

External (Subciliary) Vs Internal (Transconjunctival) Involutional Entropion Repair

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- **PURPOSE:** To compare surgical outcomes of internal (transconjunctival) vs external (subciliary) involutional entropion repair.
- **DESIGN:** Retrospective, consecutive case series.
- **METHODS:** Electronic medical record review of all patients who underwent involutional entropion repair at the Jules Stein Eye Institute over a 4-year period was performed. **MAIN OUTCOME MEASURES:** Anatomic and functional success, recurrence rate, and complications.
- **RESULTS:** Forty-nine eyes (39 patients) were operated. Twenty-nine eyes underwent subciliary incision repair; 20 eyes underwent transconjunctival repair, both with lower lid retractors reinsertion. Good correlation was found between two masked observers in grading surgical outcome (on a scale of 1 to 4) ($r = .76$, $P < .001$). Forty-two cases (84%) achieved good surgical repair and improvement in symptoms. Recurrence was noticed in 4 eyes (8.2%). Recurrence was higher with the internal approach (15% vs 3% with subciliary incision), but this was not statistically significant ($P = .14$). Complications included: three cases (8.2%) with mild eyelid retraction that were treated conservatively, three cases with postoperative ectropion (all in the external approach, two of which lateral canthal resuspension was not performed), and two cases (4.1%, one case in each group) with pyogenic granuloma.
- **CONCLUSIONS:** Surgical correction of involutional entropion by reinsertion of lower eyelid retractors has similar outcome with internal (transconjunctival) and external (subciliary) approaches. Although not statistically significant, internal repair may result in a higher recurrence rate, whereas external repair may show more postoperative ectropion, most probably attributable to scarring of the anterior lamella. Lateral canthal resuspension,

when needed, may reduce the rate of postoperative ectropion. (Am J Ophthalmol 2005;139:482-487. © 2005 by Elsevier Inc. All rights reserved.)

LOWER EYELID ENTROPION IS A COMMONLY ACQUIRED eyelid malposition affecting the elderly population. Local eye symptoms include discomfort, itching redness, and tearing frequently associated with coexistent trichiasis. Severe cases may cause chronic ocular surface irritation, punctate keratopathy, and corneal pannus formation with decreased visual acuity.¹⁻³ Disinsertion of lower eyelid retractors, lower eyelid horizontal laxity, and overriding of the orbicularis muscle are thought to be the mechanism of involutional entropion.^{4,5} Medical management, including lubricants and anti-inflammatory medications, is usually ineffective. Surgical therapy is considered the treatment of choice and should address each of the specific mechanical causes of the lower eyelid malposition, specifically, reinsertion of lower eyelid retractors being the most important and tightening of the lateral canthus to the orbital rim in cases of lower eyelid laxity.⁶⁻¹³

Reinsertion of lower eyelid retractors can be done thorough a cutaneous infralash incision (external) or internally through a transconjunctival approach.^{14,15} The conjunctival approach avoids a cutaneous incision and may decrease the risk of postoperative cicatricial retraction associated with external repair. The purpose of this work was to compare success, recurrence, and postoperative complications between the internal and external approach.

METHODS

THIS STUDY IS A RETROSPECTIVE, COMPARATIVE INTERVENTIONAL case series. Medical records of all patients who underwent surgery for involutional entropion at the Jules Stein Eye Institute between January 1, 2000 and December 1, 2003 were reviewed. The study complied with the policies of the local institutional review board.

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Data included complete slit-lamp examination, degree of patients' discomfort pre- and postoperatively, and grading of surgical outcome by two independent masked observers. Recurrence rate and complications were compared between two groups of patients.

Grading was performed using a scale of 1 to 4, with 1 being excellent anatomic and functional results and 4 being poor outcome or recurrence of entropion. Both independent observers were masked, and Pearson bivariate correlation was used to calculate agreement between two observers.

- **SURGICAL TECHNIQUE:** Transconjunctival (internal) entropion repair was performed by retracting the lower eyelid and incising the conjunctiva 2 mm below the inferior tarsal border from the lateral canthus to the level of the medial punctum. A conjunctival flap was elevated, and the lower eyelid retractors were identified. The lower eyelid retractors then were reattached to the anterior inferior border of the tarsus using three interrupted buried 5-0 polyglactin sutures on a spatulated needle. The conjunctival incision was approximated by the deep sutures, and no superficial closure was performed.

External repair was performed using an 11 blade and by creating a subciliary cutaneous incision. The orbital septum was then bluntly dissected until the lower eyelid retractors were identified. Care was taken not to sever the preaponeurotic fat pads. The edge of the lower eyelid retractors were then reattached to the anterior inferior border of the tarsal edge using two to three interrupted 5-0 polyglactin sutures on a spatulated needle. Skin was sutured using a running 6-0 fast-absorbing chromic gut sutures.

When lateral canthal tendon laxity was addressed in surgery, a lateral canthal strip procedure was used.¹⁶ The canthal tendon was exposed by lateral canthotomy and cantholysis. Using curved Stevens tenotomy scissors, a lateral tarsal strip was then created by de-epithelializing the cut edge of the newly disinserted lateral canthal tendon. A monopolar cautery was used to dissect and expose the orbital rim. The lower eyelid was resuspended to the periosteum inside the orbital rim at the level of Whitnall's tubercle with one interrupted 4-0 polyglactin suture on a P2 needle. The deep orbicularis was reapproximated using two buried 6-0 polyglactin sutures. Skin was closed using 6-0 fast-absorbing gut suture.

Patients were selected for internal or external surgery based on surgeon preference.

- **STATISTICAL ANALYSIS:** Statistical analysis was performed using paired sample *t* tests to evaluate pre- and postoperative data such as visual acuity (VA) and intraocular pressure (IOP). Independent sample *t* tests were used to compare variables such as age, visual acuity, intraocular pressure, and mean outcome score between two groups (internal and external entropion repair). Chi-

TABLE 1. Demographics and Clinical Manifestations of 39 Patients (49 Eyelids) Operated for Involutional Entropion at the Jules Stein Eye Institute, 2000–2003

N = 49 Eyes; (39 Patients 14 Males, 25 Females)	
Age (years)	78 ± 7 (65–92)
Eye	
OD	29 (60%)
OS	20 (40%)
Follow-up (months)	6.8 ± 2.7(6–22)
Signs and symptoms	
Tearing	34 (70%)
Trichiasis	10 (20.6%)
Conjunctival inflammation	24 (49%)
Lateral canthal laxity	41 (84%)
Snap test (1–4)	1.8
Eyelid distraction (1–4)	1.8
Punctate keratopathy	29 (59%)

square (χ^2) nonparametric analysis was used to compare success, recurrence, and postoperative complications between the two groups. Pearson bivariate correlation was used to examine correlation between age and visual acuity and interobserver agreement. We realize that we use an arbitrary 1 to 4 scale, but we assume the change in each point in the 1 to 4 scale is equivalent (i.e., change from 1 to 2 is equal to change from 2 to 3 or 3 to 4). If these assumptions are not met, then the *P* values are approximate.

RESULTS

THIRTY-NINE PATIENTS (49 EYELIDS) WITH INVOLUTIONAL entropion underwent surgical repair; 10 patients had bilateral entropion. Patients' demographics and preoperative data are summarized in Table 1.

Ocular discomfort associated with local eye symptoms, tearing, and light sensitivity were common presenting signs. On clinical examination, 10 patients were noticed to have coexistent lower eyelid trichiasis. Lateral canthal laxity was noticed in 41 eyelids (84%, Table 1).

Visual acuity remained unchanged after surgery (mean pre- and postoperative visual acuity of 20/40). Older patients had lower pre and postoperative visual acuity ($r = .35$, $P = .014$ and $r = .41$, $P = .006$, respectively).

Twenty-nine eyes underwent external (subciliary incision) entropion repair with reinsertion of lower eyelid retractors; 20 eyes underwent internal (conjunctival incision) entropion repair with lower eyelid retractor reinsertion. Lateral canthal resuspension was performed in 41 cases (83.7%).

Surgical outcome was graded by two masked observers on a scale of 1 to 4, with 1 being excellent results and 4 indicating recurrent entropion; good correlation was found

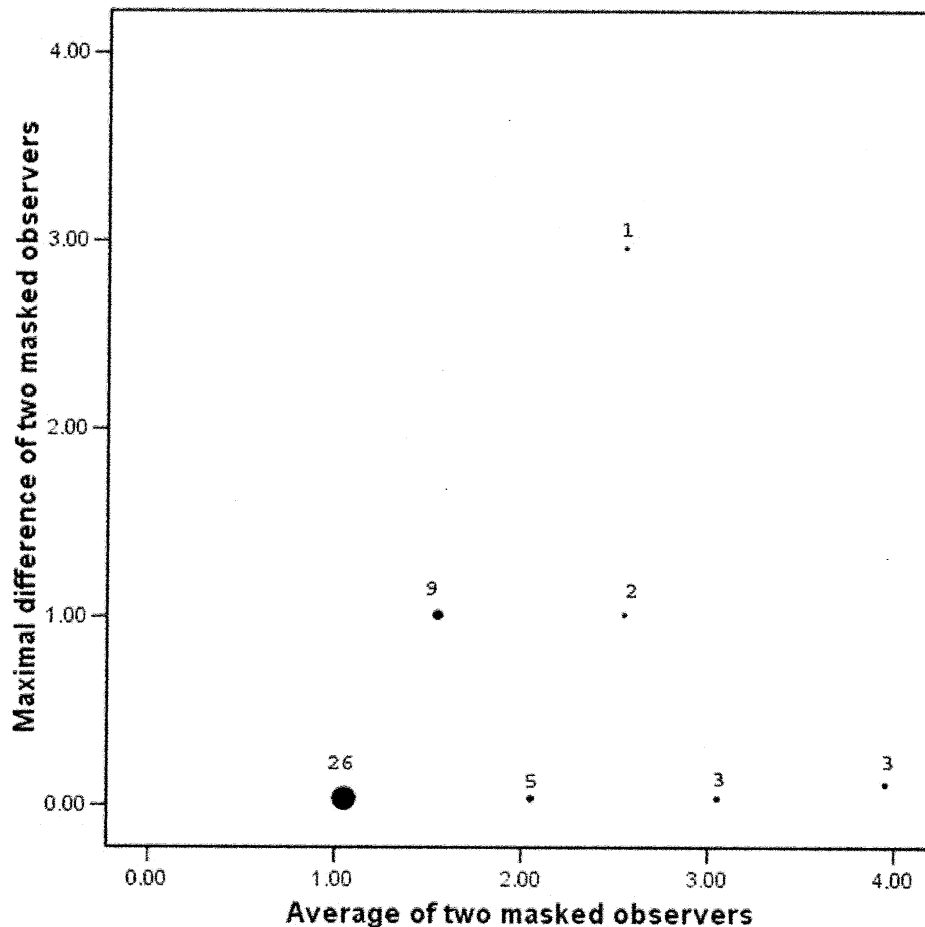


FIGURE 1. Surgical outcome was graded by two masked observers on a scale of 1 to 4, with 1 being excellent results and 4 indicates recurrent entropion; good correlation was found between different observers ($R = 0.76$, $P < .001$, Pearson correlation). Scattergram showing agreement between two masked observers on surgical outcome. Marker size is a count indicator for pairs given by two different observers (number of eyelids in each point is presented above marker).

between different observers ($r = .76$, $P < .001$, Pearson correlation, Figure 1).

Overall, 42 cases (84%) achieved a good result of surgical repair with lower eyelid in normal anatomic position and improvement in symptoms, mean outcome score 1.6. (Figure 2). Recurrent entropion was noticed in four eyes (8.2%); all underwent successful second repair. Recurrence was higher with the internal approach (15% vs 3% with subciliary incision) but this was not statistically significant ($P = .14$).

Three eyes (6.1%) had anatomic success, but patients still had mild discomfort mostly because of lower lid retraction (Table 2). At the end of follow-up time, only five eyes (10.2%) showed superficial punctate keratopathy secondary to dry eye.

Complications included three cases (8.2%) with mild eyelid retraction that were treated conservatively. Three eyes showed overcorrection and postoperative ectropion (Figures 3, and 4), all in the subciliary incision group; in two of these eyes lateral canthal resuspension was not performed in the first surgery. The ectropion was repaired

in one eye, and in the other two cases, the patient was lost to follow-up. Two cases (4.1%, one case in each group) had pyogenic granuloma and were successfully treated with intralesional triamcinolone acetonide 0.1 ml of 40-mg/ml injection. Finally, we had one case (2%) of conjunctival cyst that was surgically excised.

DISCUSSION

OUR STUDY SHOWS SIMILAR FUNCTIONAL AND ESTHETIC surgical outcome for involutional entropion with either internal (transconjunctival) approach or external (subciliary) approach. Although internal entropion correction in our patients resulted in higher recurrence rate and external correction with higher rate of postoperative ectropion, these differences were not statistically significant.

Different methods have been described for surgical management of involutional entropion.^{2,5,14,15,17-26} Most authors perform retractor complex reinsertion with some form of lateral canthal tendon resuspension. When hori-



FIGURE 2. Clinical photograph of a 76-year-old female with bilateral involitional entropion of the lower eyelids. Entropion was not apparent in primary position (upper image) but could have been induced by forceful eyelid closure (middle images). Lower image, 3 months postoperatively (internal approach) with excellent results.

zonal laxity exists preoperatively, some add horizontal shortening by wedge resection. The recurrence rate may be as low as 0% to 5% when retractor reinsertion is performed in conjunction with a horizontal tightening or lateral canthal resuspension procedure.^{2,15,17-21} These recurrence rates could be as high as 17% with more conservative approaches such as a Wies procedure or retractor repair without horizontal shortening.^{5,6,22-26} In the absence of horizontal shortening of the lower eyelid, Jones retractor plication resulted in a higher success rate, less recurrence, and less postoperative overcorrection compared with a Wies procedure.²⁵

Recently, surgical correction using combined fornix suture and lateral canthal resuspension proved to be an efficient repair with a low recurrence rate (1.6%) over a period of 2 to 3 years.²⁷ This technique was not associated with overcorrection or postoperative ectropion that may occur with cutaneous incision.

We had relatively high recurrence rate of 8.2%. Of note, three of four cases of recurrence were in the internal approach group, but the difference in recurrence was only

TABLE 2. Comparative Analysis Between External Entropion Repair (Subciliary Incision) and Internal (Conjunctival Incision) Repair

	External Repair (N = 29)	Internal Repair (N = 20)	P*
Age (years)	80 ± 7	76 ± 5	.03
Visual acuity			
Preoperative	20/50	20/30	.02
Postoperative	20/50	20/30	ns
IOP (mm Hg)			
Preoperative	15.3 ± 3	13.7 ± 2.6	ns
Postoperative	13.5 ± 4	15.5 ± 3.1	ns
Success [†]	25 (86%)	17 (85%)	ns
Mean outcome score [‡]	1.47 ± 0.7	1.78 ± 1.1	ns
Recurrence	1 (3.4%)	3 (15%)	ns (.14)
Postoperative			
ectropion	3 (10%)	0 (0%)	ns (.13)
Follow-up (months)	6.4 ± 1.3 (6-12)	7 ± 3.3 (6-22)	ns (.4)

IOP = intraocular pressure; ns = not significant.

*P was calculated using independent samples *t* test for age, visual acuity, intraocular pressure and mean outcome score, and using χ^2 non-parametric test for success, recurrence, and postoperative complications. [†]Success defined as good anatomic lower eyelid position with no lid retraction or postoperative ectropion and resolving symptoms and signs such as discomfort, tearing, and SPK. [‡]Grading was performed using a scale of 1-4, with 1 being excellent anatomic and functional results and 4 being poor outcome or recurrent entropion.

marginally significant ($P = .14$, χ^2 analysis). It may be that the external approach results in scarring of the anterior lamella, resulting in everting forces on the lower eyelid margin and prevents the orbicularis overriding; this, in conjunction with horizontal shortening and reinsertion of the retractor complex, may result in more stable eyelid position postoperatively. Interestingly, Cook and associates¹⁴ report a similar recurrence rate (8.3%) with transconjunctival repair; they postulated that a higher rate may result from cicatricial shortening of the posterior lamella associated with conjunctival incision, although others did not note cicatricial entropion associated with the transconjunctival incision.^{15,29-32}

We did not address the overriding orbicularis in surgery; in our opinion this is secondary to lower eyelid retractor disinsertion and horizontal laxity and not a direct cause of the involitional changes. It is important to note that there is no anatomic basis for that, and it merely represents our experience. Excision, tightening, or cautery of the orbicularis may further support eyelid position in entropion surgery by scarring and shortening of the anterior lamella.^{17,19,24,33,34} Conversely, surgical manipulation of the orbicularis may increase the risk of paralytic and cicatricial changes leading to lower eyelid retraction. Although our

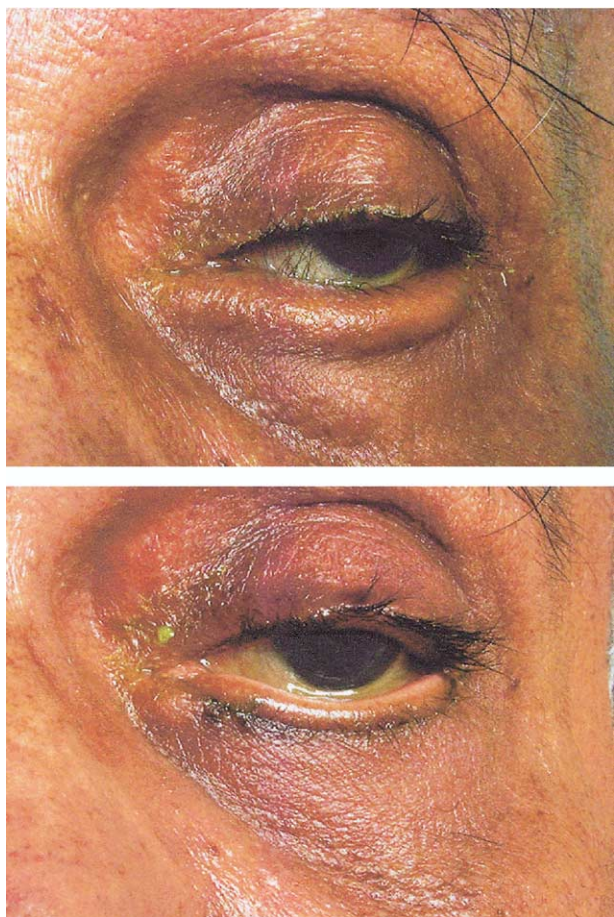


FIGURE 3. Clinical photograph of a 72-year-old male with involucional entropion left lower eyelid (upper image). Three months postoperatively (external approach), he developed postoperative lower eyelid ectropion (lower image).

approach has been to focus on retractor reinsertion and horizontal tightening, we recognize that addressing the orbicularis may reduce the recurrence rate in entropion surgery. The data from retrospective studies is unlikely to answer this question.

Surgical success was graded on a scale of 1 to 4 with 1 being an excellent result with good anatomic position and 4 indicating recurrent entropion. Interestingly, there was good agreement between two independent masked observers ($r = .76$, $P < .001$, Pearson correlation, Figure 1). It is important to realize that apparent success may vary with different follow-up methods, and physical examination of the patients combined with provocative testing may be a more accurate method of defining success. Long-term follow-up office examination revealed cases of recurrent postoperative entropion that had not been detected otherwise.³⁵

Limitations of the study stem from its retrospective design, the relatively small number of patients, and the relatively short-term follow-up based on the referral pattern of the authors' practice is a further limitation.



FIGURE 4. Clinical photograph of an 82-year-old male with bilateral lower eyelid involucional entropion (upper image). The patient developed postoperative (external approach) ectropion (lower image). He was offered surgery for ectropion but was lost to follow-up.

In the current study, surgical outcome was similar in both groups (internal and external repair). Therefore, we cannot conclude that one approach is superior to the other. We would recommend, however, that surgery should be performed based primarily on surgeon preference and experience, because the transconjunctival approach may be more difficult. In cases of tight anterior lamella and actinic changes in periocular skin, such as in patients with acne rosacea, we would prefer the internal approach to prevent postoperative over correction and ectropion.

In conclusion, reinsertion of the retractor complex for correction of involucional entropion results in similar outcome by using internal (transconjunctival) incision or external (subciliary) incision. Addressing the lateral canthal laxity is an integral part of entropion surgery, and this work as well as previously published works^{5,22-26} show evidence that it may decrease recurrence rate. Although not directly examined in the study, we believe that horizontal shortening by a lateral tarsal strip procedure is more robust than tucking or tightening the inferior crus of the lateral canthal tendon. External repair may result in a slightly higher rate of postoperative ectropion, most probably secondary to scarring and shortening of the anterior lamella. It is suggested that combined internal repair with tarsal strip procedure may add the advantage of both techniques and reduce complications and recurrence rate.

Only a prospective randomized study comparing subciliary and transconjunctival incision would provide more meaningful conclusions.

REFERENCES

1. Collin J, Rathbun JE. Involutional entropion: a review with evaluation of a procedure. *Arch Ophthalmol* 1978;96:1058–1064.
2. Rainin E. Senile entropion. *Arch Ophthalmol* 1979;97:928–930.
3. Scheie H, Albert DM. Distichiasis and trichiasis: origin and management. *Am J Ophthalmol* 1966;61:718–720.
4. Dagleish R, Smith JLS. Mechanics and histology of senile entropion. *Br J Ophthalmol* 1966;50:79–91.
5. Dryden R, Leibson J, Wobig J. Senile entropion. Pathogenesis and treatment *Arch Ophthalmol* 1978;96:1883–1885.
6. Wies F. Surgical treatment of entropion. *J Int Coll Surg*, 1954;21:758–760.
7. Collin J. A manual of systematic eyelid surgery. Edinburgh: Churchill Livingstone, 1989:7–26.
8. Quikert M, Rathbun E. Suture repair of entropion. *Arch Ophthalmol* 1971;85:304–305.
9. Hargiss J. Inferior aponeurosis vs orbital septum tucking for senile entropion. *Arch Ophthalmol* 1973;89:210–213.
10. Jones L, Reeh MJ, Wobig JL. Senile entropion. A new concept for correction. *Am J Ophthalmol* 1972;74:327–329.
11. Carroll R, Allen SE. Combined procedure for repair of involutional entropion. *Ophthalmic Plast Reconstr Surg* 1991;7:273–277.
12. Jackson S. Surgery for involutional entropion. *Ophthalmic Surg* 1983;14:322–326.
13. Lemke B, Sires BS, Dortzbach RK. A tarsal strip periosteal flap technique for lateral canthal fixation. *Ophthalmic Surg Lasers* 1999;30:232–236.
14. Cook T, Lucarelli MJ, Lemke BN, Dortzbach RK. Primary and secondary transconjunctival involutional entropion repair. *Ophthalmology* 2001;108:989–993.
15. Dresner S, Karesh JW. Transconjunctival entropion repair. *Arch Ophthalmol* 1993;111:1144–1148.
16. Anderson R, Gordy DD. The tarsal strip procedure. *Arch Ophthalmol* 1979;97:2192–2196.
17. Nowinski T. Orbicularis oculi muscle extirpation in a combined procedure for involutional entropion. *Ophthalmology* 1991;98:1250–1256.
18. Dortzbach R, McGetrick JJ. Involutional entropion of the lower eyelid. *Plast Reconstr Surg* 1983;2:257–267.
19. Hsu W, Liu D. A new approach to the correction of involutional entropion by pretarsal orbicularis oculi muscle fixation. *Am J Ophthalmol* 1985;100:802–805.
20. Wesley R, Collins JW. Combined procedure for senile entropion. *Ophthalmic Surg* 1983;14:401–405.
21. Allen L. Four-snip procedure for involutional entropion: modification of Quikert and Jones procedures. *Can J Ophthalmol* 1991;26:139–143.
22. Hornblase A, Bercovici E, Smith B. Senile entropion. *Ophthalmic Surg* 1977;8:47–57.
23. Saunders D, Shannon GM, Nicolitz E. The corncrib repair of senile entropion. *Ophthalmic Surg* 1980;11:128–130.
24. Hill J, Feldman F. Tissue barrier modifications of Wheeler II operation for entropion. *Arch Ophthalmol* 1967;78:621–623.
25. Boboridis K, Bunce C, Rose GE. A comparative study of two procedures for repair of involutional lower lid entropion. *Ophthalmology* 2000;107:959–961.
26. Danks J, Rose GE. Involutional lower lid entropion: to shorten or not to shorten? *Ophthalmology* 1998;105:2065–2067.
27. Rougraff P, Tse DT, Johnson TE, Feuer W. Involutional entropion repair with fornix sutures and lateral tarsal strip procedure. *Ophthalmic Plast Reconstr Surg* 2001;17:281–287.
28. Tenzel R, Buffam FV, Miller GR. The use of the “lateral canthal sling” in entropion repair. *Can J Ophthalmol* 1977; 12:199–202.
29. Khan S, Meyer DR. Transconjunctival lower eyelid involutional entropion repair: long-term follow-up and efficacy. *Ophthalmology* 2002;109:2112–2117.
30. Baylis H, Long JA, Groth MJ. Transconjunctival lower eyelid blepharoplasty. Technique and complications. *Ophthalmology* 1989;96:1027–1032.
31. Zarem H, Resnick JI. Expanded applications for transconjunctival lowerlid blepharoplasty. *Plast Reconstr Surg* 1991; 88:215–220.
32. Westfall C, Shore JW, Nunery WR, et al. Operative complications of the transconjunctival inferior fornix approach. *Ophthalmology* 1991;98:1525–1528.
33. Dunnington J, Regan EF. Ziegler cautery puncture for noncicatricial entropion. *Am J Ophthalmol* 1966;61:1090–1092.
34. Corin S, Veloudios A, Harvey JT. A modification of the lateral tarsal strip procedure with resection of the orbicularis muscle for entropion repair. *Ophthalmic Surg* 199;22:606–608.
35. Glatt H. Follow-up methods and the apparent success of entropion surgery. *Ophthalmic Plast Reconstr Surg* 1999;15: 396–400.