Various techniques for canthoplasty have been published over the past 2 decades under many different names: tarsal-strip procedure, tarsal suspension, lateral tarsal strip, dermal orbicular pennant, lateral canthopexy, and lateral retinaculum canthoplasty. The tarsal suspension technique is a time-tested, efficient way to improve many lid malpositions. It is used to correct retraction (cicatricial or involutional) and ectropion. It is also a champion technique for elevation and tightening of the eyelid. It can be performed as a sole procedure or in conjunction with a midface lift or malar fat pad elevation. Although most canthoplasties can produce eyelid tightening, tarsal suspension allows elevation, retroplacement, and tightening even if the eyelid is under inferior-based tension (Figure 1).

Dermal orbicular pennant repair and lateral retinaculum repair avoid canthotomy, but they are only appropriate for a limited subgroup of younger patients without eyelid laxity. Older patients with lax, horizontally lengthened eyelids are better treated with tarsal suspension (Figure 2). Patients who treat the eye area indelicately or who frequently manipulate their eyelids (eg, contact lens wearers and patients who require frequent instillation of eye drops) are also candidates for tarsal suspension. To achieve longevity of results, these patients require stronger support than a retinaculum repair can offer.

Preoperative Instructions

The efficacy of any canthoplasty procedure will be increased if patients are given basic instructions about postoperative care of the eyelid area. I instruct patients to avoid touching their lower eyelids. Those who wear contact lenses are taught to insert the lenses by elevating an upper eyelid or placing the lens directly onto their cornea. Patients who pull their lower eyelids inferiorly twice a day to install and remove contact lenses will experience accelerated eyelid laxity, no matter what operative technique is used. Frequent eyedrop users are given similar instructions. Female patients are instructed to pull the lid laterally or not at all when applying eye makeup to avoid any premature loosening. Every canthoplasty loosens with time, because blepharospasm and most activities of daily living attenuate the canthal soft tissues. However, canthoplasties can provide reasonable longevity if patients follow instructions for postoperative care.

If the eyelid does fall quickly, it is usually attributable to attenuation of the tarsal sutures or their pulling through the tarsal strip. Dehiscence from the periosteal adhesion is uncommon. In this regard, it is of relatively little importance whether the tarsus is wired or sutured to the lateral orbital rim or even whether the lateral retinaculum is used. The point of dehiscence, if it is going to occur, is the suture contact with tarsus or lateral retinaculum, not the adhesion of tarsus to lateral periosteum or bone.

Preoperative Workup

The tarsal suspension procedure has diminished efficacy in patients with a large globe, shallow orbit, or hypoplastic malar eminence (negative vector). However, it is possible to hammock the eyelid if there is a prominent globe or negative vector. In these cases, the suspension should be performed high on the superotemporal orbital rim to allow the mid eyelid to move in a superior direction. This
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high attachment of the tarsus, however, may produce a displeasing lateral upsweep.

Preoperative evaluation will reveal whether moderate mechanical pressure placed over the lateral canthus will successfully elevate the eyelid. If a great deal of pressure is required to elevate a tight eyelid, inferior tension should be released with extensive lateroinferior dissection and exaggerated suprareplacement of the tarsal strip. Before surgery, I illustrate the achievable result for the patient as a small, medium, or large degree of eyelid elevation. A bowed, U-shaped eyelid can be straightened (small) or upturned with a moderate upsweep (medium), or the superior temporal rim can be significantly elevated to narrow the palpebral aperture in a patient with a dry eye or exposure (large). These 3 alternatives for eyelid placement are demonstrated to the patient with preoperative and postoperative photographs.

Operative Technique

After infiltration of the lateral commissure, including lateral upper and lower eyelids, with 2% topical lidocaine (Xylocaine) with adrenaline, an incision is made from the horizontal crow’s-foot for at least 8 to 10

Figure 1. A, Preoperative view of a 45-year-old woman who had previously undergone lower lid blepharoplasty with malar implants. The right malar implant became secondarily infected and was removed, producing a cicatrized, retracted, ectropic eyelid. B, The postoperative view is shown 10 months after a tarsal suspension procedure was performed with release of the orbital septum and severance of midlamellar adhesions. Tarsal suspension produces an adhesion to the superotemporal orbital rim that is more secure than a one-point suture attachment.

Figure 2. A and C, Preoperative views of a 64-year-old woman with a bowed, lax eyelid. The lateral view clearly shows that the lid is ectropic. B and D, Postoperative views are shown 5 months after the patient underwent a right coronal brow lift, face lift, and tarsal suspension procedure. Her eyelids have been subtly changed by placing the lateral tarsus low in the superotemporal orbital rim for straightening effect only. The lid has been adequately retroplaced with minimal elevation.
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mm. It may be necessary to lengthen the incision if a large festoon is present and a lower eyelid flap is to be developed. When the technique is performed alone or in combination with a transconjunctival blepharoplasty, only an 8- to 10-mm incision is required. No premarking is needed, because the junction of upper and lower eyelids is evident. A no. 15 Bard-Parker scalpel (Becton Dickinson, Franklin Lakes, NJ) is used only to incise skin and underlying orbicularis. A complete canthotomy is performed with curved Stevens tenotomy scissors. A Colorado electrocautery needle (Colorado Biomedical, Inc., Evergreen, CO) is used for hemostasis.

The horizontal severance of the main body of the lateral canthal tendon (canthotomy) is insufficient to mobilize the lower eyelid and suprareplace it. The inferior crus of the lateral canthal tendon must be severed to elevate the lower eyelid (Figure 3). If tension is placed superiorly or laterally on the eyelid, the inferior crus of the lateral canthal tendon can be straddled with closed Stevens tenotomy scissors and then severed (Figure 4).

The remaining structures holding the eyelid are the medial canthal tendon and retractors of the lower eyelid (capsulopalpebral fascia). Stretching the lateral segment of
the eyelid will allow the surgeon to estimate the point of adhesion required to elevate the eyelid to the desired position. If the lower eyelid is still under a great deal of inferior tension from cicatricial changes, the orbital septum should be incised through the same lateral incision. Blunt dissection across the eyelid with subsequent incision of the septum is performed until the eyelid is mobile (Figure 5).

The dissection track across the midposition of the eyelid should be temporarily filled with adrenaline-soaked sponges for hemostasis; direct cautery can be performed if the lateral wound is stretched with Desmarres lid retractors. At this point, it should be noted that a small rent or dehiscence has been made in the lateral conjunctiva, which is not of any significance. It is not necessary to back-cut or incise the conjunctiva into the inferior fornix.

If the tarsal suspension is combined with a transconjunctival blepharoplasty, the eyelid is externally rotated, the transconjunctival incision is made, and fat is removed. If the procedure is being combined with a transcutaneous blepharoplasty (to treat a malar bag or remove excess skin), the subciliary incision is then made.

The tarsal strip is developed with a small, sharp-pointed blade, such as a 30-degree cataract superblade knife, or a no. 11 Bard-Parker scalpel (Figure 6). This strip development is essentially a horizontal shortening. The eyelid is shortened in the lateral commissure, the degree of shortening depends on the amount of laxity in the eyelid. The length of the strip can be as short as 6 to 7 mm for limited shortening or as long as 10 to 12 mm if a large amount of eyelid is redundant (Figure 6).

The anterior lamella of the eyelid is excised after the splitting of the mucocutaneous junction (Figure 7). It is not necessary to recognize the gray line or mucocutaneous junction when the incision is made. It is only necessary to leave the full height and depth of tarsus; skin and orbicularis are resected to develop the strip. It is not necessary to remove conjunctiva from the posterior surface of the flap, because excess manipulation increases postoperative edema. The strip is further developed by a back-cut or relaxing incision beneath the inferior border of tarsus; the length of the strip is totally dependent on the laxity of the eyelid. It is necessary for the strip to be buried beneath periosteum for at least 4 to 5 mm to develop secure areas of contact and adhesion. If the strip is excessively long, it should be trimmed at its lateral end.

Placement of the Strip

A slot is opened in periosteum at the inner aspect of the superolateral orbital rim (Figure 6). Periosteum should be exposed with a limited dissection to minimize postoperative edema. Therefore, a small, sharp-pointed rake is placed within the wound to stretch and expose the superotemporal rim (Figure 8). A swab is used to push any orbital contents away from the rim. With placement of the rake, tension is placed on the lateral orbital rim from both anterior and posterior directions and the periosteum is exposed. A no. 15 Bard-Parker scalpel is used to cut down
to periosteum and open it for 8 to 12 mm. A Colorado electrocautery needle is placed within this opening, and coagulation is used, both to achieve hemostasis and to open the slot for direct placement of an ME2 cutting needle on a 4-0 Polydek suture (Deknatel, Inc., Fork River, MA; Figure 9). The suture will lead the tarsal strip into the slot to gain a tongue-in-groove adhesion. The tongue-in-groove suture is much more secure than a simple direct suture to periosteum, which achieves only a one-point contact that is easily dehisced. Surgeons who have not achieved satisfactory long-term results with the tarsal suspension may be using only a one-point contact to periosteum. Placing the inferior crus of the lateral canthal tendon through the divided superior crus does not take full advantage of the pull that can be achieved for any eyelid under tension with a complete tongue-in-groove adhesion.

The location of the strip on the superior temporal rim is an important consideration. The degree of eyelid elevation or lateral upsweep resulting from the procedure should be totally dependent on the patient’s needs and preferences. During the initial consultation, photographs of 3 different eyelid positions—a straight eyelid, a small upsweep, and a large upsweep—are presented to determine patient preference. A patient whose small palpebral aperture has been retracted by eyelid surgery...
or involutional changes may wish to have a lateral upsweep once again.

It is difficult to judge eyelid position on the operating table by the relationship of the lid to the inferior limbus. A patient whose sedation is light can fixate directly ahead, but most patients are sufficiently sedated to produce some degree of Bell’s phenomenon. It is a mistake to supraplace the eyelid and chase it up to the inferior limbus when the globe has rotated superiorly. The lid should be straight in its medial third and middle third, and the only analysis needed should be to determine the degree of lateral upsweep. Compare the degree of upsweep in each eye, and achieve symmetry after one eyelid is well positioned.

Feel for the slot with the tip of the ME2 needle, which will pick up a few fibers of periosteum and lead the strip into the slot. Once the knot is secured, use very sharp-pointed scissors to remove the entire tail of the knotted Polydek suture. Polydek is a braided, nonabsorbable suture, and if the limbs are left too long, it may produce a late cyst or fistula created from constant blepharospasm. After the 4-0 Polydek mattress suture is placed within the tarsus and into the periosteal slot, a second 4-0 PDS suture (ETHICON, Inc., Somerville, N J) is placed over the Polydek suture. The purposes of the 4-0 PDS suture are (1) to provide additional suture support to the strip for added longevity, (2) to cover the Polydek knot, and (3) to elevate or drop the eyelid to attain reasonable symmetry with the other side.

If both lower eyelids have been set up and secured and good symmetry is noted, use the 4-0 PDS suture for security only; it secures tarsus to periosteum and exits lateral
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Figure 9. A 4-0 Polydek suture is placed as a lamellar mattress suture within the strip and led into the periosteal slot. It is not necessary to dissect down to the lateral orbital tubercule; it is only necessary to feel for the slot with the tip of the ME2 cutting needle. This will lead the strip into the periosteal opening to form a tongue-in-groove adhesion.

to the Polydek knot. The 4-0 PDS suture is also used to imbricate orbicularis over the Polydek knot to prevent a later exposure. If a change in elevation is needed to obtain symmetry with the contralateral side, the 4-0 PDS suture is placed superior or inferior to the first suture to draw the lateral eyelid up or down (Figure 10).

Reevaluate the temporal fat pocket before or after placement of the second suture. As in any canthoplasty, the globe is retroplaced to some degree. Residual fat that may not have been evident prior to the tightening of the eyelid will reherniate. At that point, the now-evident temporal fat pocket should be removed transconjunctivally or through the canthoplasty incision. Eyelids that are not under a great deal of tension may also exhibit imbricated or pleated orbicularis inferior to the lateral canthal incision. Any herniation noted is fat or orbicularis that has been telescoped or folded. Fat and residual orbicularis should be excised to flatten the area (Figure 11).

Canthal Closure

The mucocutaneous junction at the lateral canthus should be doubly closed, as some patients, men in particu-
lar, tend to treat facial skin indelicately, especially during shaving. To prevent a lateral canthal dehiscence, two 6-0 chromic catgut sutures are placed, starting transcutaneously and exiting through the midposition of the mucocutaneous junction, reuniting upper and lower eyelids. A 6-0 silk suture is also placed in the same area and should be left in place for at least 8 to 9 days to get a good lateral-commissure adhesion (Figures 12 through 14). When the chromic sutures dissolve, patients experience a fair amount of desquamation of epithelium along with the matted chromic catgut sutures; this produces discharge in the lateral canthus. After placement of the canthal sutures, it is worthwhile to use a jeweler’s forceps to brush away any cilia that may have overlapped with the sutures, pushing the cilia onto the conjunctiva. The cilia can be swept into their normal position or epilated. Excess skin is excised.
before skin closure with 6-0 silk. The lateral canthal 6-0 silk suture must be kept in for 8 to 9 days to allow the opposing tarsus to adhere. Other silk skin sutures are removed 3 to 5 days after surgery.

Patients should be instructed not to pull their eyelids. However, if a significant asymmetry is noted at 1 week postoperatively, the surgeon should stretch and slacken the superior-placed eyelid in the office to produce the effect of the sutures being pulled through the tarsal strip to soften the asymmetry. This is not a common manipulation but can be readily performed if needed; the patient can slacken the elevated eyelid at home by infraplaceing the canthus with a stretching maneuver.

Conclusions
No single canthoplasty technique suits every patient. However, the tarsal suspension procedure is the most popular canthoplasty procedure because it has wide

Figure 11. Once the tarsal suspension has been performed, the tightening of the eyelid retroplaces the globe and subsequently reherniates residual fat in the far temporal pocket. If this occurs, fat is excised through the lateral incision. The insert depicts a folding or pleating of orbicularis, which is occasionally seen after placement of the strip. If the orbicularis has pleated on itself, it is directly excised with a cutting mode cautery with a Colorado electrocautery needle.
applicability. A dense adhesion is created at the supero-temporal orbital rim. Minimal edema is produced because the opening of periosteum is performed without extensive dissection down to the lateral orbital tubercle.

This procedure has a number of applications: (1) to change the shape and contour of an eyelid, alone or in combination with a transconjunctival blepharoplasty (Figure 15); (2) to correct eyelid laxity; and (3) to secure an eyelid that is simultaneously undergoing a midface, cheek, or festoon lift. I find that the second 4-0 PDS suture is of great help in attaining symmetry, because this suture can supraplace or infraplace the eyelid to match the contralateral side. Residual fullness in the lateral third of the eyelid can be produced and should be addressed after placement of the tarsal strip by resection of herniated lateral eyelid fat or buckled orbicularis. Lastly, to prevent a dehiscence at the commissure, the closure is performed with two 6-0 chromic catgut sutures and a 6-0 silk suture. Recent canthoplasty variations, such as lateral retinaculum repair, avoid severance of the lateral canthal anatomy but are useful only in a limited number of patients. Most patients have an eyelid that is under tension when retracted and need release of the cicatrix and a new dense adhesion created at the supero-temporal periosteum to attain longevity. Patients who have horizontal lengthening of the eyelid need shortening in addition to lateral fixation; retinaculum and orbicular-
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Many patients have retraction from prior surgery, with horizontally lengthened eyelids from involutional changes. Therefore, they are not good candidates for an upper-eyelid approach to the lateral retinaculum. Tarsal suspension is the superior choice for a wide range of patients undergoing aesthetic or reconstructive eyelid surgery.

Figure 13. The mucocutaneous junction is closed twice with 6-0 chromic catgut sutures and left to fall out.

Figure 14. A 6-0 silk suture is placed at the lateral commissure and left for 8 to 9 days before removal.

Figure 15. This 42-year-old woman wished to change a rounded palpebral aperture produced by prior transcutaneous blepharoplasty. A low tarsal suspension produced a lateral upsweep with no significant narrowing at 12 months postoperatively (lower photo).

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The words canthoplasty and canthopexy are sometimes used interchangeably to indicate an operation on the corner of the eye, but their meanings are different. Canthoplasty, according to Stedman’s Medical Dictionary, is “an operation for lengthening the palpebral fissure by incision through the lateral canthus” or “an operation for restoration of the canthus”; canthoplasty is synonymous with cantholysis. Canthopexy is not defined in Stedman’s.

Examining the Greek derivatives of these words is instructive. The prefix cantho is from the Greek kanthos (corner of the eye). The suffix plasty is from the Greek plastos (formed or shaped). The suffix pexy is from the Greek pexis (fixation). Canthoplasty, then, is an operation to shape or form the corner of the eye, whereas canthopexy is an operation to fixate the corner of the eye. Canthoplasty usually includes canthopexy.

Lateral canthoplasty and canthopexy are performed for a variety of reasons:

1. Canthopexy stabilizes the lower-lid margin during primary cosmetic blepharoplasties and midface lifts.
2. Canthoplasty can shorten an elongated lower-lid margin.
3. Both procedures can elevate the lateral canthus and correct or prevent ectropion.

Tarsal-strip canthoplasty is a highly reliable method for elevation and fixation of the lateral canthus and will correct most ectropions. As Dr. Lisman notes, the tarsal-strip procedure works against tension better than other methods. One cannot ignore surgical principles, however, and Dr. Lisman details the steps involved in releasing tension before canthal tightening. Adequate mobility of the lower lid is a prerequisite to any lid tightening or elevation.

Although tarsal-strip canthoplasty is a champion method, it requires attention to certain technical details:

1. Careful excision of all cilia from the buried strip is important for preventing chronic eye irritation.
2. An expanded area of tissue adhesion is created by precise placement of a permanent suture from the tarsal strip to the soft tissues immediately overlying the inner surface of the superolateral orbital rim.
3. Although it may be time-consuming, the surgeon should not hesitate to revise fixation sutures to achieve better symmetry.
4. Re-creation of a sharply defined, succinct lateral canthus requires accurate placement of the first key suture, which unites the upper and lower lids at the lateral canthus.

The tarsal-strip canthoplasty will predictably shorten the lower lid and reduce the intercanthal distance. If the lower lid is elongated, it may be appropriate to reduce the medial-to-lateral dimension. Both surgeon and patient should be aware, however, that the eye may appear smaller after tarsal-strip canthoplasty.

Surgeons performing lower-lid blepharoplasties and midface lifts frequently need to stabilize the lower lid. The choice between tarsal-strip canthoplasty and forms of canthopexy that do not require cantholysis depends in part on the state of the lower-lid margin. If the lid margin is elongated, the tarsal-strip procedure will provide shortening and strong fixation. If the lid shows a lesser degree of laxity, the simpler canthopexy may suffice. Selecting the most appropriate method of fixation is a matter of surgical judgment and experience. Dr. Lisman, a master of the tarsal-strip technique, beautifully demonstrates the rationale and method of this procedure. All plastic surgeons operating on the eyelids will benefit from study of his work.

Reference