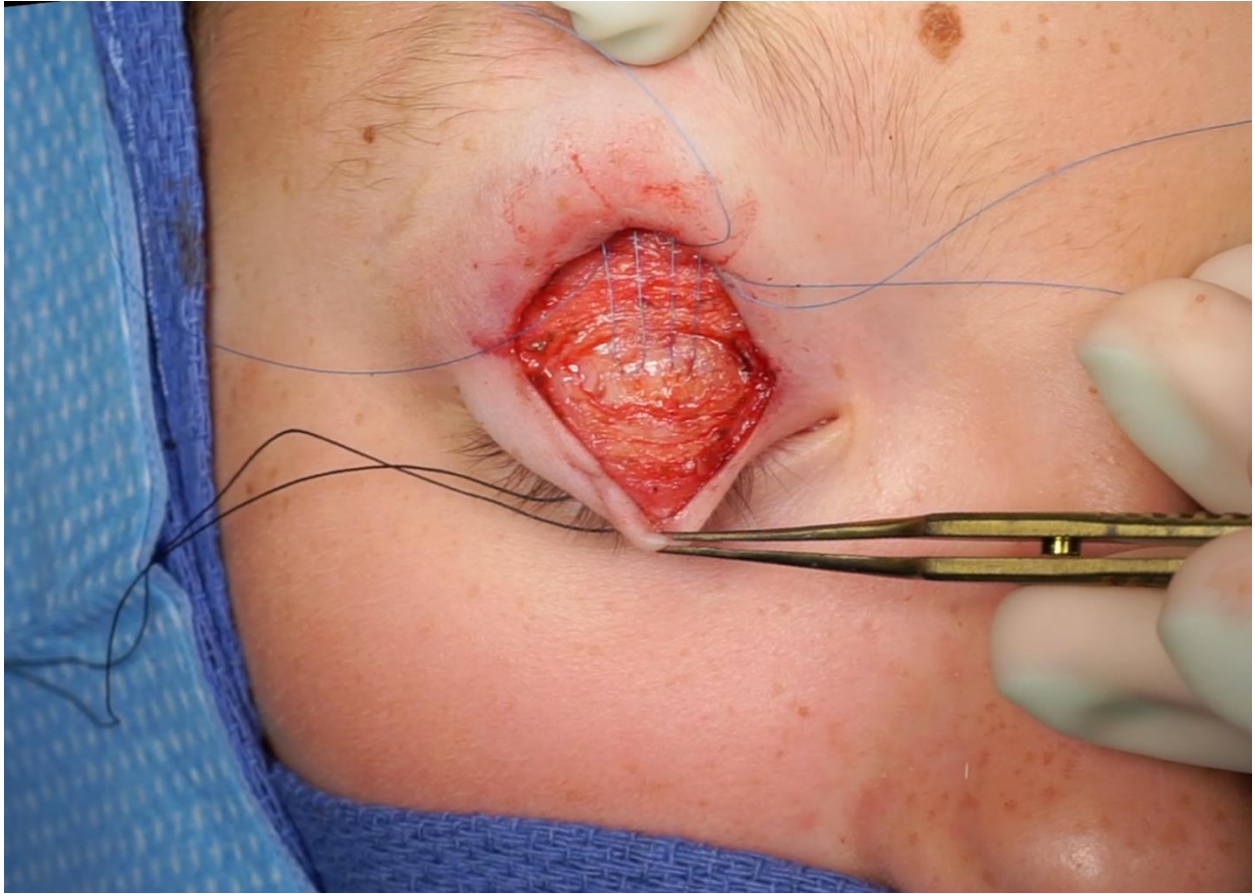


Figure 9a & 9b. Frontalis flap advancement. The frontalis flap is advanced inferiorly and affixed to the superior 1/3 of the tarsus with two 6-0 prolene horizontal mattress sutures passed in a partial thickness, lamellar fashion through the tarsus and tied temporarily with slip knots.



Figure 10. Assessment of lid height and contour. The lid should have a natural contour with a slightly nasal peak and should sit approximately 1-2mm below the superior limbus. If the lid sits too high, the tarsal suture can be shifted superiorly and further dissection of the flap may be performed. Once the desired height and contour are achieved, the sutures are tied permanently.



Figure 11. Soft tissue and skin closure. Three lid crease-forming 7-0 polyglactin 910 sutures are placed medially, centrally, and laterally; these are passed in an interrupted fashion through the orbicularis at the superior incision edge, the frontalis flap, and the orbicularis at the inferior incision edge. The incision is closed in a running fashion using 6-0 fast absorbing gut suture.

Postoperative care

Postoperatively, ice packs should be carefully applied to the upper eyelid (20 minutes on, 20 minutes off) for about 72 hours. Antibiotic ointment should be applied to the incision twice daily for 2 weeks. Acetaminophen may be used as needed for pain. Frequent use of artificial tears as well as nighttime lubricating ointment is encouraged.



Figure 12. (Left) Pre-operative photo showing congenital ptosis of the right eyelid after a failed silicone sling procedure. (Right) Post-operative photo after the frontalis flap advancement procedure, demonstrating natural and symmetric lid position.

Potential complications

Lagophthalmos may occur following frontalis flap advancement but is typically well-tolerated and improves in the months following surgery.^{5, 17} Dry eye secondary to increased corneal exposure can be treated with frequent application of lubricant eyedrops, gel, and ointment. Other possible complications include recurrent ptosis, entropion, and ectropion with separation of the eyelid from the corneal surface.¹ Intra-operatively, if ectropion is noted upon advancing the frontalis flap, the horizontal mattress suture can be shifted superiorly on the anterior tarsal surface and further dissection of the frontalis flap can be performed.

Conclusion

Frontalis flap advancement is an effective tool for the correction of ptosis associated with poor levator function. It can be performed in infants and eliminates many of the risks involved with frontalis sling procedures. Because the technique described in this chapter involves minimal dissection, it can achieve powerful eyelid lifting with minimal tissue trauma.

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