http://dx.doi.org/10.35630/2199-885X/2022/12/2.13

SURGICAL APPROACH TO THE TREATMENT OF UPPER EYELID RETRACTION CAUSED BY PROMINENT FILTRATION BLEB

Received 18 December 2021;
Received in revised form 12 January 2022;
Accepted 15 January 2022

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ABSTRACT — OBJECTIVE: To report on the technique of upper eyelid lengthening in patients with upper eyelid retraction not associated with Graves' disease but associated with bleb exposure and exposure keratitis.
CASE SERIES: We present three patients (four eyes) with a history of glaucoma who underwent trabeculectomy with an active bleb with symptoms associated with bleb and corneal exposure due to retraction of the upper eyelid not associated with Graves' disease. All patients underwent surgical treatment to lengthen the upper eyelid by percutaneous complete blepharotomy with complete dissection of the orbicularis muscle, aponeurosis of levator palpebral muscle, Muller's muscle and dissection of nasal and temporal conjunctiva reaching the superior border of the tarsus. In addition, the lateral horns of the levator muscle were resected, while preserving a strip of intact conjunctiva directly above the bulging bleb.
Before and after surgery, the following measurements were made: including, visual acuity, retraction measurement, presence symptoms of dry cornea and bleb, MRD, and upper eyelid contour.
RESULTS: Preoperative upper lid marginal reflex distance (MRD) was measured. In addition, conjunctival staining of the bleb and cornea was recorded. Visual acuity ranged from 6/12 to 6/36. Upper eyelid retraction ranged from 3mm to 7.5mm, this was measured by calculating the marginal reflex distance (MRD) of the upper retracted eyelid minus 4.5 mm, representing the normal MRD. Amounts of lubricating drops used by patients per day was also recorded and quantified.
The following postoperative measurements were recorded: MRD of upper eyelid; specifically including upper eyelid contour and position, present or absence of upper eyelid ptosis. Visual acuity improved by one line in the first postoperative week and maximum up to three lines after a month. A good cosmetic result was achieved.
CONCLUSION: Blepharotomy is a surgical procedure suitable for the treatment of severe eyelid retraction. Preservation of the bridge of the intact conjunctiva over the bleb protects the bleb from traumatization in the postoperative period. This makes possible to use the blepharotomy in cases of eyelid retraction with exposure of the filtration bleb, and also maintain the correct contour of the upper eyelid.

KEYWORDS — eyelid retraction, upper eyelid lengthening, blepharotomy, filtration bleb.

INTRODUCTION

Retraction of the eyelids is defined as an increase in the vertical opening of the palpebral fissure. (1, 2) In this regard, eyelid retraction is both a functional disease and a cosmetic problem. The most commonly seen cause of eyelid retraction is an over-active thyroid gland, a medical condition called Graves' disease. (3, 4, 5) Retraction of the eyelids can be acquired and congenital. (3) Acquired cases are more common. There are several etiologies may cause eyelid retraction. For example, conditions such as autoimmune inflammatory disorder, neurogenic, myogenic and mechanical pathology (3, 4). Mechanical retraction of eyelids the most common cause. Mechanical types of retraction include conditions defined as *bulging or protruding* eyes associated with high myopia, buphthalmos, proptosis, retrobulbar hemorrhage, craniosynostosis. The mechanical etiology of retraction also includes fractures of the lower wall of the orbit, eyelid neoplasia, atopic dermatitis, eyelid skin scars, extended contact lens wear, conditions after irradiation of the orbit or sinuses, after blepharoplasty and surgery to correct ptosis, and also post traumatic or postsurgical or after burn symblepharon and conjunctival scaring of posterior lamella of eyelids. The occurrence of upper eyelid retraction after filtering glaucoma operations is rare but well established. (6, 7) The mechanism by which a bleb is the cause of eyelid retraction remains unclear, but there are several hypotheses are present. The most common hypothesis is mechanical lifting of the eyelid over the underlying bulging superior bulbar conjunctiva (Fig. 1). As a result, the bleb causes retraction of the upper eyelid, and retraction leads to exposure of the bleb and cornea, exposure keratopathy, corneal and bleb erosions, lack of protection of the bleb from external influences, a greater likelihood of infection, followed by the development of blebitis and, in severe cases, endophthalmitis (8, 9). Therefore, the treatment of eyelid retraction in the case of a bare bleb is of primary importance. In these cases, there is no clear indication which surgical method is best for treating eyelid retraction and which surgical technique is superior for performing blepharotomy.

SURGICAL TECHNIQUE

The amount of bleb projection is marked, and the lid crease is marked as well. Local anesthesia is

infiltrated in the upper eyelid with lidocaine HCL 2% and epinephrine 1/100,000. (Fig. 2). The corneal shield is inserted into the palpebral fissure. An incision is made in the skin and orbicularis muscle along the eyelid crease with conjunctival sparing. Dissection is performed reaching a plane superior to the bleb. The levator aponeurosis and Muller's muscle are dissected from the upper edge of the tarsal plate and separating them from the conjunctiva. Dissection is continued to superior conjunctival fornix reaching and incising the lateral horn of the levator muscle. The palpebral conjunctiva is incised on the nasal and temporal sides of the projection (Fig. 3). The incision of the conjunctiva may continue medially, to the medial end of the tarsal plate and laterally, to the lateral canthal ligament. This graded through and through conjunctival incision is done along-side with constant measurement of the lid height to determine how much to incise. (Fig. 4), If necessary, the incision of the conjunctiva is extended from the desired side until the eyelid drops to the planned height (Fig. 5). The orbicularis muscle is sutured with Vicryl 6.0 and an intradermal suture or an external suture with 6.0 nylon suture performed. If non- dissolving sutures are chosen, the sutures are removed in two weeks. Synthomycin ointment 5% is applied in the eye and on the skin of the eyelid. The eye is closed with a tight bandage.

RESULTS:

Case 1. A 60-year-old man with a history of open-angle glaucoma in the right eye. A year prior, he underwent a revision of trabeculectomy. Workup was done and thyroid disease was ruled out. He was treated with lubricants every hour in the right eye. On examination, visual acuity without correction Right Eye — 6/36, MRD —12mm, eyelid retraction —7.5 mm, dry bleb, diffuse superficial keratitis. No other pathology of the right eye was found. After surgery on the right eye MRD — 3 mm at check in a month and after half a year, RE vision 6/24 after a 1week and 6/12 in a month after operation. Post-operative patient was treated with lubricants 6 times a day for one month, then tapering to 4 times a day. Correct eyelid contour. The disappearance of the symptoms of dryness of the bleb and cornea. The filtering function of the bleb has not changed. Patient is satisfied with cosmetics.

Case 2. A 66-year-old man with a history of open-angle glaucoma in both eyes. 3 years prior, trabeculectomy was performed on the right eye. Post operatively, the intraocular pressure decreased well without additional treatment, but his vision deteriorated and he experienced a foreign body sensation. A trial of lubricants yielded not sufficient relief. On workup, there was no evidence of thyroid eye disease. On examination, visual acuity was 6/12 OD, MRD —7.5 mm, measuring an eyelid retraction of 3mm; there was dryness and thinning of the raised bleb, and also evidence of superficial keratitis. There was no other pathology in the right eye. Blepharotomy was performed and post-op the MRD was measured — 4 mm, this was preserved 1.5 years post op. There was an improvement as well in the visual acuity OD= 6/9. Post operatively, the eyelid contour significantly improved, there was a significant decrease in corneal and conjunctival signs of dry eye and patient subjectively felt an improvement on sensation. Intraocular pressure remained controlled.

Case 3. 72 year old male with a history of open-angle glaucoma in both eyes. Bilateral trabeculectomy was performed. Post operatively, intraocular pressure decreased well without additional treatment in the first year, but then prostaglandin drops were added. He complained of blurred vision and burning sensation in both eyes and used artificial tears multiple times a day. Upon workup, no evidence of thyroid disease was found. On examination, uncorrected visual acuity was 6/18 OU, MRD OD — 11.5 mm, measuring eyelid retraction at OD 7mm. The MRD OS -8mm with eyelid retraction measuring at 3.5 mm. There was evidence of dryness and thinning of the raised cystic bleb on the right eye, and slightly less raised on the left eye, with superficial keratitis of both corneas. No other eye pathology was found. The patient underwent blepharotomy of both eyes, with an interval of several months between both eyes. Post operatively, eyelid MRD in OD was 4 mm, and 3 mm in OS, with a year half of follow up. Visual acuity in the right eye improved to 6/12 a week postop and 6/9 a month post op, in the left eye vision stayed at 6/12 a week and month post-op. The upper eyelid height and curvature was satisfactory in both eyes. There was a significant decrease in objective and subjective signs of dry eyes, with an absence of complaints. Intraocular pressure is still regulated by the prostaglandin drops. There were no complaints of burning sensation and discomfort in both eyes.

DISCUSSION

Eyelid retraction due to large cystic blebs is a rare entity and not well reported in the literature (6, 7, 8, 9). Eyelid retraction is defined by abnormal elevation of the upper eyelid in primary gaze. Lid retraction is most commonly associated with thyroid eye disease, once excluded, the list of differential diagnoses is complex; including neurological, muscular and mechanical causes (1, 2, 3). Eyelid retraction as a result of a large filtering bleb is a rare mechanical cause and was first described by Putterman in 1975 (10). There

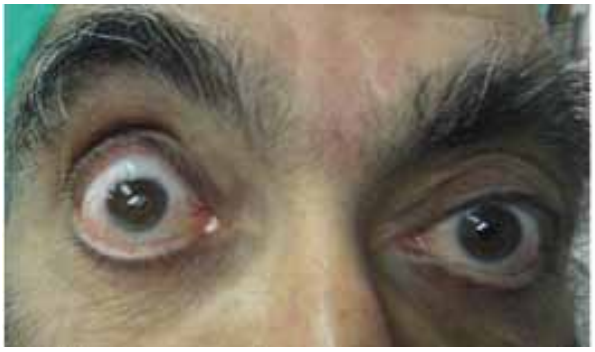

Fig. 1. *Retraction of the upper eyelid over the protruding bleb of the right eye.*

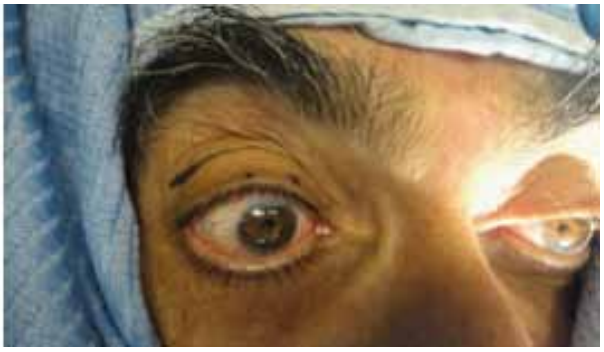

Fig. 2. *Marking of the projection of the bleb and eyelid crease.*

Fig. 3. *The conjunctival incision is more temporal than the bleb projection*

Fig. 4. *Intraoperative check of the eyelid height*

Fig. 5. *The final desired eyelid position*

Fig. 6. *2 year post-operative photo*

are several types of eyelid retraction surgery, surgical decision is dependent on the anatomical location of the pathology (7). Depending on the disease, there can be vertical shortening of either the anterior lamella, posterior lamella or both; this differentiation determines our surgical approach.

The external or cutaneous approach involves an external skin incision and dissection of the levator and Muller's muscle from the tarsus; this elongates the vertical distance of this structure and with an option to place a spacer graft (11). The internal approach involves incision through the conjunctiva, dissection of the Muller's muscle and often resection of the Muller's muscle, this creating eyelid recession (11, 12). If eyelid retraction is more significant, through the conjunctival approach, it is also possible to dissect off the levator muscle, creating a greater eyelid recession. In our experience, we can categorize each case based on the severity of the retraction; this enables us to decide on the specific surgical approach.

Usually, for mild lid retraction the internal approach is preferred(12). For more severe cases we tend to use the external approach, and in most severe cases we must elongate both the anterior and posterior lamella with spacer grafts and skin grafts (13).

We presented 3 cases of eyelid retraction secondary to prominent filtering bleb formation. In our opinion, there are multiple possible causes of upper eyelid retraction in patients with large convex upper limbal filtered bleb. The first is a mechanical reason; due to the size and bulge of the bleb, it is difficult for the upper eyelid to close over the bleb and the eyelid remains open above the bleb, creating eyelid retraction (8, 9). Second, enlargement of the bleb increases the surface area of the bulbar conjunctiva, there for necessitating a longer eyelid to cover the eye.

The third suspected mechanism is the contraction of the upper eyelid in response to constant mechanical irritation of Muller's muscle through the conjunctiva and hence, causing Mueller's muscle to retract thus retracting the eyelid (14). A similar mechanism of upper eyelid retraction is observed in some patients wearing rigid contact lenses. Hard contact lenses mechanically irritate the Mueller muscle at the site of its attachment to the eyelid tarsus through the thin conjunctiva. This irritation in the early stages leads to contraction of the Müller muscle and retraction of the upper eyelid (14). Unlike hard contact lenses, a prominent bleb is in contact with a larger area of the Muller's muscle and causes greater eyelid retraction. A fourth proposed mechanism is that long term bleb irritation of conjunctiva and Muller's muscle can cause muscle and conjunctiva fibrosis and shortening of the posterior lamella (14)

The purpose surgery for repair of lid retraction is to increase the length of the eyelids and thereby reduce the size of the palpebral fissure. Unfortunately, there are no surgical algorithms correlating the severity of eyelid retraction with the appropriate surgical approach and the amount of recession needed as we see in ptosis and strabismus repair (15). This fact complicates the possibility of preliminary assessment of the accuracy of the postoperative result.

The result of such an operation may be insufficient drooping of the eyelid or postoperative ptosis, which in either case requires a second operation.
An additional complicating factor in the treatment of upper eyelid retraction in glaucomatous patients with prominent filtration blebs is when choosing the internal approach there is increased possibility of bleb damage both during surgery and in the postoperative period by mechanical irritation of sutures and scarring. Blepharotomy with preservation of the bridge of the intact conjunctiva over the filtration bleb is the right choice for surgical treatment of upper eyelid retraction in glaucomatous patients. The bridge of the preserved conjunctiva protects the bleb from damage, the level of drooping of the eyelid can be adjusted during the operation and the operation can be completed when eyelid is at desired height. We also recommend performing a temporary tarsorraphy for one week, continuing the effect of eyelid pulling. The effect of this operation is long lasting and thereby improves the functional and cosmetic condition of the patient.

CONCLUSION

Blepharotomy is a surgical procedure suitable for the treatment of severe eyelid retraction caused by a filtering bleb. Preservation of the bridge of the intact conjunctiva over the whole surface of the bleb protects it from trauma in the postoperative period and makes it possible to use this procedure even in cases of exposure and pathologically thin filtration bleb.

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