noma cells in the deep portion of the tumor that were possibly beyond the kill depth of TTT. Peripapillary tumors and those within 1.5 mm of the optic disc were excluded from consideration of treatment with transcleral cryotherapy. Because of the disparity between the small size of the optic disc and the larger size of the extrascleral portion of the optic nerve, it was concluded that cryotherapy could not properly treat the episcleral tissue behind a tumor located in the peripapillary region without injuring the optic nerve. My observation that primary treatment of even a small choroidal melanoma (~3.0-mm thickness) could be followed by severe intravitreal hemorrhage led to the decision to apply the cryotherapy only after a post- TTT interval of 3 months. My observations of tumors treated with TTT verified that 3 months after TTT both the vascularity of the tumor and the tumor bulk were greatly reduced. The reduced tumor bulk would enable the cryotherapy to be more capable of successfully treating the entire thickness of the residual tumor, and the reduced vascularity would decrease the likelihood of causing hemorrhage.

In the present series, the development of 2 recurrences in 5 cases, despite combination therapy, was disappointing. Clearly this combination therapy will not always be successful in preventing tumor recurrences. One might argue that the depth and completeness of the freezes with the cryotherapy applications were inadequate. However, the freezes were easy to observe with indirect ophthalmoscopy; in each case, the treatment appeared to adequately and completely cover the perimeter of the tumor base. The observed freeze from the cryotherapy application extended approximately 1 mm beyond the perimeter of the TTT, which, in turn, was delivered to encompass not only the tumor base but also 1 mm of clinically normal-appearing tissue around the tumor margin.

The failure of this combined treatment may be looked on as a reason to discontinue the use of cryotherapy as an adjunctive treatment. However, the known effectiveness of primary cryotherapy in the treatment of some small melanocytic tumors4 and the effective management of an edge recurrence with cryotherapy after an initial treatment with TTT as in an unreported case, as well as the potential value in preventing extrascleral extensions, argue for continuing to explore the use of cryotherapy as an adjunctive treatment in selected cases of small melanomas. Of the 2 tumors that developed recurrences after the use of combined therapy with TTT and cryopexy, effective management appears to have been accomplished with additional TTT in 1 tumor. Brachytherapy was used to treat the other tumor recurrence. This was followed by local control of the tumor for several years, but the treatments failed to prevent metastases. Although meaningful survival statistics cannot be drawn from this small series, the development of metastatic melanoma in 1 of the 2 patients with tumor recurrence serves to remind us that a trend toward reduced survival has been demonstrated following local tumor failure after brachytherapy.6 It remains a goal to eliminate tumor recurrences. One eye developed an epiretinal membrane with resulting visual impairment despite successful pars plana vitrectomy and membrane peeling. Although epiretinal membrane formation can be seen after TTT alone, cryopexy has also been shown to produce epiretinal membrane, especially when used with heavy applications as in this case series.7 It remains uncertain whether the epiretinal membrane in this series was induced from TTT, cryotherapy, or both.

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**Functional Use of Hyaluronic Acid Gel in Lower Eyelid Retraction**

Hyaluronic acid gel is a nonanimal, naturally occurring polysaccharide found in the extracellular matrix of connective tissue and is well suited as a soft-tissue filler in cosmetic surgery. Cross-linked hyaluronic acid gel is identical in composition across species with a low risk of allergic reaction.1 It is a transparent, viscous, injectable tissue filler that can be found in varying particle sizes and whose effect lasts up to 9 months.2 Lower eyelid retraction with exposure keratopathy and lagophthalmos is a challenging clinical problem. While symptoms of corneal exposure can be medically managed, traditional long-term treatments generally involve surgical intervention. We used hyaluronic acid gel as a minimally invasive nonsurgical alternative to treat secondary lower eyelid retraction causing corneal exposure and keratopathy in 5 patients with varying etiologies. This treatment formed part of the patients’ clinical management and did not require institutional review board approval.

**Report of Cases.** Injection location and volume were determined in the preoperative visit. Preinjection and postinjection photographs were taken with standard position and lighting by the same surgeon with a Nikon Coolpix 990 camera (Nikon, Melville, New York). Each injection was done by the
same surgeon under local topical anesthetic using a 23-gauge and one-quarter–inch needle. We injected 0.2 to 2.0 mL of hyaluronic acid gel anterior to the orbital rim in the preperiosteal plane deep to the orbicularis oculi muscle to avoid visible irregular deposition and discoloration from the filler. Small amounts of hyaluronic acid gel were delivered via multiple injections, each in a thread-like manner with constant pressure to create volume (Figure 1). We aimed to inject a larger amount of hyaluronic acid gel posterior to the orbicularis oculi muscle to obtain a more marked functional use in 5 consecutive patients with secondary lower eyelid retraction. After the injection, the area was gently massaged to smooth any areas of irregularity. The patient was discharged after desirable filling of the contour and lid height were achieved. There were no postinjection instructions or restrictions.

Photographic documentation of each patient preinjection and postinjection was used to calculate the change in inferior scleral show. Using Adobe Photoshop version CS2 (Adobe, San Jose, California), the distance of the lower lid margin to the inferior corneal limbus was compared with the horizontal corneal diameter of the same patient. Actual scleral show measurements were calculated in millimeters based on the assumption that the horizontal corneal diameter was 11.5 mm.

Eight lower eyelids (4 right and 4 left) of 5 patients (2 men, 3 women; average age of 56 years) were injected. Causes of lower eyelid retraction included lower eyelid blepharoplasty (4 patients) and lower motor neuron facial palsy (1 patient). All patients had undergone other periorbital and/or orbital surgeries and complained of symptoms associated with exposure keratopathy, including discomfort, foreign body sensation, and corneal keratopathy.

The average volume of hyaluronic acid gel used was 0.925 mL in the right lower eyelid and 0.824 mL in the left lower eyelid. This volume was tailored to the individual and based on clinical need. Four patients received Restylane (Q-Med AB, Uppsala, Sweden) and 1 patient received Perlane (Q-Med AB).

Hyaluronic acid gel injections raised the height of the lower eyelids, improved eyelid closure, and reduced symptoms of exposure keratitis. Preinjection and postinjection images are
presented in Figure 2. Postinjection images were taken at 2 to 3 months after injection with the exception of Figure 2D. The mean improvement as demonstrated by the change in inferior scleral show was 1.08 mm when pretreatment and posttreatment images were compared. Moreover, the symptoms associated with corneal exposure were subjectively improved in all patients. One patient had hyaluronidase administered to diminish the effect of the injected hyaluronic acid gel.

Comment. This small study demonstrates the functional use of hyaluronic acid gel for patients with secondary lower eyelid retraction. Hyaluronic acid gel has few adverse reactions, which include pain, discoloration of the skin, asymmetry, contour irregularities, and erythema. These are often transient and localized. However, simple procedures, such as the injection of dermal fillers, have the potential to induce reactions including loss of vision from embolization or direct injury to the globe with the needle.3

Depth of injection is critical to good volume augmentation with aesthetic success. To prevent a lumpy result, larger particle fillers are generally injected in deeper planes of tissue. Patients with persistent fullness (improper volume) or superficial injection of the hyaluronic acid (improper placement of filler) can be locally injected with 10 to 20 units of hyaluronidase. The fullness or contour abnormality is reduced immediately and the action of hyaluronidase works rapidly for 24 hours.4

Conclusions. Hyaluronic acid gel is an effective, minimally invasive treatment for lower eyelid retraction. While follow-up was short-term in this study, the longevity of hyaluronic acid gel in these patients will vary in long-term follow-up. Patient satisfaction was high, with improvement of exposure symptoms. In the same way that botulinum toxin is used to lower the upper eyelid by temporary chemodenervation of the levator muscle, hyaluronic acid gel can raise the lower eyelid temporarily. This small case series illustrates the use of hyaluronic acid gel injection in the treatment of lower eyelid retraction and should be considered in patients where surgery is not desirable or whose underlying condition may evolve such that surgical intervention is not appropriate.

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