Evaluation of Levator Function for Efficacy of Minimally Invasive and Standard Techniques for Involutional Ptosis

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• PURPOSE: To evaluate clinical and anatomic outcomes of surgery for involutional ptosis using standard-length or small incisions in relation to preoperative levator function.
• DESIGN: Retrospective study.
• METHODS: Sixty-three patients diagnosed with involutional ptosis who underwent surgical correction using a small or standard-length incision between November 2010 and December 2011 were reviewed; a single surgeon performed surgery using a small incision (8 to 10 mm) in 22 patients and a standard-length incision (20 to 22 mm) in 34 patients. All patients underwent standard preoperative ptosis evaluation with margin-to-reflex distance 1 and 2 measurements and levator function assessment. Patients were divided into 2 groups according to levator function (moderate: 5 to 10 mm; and good: >10 mm). Surgical success was evaluated based on the British Oculoplastic Surgery Society criteria.
• RESULTS: Of 83 upper eyelids of 63 patients, surgery was performed using a small incision in 40 and a standard incision in 43. In patients with good levator function, surgical success was achieved with a small incision in 18 eyelids (94.7%) and a standard incision in 20 eyelids (95.2%; $P = .91$). In patients with moderate levator function, surgical success was achieved with a small incision in 14 eyelids (66.7%) and with a standard incision in 18 eyelids (81.8%; $P = .04$).
• CONCLUSIONS: These findings indicate a similar surgical success rate in patients with good levator function, regardless of incision length. The surgical success rate in patients with moderate levator function was lower when using a small incision, perhaps because of decreased visualization and anatomic access. (Am J Ophthalmol 2014;157:209–213. © 2014 by Elsevier Inc. All rights reserved.)

IN ADULT PATIENTS, ACQUIRED BLEPHAROPTOSIS MAY be differentiated mechanistically into involutional, neurogenic, mechanical, traumatic, and myogenic ptosis. Dehiscence of the levator aponeurosis is the most common cause in elderly patients with involutional ptosis.[1–3] Levator aponeurosis advancement is an effective technique that is used routinely to correct involutional ptosis. The standard approach involves a skin incision in the upper eyelid crease for the entire length of the eyelid, with or without associated blepharoplasty. The use of a smaller incision for ptosis repair was described first in 1999 by Lucarelli and Lemke.[4] The advantages of using a small incision during surgery include decreased morbidity, tissue preservation, decreased operative time, rapid healing, and reduced scarring. In addition, limiting the length of the skin incision allows for the use of a smaller amount of local anesthetic, decreases volume-related tissue distortion and the paralytic effect on local muscles, and allows for a better assessment of the eyelid height and contour during surgery.[5] In a published series, small incisions were reported to be effective and were associated with an improved surgical outcome[4,6,7] and shorter surgery time[7] compared with a standard length incision. Preoperative characteristics of the patient, however, may affect the decision to use a small or standard-length incision. In our clinical practice, we observed that a smaller incision was more likely to lead to a poor outcome in patients with worse levator function compared with patients with better levator function. Therefore, in the present retrospective study, we assessed the efficacy of surgical correction of involutional ptosis using a standard-length incision or a small incision in relation to preoperative levator function.

METHODS

THIS RETROSPECTIVE, OBSERVATIONAL CASE SERIES STUDY was conducted at the Eye Clinic of the University of Milan, San Giuseppe Hospital, Milan, Italy. It was approved by the institutional review board of our hospital and local ethics committee and adhered to the tenets of the Declaration of Helsinki.

• PATIENTS: Sixty-nine charts of consecutive patients with involutional ptosis requiring surgical correction who were referred to the Oculoplastic Service of the San Giuseppe Hospital were reviewed, and patients meeting the inclusion criteria were included in the analysis. Inclusion criteria were involutional ptosis requiring surgical correction and moderate to good levator function. Exclusion criteria were levator muscle function less than 5 mm, floppy eyelid syndrome, history of upper eyelid

Accepted for publication Aug 1, 2013.
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0002-9394/$36.00
http://dx.doi.org/10.1016/j.ajo.2013.08.005

surgery, dermatochalasis in patients who underwent simultaneous skin blepharoplasty, and a follow-up period of less than 2 months.

Levator function was graded before surgery as poor (< 5 mm), moderate (5 to 10 mm), or good (> 10 mm) on the basis of the eyelid excursion.[8] All procedures were performed under local anesthesia by a single ophthalmic plastic surgeon (S.R.). The surgical time for each procedure was measured from skin incision to skin closure. A standard-length incision (20 to 22 mm) was used for surgeries performed between November 2010 and April 2011. Based on the reported advantages of a less invasive procedure,[4,6,7] the same surgeon elected to use a smaller incision (8 to 10 mm) for surgeries performed between May and December 2011.

Success of the surgery was evaluated on the basis of the criteria of the British Oculoplastic Surgery Society National Ptosis Survey. This survey defines an operation as successful only if all of the following criteria are met: upper margin reflex distance between 3 and 5 mm, interlid margin reflex distance difference of 1 mm or less, interlid crease difference of 2 mm or less, and the presence of symmetrical lid contour.[9] Before surgery, all subjects underwent a complete ophthalmic examination including preoperative eyelid measurements (margin reflex distance, levator function, and assessment of dermatochalasis).

Postoperative parameters, including margin reflex distance, contour, and symmetry, were evaluated at all follow-up visits scheduled 3 weeks and 6 months after surgery. All patients underwent preoperative and postoperative photography. All measurements were obtained by a single examiner (M.S.).

All patients received a postoperative regimen of 2 g/day oral amoxicillin (Ratiopharm Italia, Milano, Italy) for 6 days and administration of eye drops containing a fixed combination of 3 mg/mL tobramycin and 1 mg/mL dexamethasone (Alcon Italia S.P.A., Milano, Italy) 4 times daily for 2 weeks.

• **STUDY OUTCOMES:** The primary outcome was to compare the overall efficacy of surgery performed using small and standard-length incisions for involutional ptosis correction between 2 groups, those with moderate levator function (5 to 10 mm) and those with good levator function (>10 mm), based on the British Oculoplastic Surgery Society National Ptosis Survey criteria at 6 months after surgery. Secondary outcomes included differences in the operating times, complication rates between the 2 surgical techniques, and correlation between preoperative and postoperative margin reflex distance in the 2 groups.

• **SURGICAL TECHNIQUE:** Each upper lid was infiltrated subcutaneously with 0.3 to 0.6 mL of 2% lidocaine with 1:200 000 units of epinephrine (Cabon, Milan, Italy). A central upper eyelid crease incision was marked at the natural anatomic crease 8 to 10 mm from the ciliary margin; the standard incision was 20 to 22 mm long and the small incision was 8 to 10 mm long (Figure 1, Top).

After opening the orbicularis muscle plane and the orbital septum with Westcott scissors (Janach, Como, Italy), the preaponeurotic fat pad was retracted to reveal the thinned levator aponeurosis. The levator aponeurosis than was excised near the upper tarsus (Figure 1, Bottom left) and sutured to the tarsus with interrupted 6-0 polypropylene sutures (Ethicon, Inc, Somerville, New Jersey, USA; Figure 1, Bottom right). One advancement suture was used for the small incision and 3 advancement sutures were used for the standard-length incision. The skin was closed with a running 6-0 polypropylene suture followed by the application of tobramycin ophthalmic ointment (Alcon Italia).

• **STATISTICAL METHODS:** A formal sample size was calculated to assess the difference between the 2 surgical techniques. Setting the α error to 5%, 65 patients would enable detection of a 20% difference between the 2 surgical techniques with a power of 80%. Data of patients (age and sex) with moderate levator function and those with good levator function were compared using a 2-sample independent statistical test (Student's t test and the chi-square test). The correlation between the preoperative and postoperative margin reflex distance was evaluated by regression analysis.

RESULTS

• **PATIENTS:** Thirty-seven charts of consecutive patients who underwent the surgery with a standard-length incision between November 2010 and April 2011 were reviewed, and 3 patients (8%) were excluded. One patient (2.7%) had insufficient follow-up, 1 patient (2.7%) was determined not to have involutional ptosis, and 1 patient (2.7%) had undergone a reoperation. A total of 34 patients were included in the analysis, 9 of whom had bilateral surgery (26.5%). Thirty-two charts of consecutive patients who underwent surgery with a small incision between May 2011 and December 2011 were reviewed. Three patients (9.4%) were excluded, 2 (6.2%) with insufficient follow-up and 1 (3.1%) had undergone a reoperation. Twenty-nine patients were included in the analysis, 11 (37.9%) of whom had undergone bilateral surgery.

A total of 83 upper eyelids of 63 patients fulfilled the inclusion criteria and were included in the analysis (40 in the small-incision group and 43 in the standard-incision group; mean patient age, 62 years; range, 18 to 81 years). Both the small-incision and standard-incision groups were similar with respect to age ($P = .02$, paired t test), sex ($P = .85$, Fisher exact test), and side of operated eye ($P = .85$, Fisher exact test). Mean postoperative follow-up was 3.4 months (range, 2 to 6 months).