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Ptosis Repair for the Cosmetic Surgeon

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Several surgical procedures have been described for the correction of eyelid ptosis [1–9]. Initially, these procedures were described to improve the field of vision. The goal of surgery was to raise the eyelid height to a point where vision was improved and appearance was acceptable. Ptosis repair as a cosmetic procedure must be addressed differently. Patients will not simply be satisfied with a raise in eyelid height, and an improvement in vision is not the only goal. Patients are concerned only with how they will look, presenting a challenge for the surgeon.

In standard cosmetic upper eyelid surgery (blepharoplasty), variable amounts of skin, muscle, and fat are excised from the upper eyelid. Within the scope of eyelid surgery, blepharoplasty can be considered a superficial procedure that does not typically alter the internal dynamic function of the eyelid. Conversely, by definition, standard ptosis surgery involves dissection, excision, and realignment of the muscles (levator palpebrae superiosis and Müller's muscle) that move the eyelid [1–9]. This surgery is more complex, demanding, and potentially time consuming, and requires greater knowledge and experience than does blepharoplasty. In contrast to typical blepharoplasty, ptosis surgery can lead to changes in upper eyelid shape and contour, complications not normally seen in blepharoplasty. Consequently, cosmetic ptosis repair must be approached with caution and a greater degree of familiarity and experience with eyelid anatomy and surgery.

The goal of this article is not to provide a comprehensive overview of ptosis, eyelid anatomy, and ptosis surgery. That information can be obtained in numerous well-written articles and textbooks on the subject. Instead, my goal is to provide information relevant to the cosmetic facial surgeon that will provide him or her a foundation and framework for how to approach and manage the patient with eyelid ptosis. Most patients are unaware of what eyelid deficits they have and of how they affect their appearance (it is the job of the surgeon to do this). They simply do not like the way they look. Often, heavy eyebrows, redundant upper eyelid skin, and prominent fat pads may mask a pre-existing eyelid ptosis. When blepharoplasty is performed in the presence of unnoticed or untreated ptosis, the ptosis becomes unmasked and more noticeable after surgery. Patients may view this result as a poor outcome of otherwise excellent surgery. As such, identifying and addressing eyelid ptosis is a critical component of the cosmetic eyelid evaluation and management.

I have found that the vast majority of patients presenting for cosmetic surgery who have ptosis can be managed surgically through a posterior eyelid approach via excision of variable amounts of con-

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junctiva and Müller's muscle (Müller's muscle conjunctival resection or MMCR) [6–9]. This technique is the ideal surgical procedure for the cosmetic surgeon because it is quick, simple, reliable, and requires little knowledge of eyelid anatomy, and because it can be performed with the patient asleep (requires no patient cooperation). Patients who are not candidates for the posterior eyelid approach require levator aponeurotic surgery [1–4]. This procedure is performed transcutaneously, requires a detailed knowledge of eyelid anatomy, and is a more complex surgical approach that requires patient cooperation. Before detailing both surgical approaches, I will review the relevant issues of the preoperative ptosis evaluation.

Ptosis evaluation

There are a variety of etiologic considerations when evaluating a patient with upper eyelid ptosis. These factors include congenital, mechanical (eyelid mass), neurologic, myogenic, involutional, and traumatic causes [1]. The baseline ptosis evaluation must include a directed and detailed history, measurements of certain eyelid parameters, and basic techniques of evaluation to identify how to best correct the ptosis and to avoid missing an underlying pathologic entity. The common pathologic processes that need to be ruled out are neurologic entities, which at times can be subtle, including myasthenia gravis (MG), third nerve paresis, and Horner's syndrome [1].

I ask all of my patients about the duration of the ptosis, whether it is variable (in the same eye or from eye to eye), and whether there are any associated neurologic symptoms. Ptosis associated with diplopia is important because it may underlie significant neurologic disease (eg, third nerve palsy, MG). A variability in ptosis (ie, worsening as the day goes on or switching from eyelid to eyelid) with or without associated systemic weakness may be a sign of MG. A history of headache, neck pain, chest surgery, and decreased sweating may indicate Horner's syndrome.

I always begin the examination with an evaluation of the pupils. A dilated pupil can be a sign of third nerve pathology, whereas a miotic pupil may indicate a Horner's syndrome. The degree of ptosis is measured by defining the margin reflex distance-1 (MRD_1) [9]. This measurement is defined as the distance from the center of the pupil (identified by the reflex created by shining a light on the pupil) to the margin of the upper eyelid. This value is a better measure of ptosis than the vertical palpebral fissure height (distance from the margin of the upper to lower lid) because the position of the lower lid can alter the latter measurement but not the MRD_1 [9]. The MRD_2 is the reflex distance to the lower lid margin and is a measurement of relative lower lid position. A normal MRD_1 is approximately 4 mm.

The levator function is measured by asking the patient to look down and then up while stabilizing the eyebrow position. An excursion of greater than 12 mm is normal. The eyelid crease is defined by measuring the distance of the crease from the central eyelid margin. A distance of 10 mm is considered normal. The strength of the orbicularis muscle is defined by an attempt to pry the eyelids open with the patient forcing them closed. This strength is typically graded as 1/4 to 4/4, with the latter ratio being normal. I always check for upgaze fatigue. The patient is asked to look up (using my finger as a target) to note a drop of eyelid height over a 1-minute period. A normal measurement reveals no descent in eyelid height (fatigue) in forced upgaze. After attempting to fatigue the lid, I ask the patient to look down quickly and then up again. A Cogan's twitch is a fasciculation of the upper eyelid that occurs when the patient looks up in this maneuver. I also routinely check ocular motility in a standard ptosis evaluation. A normal examination reveals unrestricted movements of the eyes (individually and together) in all fields of gaze.

A finding of upgaze fatigue is indicative of MG and is often accompanied by decreased orbicularis strength, a Cogan's twitch, and possibly decreased levator function, diplopia, and an ocular alignment or motility disturbance. Abnormal ocular alignment and motility can also be a sign of third nerve disease, especially when presenting with an enlarged pupil and diplopia.

In ptosis without an underlying neurologic etiology, one should find normal levator function, a normal or high lid crease, excellent orbicularis strength, no upgaze fatigue, no Cogan's twitch, normal alignment and motility, and a normal pupillary examination. These patients are ready for surgery.

After attaining the basic information described previously, phenylephrine drop testing is performed in every patient. This test is important in determining which ptosis procedure is most appropriate for the patient. Two muscles function as elevators of the eyelid. The levator palpebrae superioris is the primary eyelid elevator. It is innervated by the third cranial nerve, capable of elevating the eyelid 15 mm, and composed of striated muscle fibers. The accessory eyelid elevator is Müller's muscle. This autonomically driven muscle can elevate the eyelid 2 to 3 mm [1], on average, and is innervated by the sympathetic nervous system. Phenylephrine drops 2.5% are instilled into the ptotic eye or eyes twice, a few minutes apart. I then re-examine the MRD_1 in both eyes after

waiting approximately 5 minutes to note whether there is a response to the drops and, if so, what the new MRD_1s are.

In my experience, most individuals with cosmetic ptosis have a small degree of ptosis that can be corrected with phenylephrine drops. These patients are candidates for MMCR to correct the deficit. As discussed later on, this finding makes surgery much easier. If phenylephrine drops do not correct the ptosis, elevating the eyelid must proceed by levator aponeurotic surgery.

Surgical procedures

Müller's muscle conjunctival resection

A frontal nerve block is obtained with an injection of 1 mL of 1% lidocaine (Xylocaine) with 1:100:000 epinephrine. This injection is performed by feeling for the supraorbital notch and directing the needle toward it [Fig. 1]. I have not found it necessary or beneficial to enter the orbit with the needle as has been described previously, because this can lead to complications. The lid margin is then anesthetized with 0.25 mL of the same anesthetic. A 4-0 silk traction suture is passed through the lid margin (passing through tarsus for tensile strength), and the margin is everted over a Desmarres retractor. Subconjunctivally, 0.25 mL of anesthetic is injected and allowed to diffuse with gentle pressure. The appropriate amount of conjunctiva and Müller's muscle are demarcated from the superior tarsus toward the fornix and marked with a cautery burn nasally, temporally, and centrally approximately 5 mm apart from each other. A 6-0 silk suture is then passed through these marks to create a delineation at this level [Fig. 2]. A Putterman ptosis clamp (Karl Ilg & Co., St. Charles, Illinois) is used to engage the demarcated tissue (a straight hemostat will also suffice). The skin is distracted from the clamp with a tissue forceps to

Fig. 2. Eyelid everted over a Desmarres retractor (posterior eyelid exposed) with a 6-0 silk suture delineating the tissue to be excised.

ensure that the levator aponeurosis is not caught within the clamped tissue. The levator aponeurosis has attachments to the skin via the lid crease. If levator tissue is trapped within the clamp, there will be a tether on the skin when it is pulled away from the clamp. A double-armed 5-0 chromic suture is run full thickness through the lid tissue 1.5 mm below the clamp from the temporal to nasal direction [Fig. 3]. The clamped tissue is then excised with a scalpel blade. The scalpel should be beveled toward the clamp to ensure not cutting the suture. The lid is again everted over the Desmarres retractor, and the preplaced chromic suture is run from nasal to temporal to close the wound [Fig. 4]. If blepharoplasty is performed simultaneously, the lid is reverted and the blepharoplasty performed. Before closing the eyelid wound, the chromic sutures are brought full thickness (from conjunctiva to wound site) and tied to themselves within the wound. The skin is then closed, burying the ptosis sutures. If blepharoplasty is not performed, the chromic ptosis sutures are brought full thickness (conjunctiva to skin) and tied to themselves

Fig. 1. Regional supraorbital nerve block obtained with a 25-G needle directed at the notch.

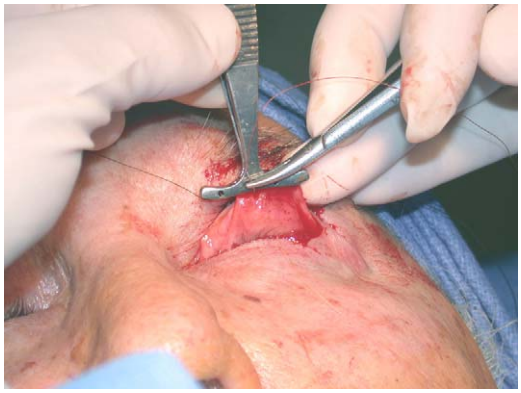

Fig. 3. 5-0 chromic suture being passed beneath the ptosis clamp.

Fig. 4. Same suture shown in Fig. 3 being run to close the posterior eyelid wound.

over the skin. In both instances, the ptosis sutures are internalized into the blepharoplasty wound or externalized to the skin to avoid corneal irritation or frank abrasion.

The amount of tissue resected during surgery is determined by the results of the phenylephrine drop test. In unilateral ptosis, if the drops exactly correct the eyelid asymmetry, an 8.0-mm resection of conjunctiva/Müller's muscle is performed. If the drop testing under- or overcorrects eyelid height, slightly more or less tissue is resected. I have resected as much as 9.5 mm of tissue and as little as 3 mm. Every surgeon has developed his or her own algorithm for how much tissue to resect. I measure the amount of ptosis correction in millimeters by assessing the predrop and postdrop MRD_1. Realizing that an 8.0-mm resection will elevate the lid this amount, I then reduce or increase the amount of resection based on this relationship. For example, if the predrop MRD_1 is 4 mm on the right and 2 mm in the ptotic left eye, and the drops change the MRD_1 to 4 mm on the right and 5 mm on the left eye, an 8-mm resection of tissue would elevate the ptotic left eyelid 3 mm. My desire is to raise it 2 mm. Consequently, I would resect two thirds of 8 mm, or approximately 5.5 mm of tissue.

Levator advancement

An eyelid crease incision is demarcated [Fig. 5]. Some surgeons inject anesthetic without epinephrine so as not to stimulate Müller's muscle and induce chemical elevation of the upper eyelid. I feel the hemostatic affect of the epinephrine in reducing the potential for excessive eyelid bleeding and tissue damage from extensive cautery outweighs the eyelid elevation it may induce. I compensate for the elevation effect of epinephrine when judging lid height.

A total of 1.5 mL of 1% lidocaine with 1:100:000 epinephrine is injected subcutaneously to the demarcated area. I avoid deeper eyelid injection, which stimulates Müller's muscle, as much as possible. An incision is made through the crease, and the orbicularis muscle is incised. Special attention is given to putting both ends of the eyelid incision on stretch (with four-pronged rakes) so that the fibers of the muscle can be identified and the incision does not proceed too deep. A cotton-tipped applicator can then be used to complete the dissection bluntly beneath the orbicularis muscle until the preaponeurotic fat is identified. The orbital septum overlies the preaponeurotic fat. The fat is an important surgical landmark because the levator aponeurosis is directly below it. In younger individuals, the septum can be a thick dense tissue. It is identified by grasping it and pulling downward. If the septum is grasped, there will be a tether on traction because it is attached to the superior orbital rim at the arcus marginalis. In older persons with thin lids and hollow sulci, the aponeurosis (and thus the fat above) can be retracted superiorly, making these tissues and the septum difficult to identify. In these cases, I make sure to dissect superiorly, sometimes grasping and distracting internal eyelid tissue downward until ballottement (pushing) on the eye exposes the preaponeurotic fat. In both cases, once the fat is identified, I tent-up the septum and incise it [Fig. 6]. I then grasp the fat and use blunt (with a cotton-tipped applicator) or sharp (Wescott scissors) dissection to release all of the connective tissue attachments of the septum to the aponeurosis. It is important to control all small bleeders during surgery, because undue swelling and engorgement of tissue will make judgment of lid height difficult.

In most cases of ptosis, the levator aponeurosis has retracted from the tarsus by stretching, thinning, or dehiscence, explaining why muscle function and lid excursion are typically normal in the

Fig. 5. Demarcation of the eyelid crease.

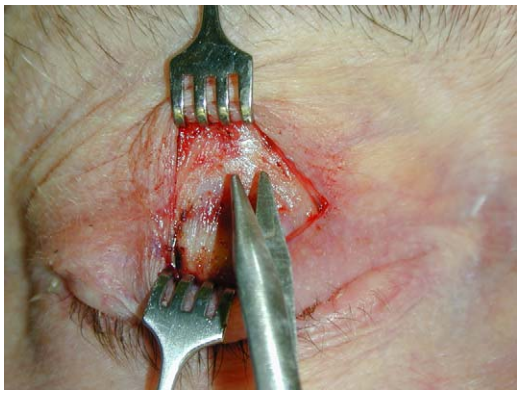

Fig. 6. Dissection of orbital septum.

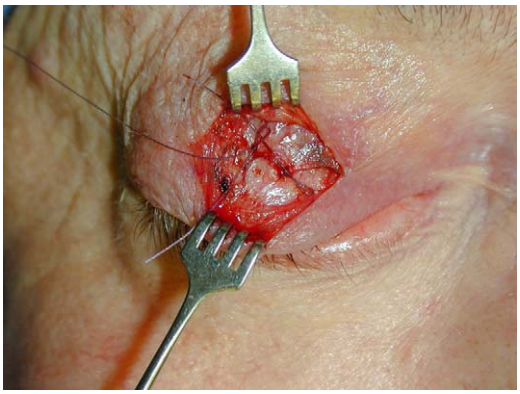

Fig. 8. Adjustable knots approximating the aponeurosis to tarsus.

presence of a descended eyelid. The ptosis can be compared with an elastic rope over a pulley holding up a heavy weight off the floor. If the rope stretches, it can still pull the weight up, but the weight will be closer to the floor. The aponeurotic defect is the basic eyelid deficiency that must be corrected.

To resecure the aponeurosis to the tarsus, the tarsal surface must be exposed [Fig. 7]. The orbicularis muscle is grasped above the superior tarsus and trimmed down to the tarsus. This maneuver not only exposes the tarsus but also debulks the eyelid in this area, enhancing the postoperative crease. The free edge of the aponeurosis is typically irregular. I trim off a few millimeters of tissue, creating a new raw edge. The tarsus is engaged with a fine-tissue forceps and pulled superiorly to assess eyelid contour. If the contour is appropriate, the aponeurosis is secured to the tarsus at this site with a double-armed 5-0 Vicryl suture on a spatula needle (S-14). I take a partial-thickness bite of tarsus and then evert the eyelid to ensure that the suture does not pass full thickness through the eyelid. Both ends of the double-armed suture are passed through the free edge of the aponeurosis and tied in an adjustable slip knot [Fig. 8]. I ask the patient to open his or her eyes and assess lid height and contour. If the lid contour is off, I do not attempt to correct it by adding additional sutures in separate locations because, in my experience, this does not work. The initial suture is critical for appropriate contour. Consequently, I replace this suture until I am happy with the arc of the lid. As discussed previously, I use epinephrine in my anesthetic injection, which has a tendency to overcorrect lid height by stimulation of Müller's muscle. Before surgery, I evaluate all ptosis patients by instilling dilute phenylephrine into the eyes. In patients who have no response (lid elevation) to the drops, I set lid height to be symmetric during surgery. In those who have a response to the drops (but do not undergo MMCR because of a suboptimal response), I overcorrect lid height by 1 to 1.5 mm, expecting a postoperative drop. Once the lid height and shape are acceptable, I typically add support sutures nasal and temporal to the central suture [Fig. 9].

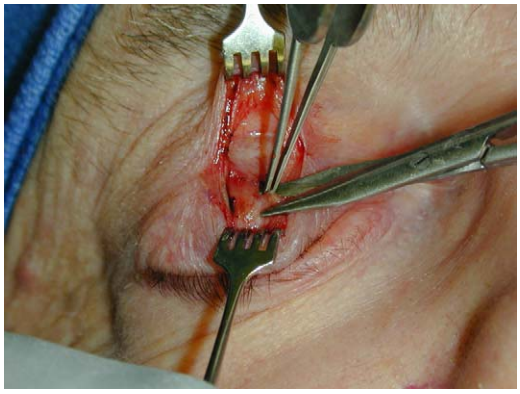

Fig. 7. Tarsal surface being exposed.

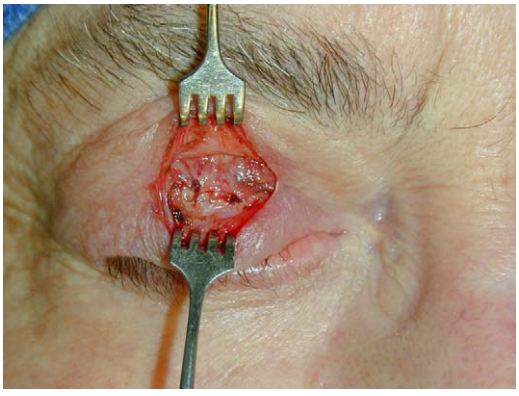

Fig. 9. Final placement of Vicryl sutures securing the aponeurosis to tarsus.

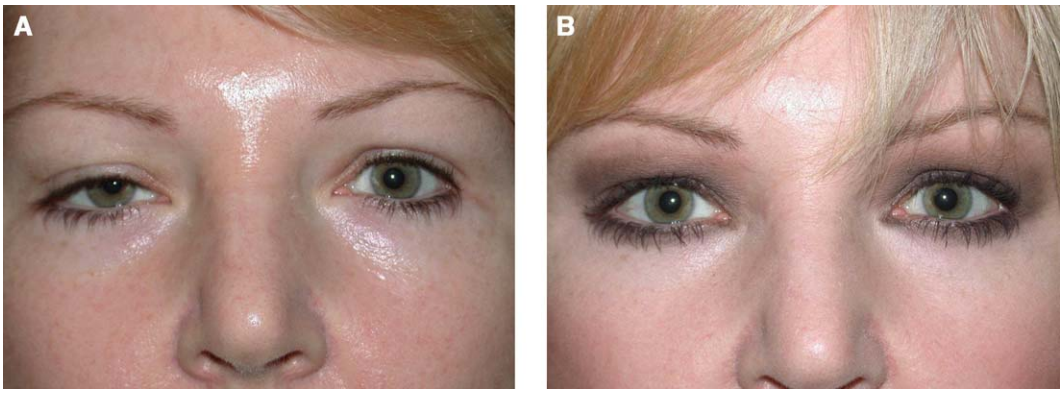

Fig. 10. Preoperative (*A*) and postoperative (*B*) view of patient undergoing cosmetic MMCR ptosis surgery.

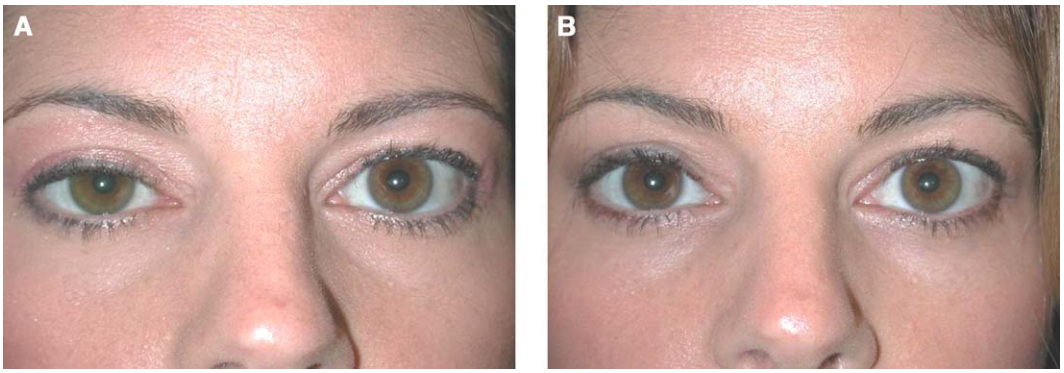

Fig. 11. Preoperative (*A*) and postoperative (*B*) view of patient undergoing cosmetic levator aponeurotic ptosis surgery.

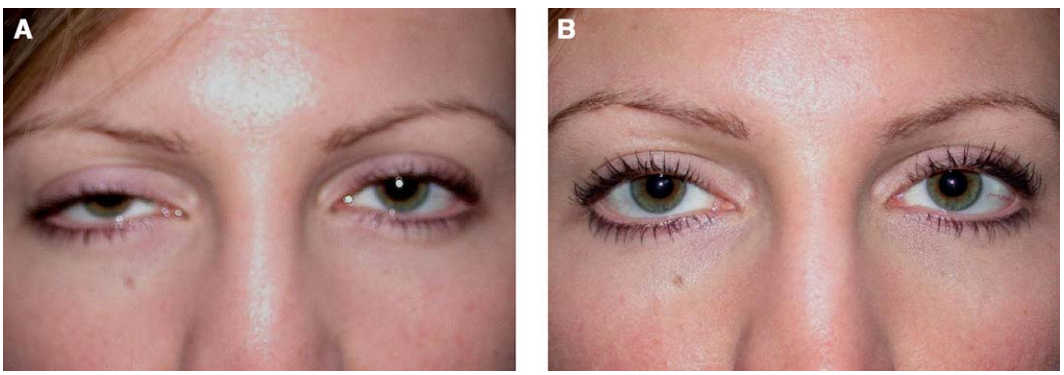

Fig. 12. Preoperative (*A*) and postoperative (*B*) view of patient undergoing cosmetic MMCR ptosis surgery.

Summary

The cosmetic surgeon must be familiar with the evaluation and management of the ptotic eyelid. A small amount of unrecognized preoperative eyelid ptosis can seem obtrusive if it is unmasked after blepharoplasty. As such, ptosis repair is an important adjunctive procedure to cosmetic eyelid surgery. This article has described the basics behind the two most common procedures to correct eyelid ptosis. Cosmetic eyelid surgeons should familiarize themselves with these procedures, or should work in conjunction with an ophthalmic plastic surgeon who can assist in addressing this common eyelid malposition. Eyelid ptosis should be assessed and approached methodically, which will lead to excellent results and happy patients [Figs. 10–12].

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