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Case report

Patch graft using collagen matrix (Ologen) for glaucoma drainage device exposure in a patient with Boston Keratoprosthesis type 1

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ABSTRACT

Purpose: To report the first successfully treated case of recurrent tube exposure in a patient with the Boston Keratoprosthesis type 1 with a collagen matrix patch graft (Ologen).
Observations: A 50 year-old female with a Boston Keratoprosthesis type 1 and a history of Axenfeld-Reiger syndrome presents to our department with recurrent glaucoma drainage device exposure in her left eye. After failed spontaneous closure with topical antibiotics and lubricants, she undergoes tube exposure repair using an Ologen patch graft. Surgery was successful and the patient did not have any recurrence up to last follow-up two years post-operatively.
Conclusion: Collagen matrix patch graft seems to be advantageous in treating glaucoma tube exposure in the Boston KPro eye, which is often a more challenging entity to treat.
Importance: Collagen matrix patch graft could be considered as a primary patch graft in treating tube exposure in eyes with the Boston KPro.

1. Introduction

The use of glaucoma drainage devices (GDD) to treat complicated glaucoma has gained widespread popularity over the last decades.[1] These silicone tubes are usually placed in the anterior chamber (AC) and drain aqueous humor to a reservoir plate covered by Tenon's and conjunctiva. In order to prevent erosion of the tube through conjunctiva, several graft types, most commonly partial thickness scleral grafts,[2] have been used to cover the tube. However, in some cases, tube exposure results despite adequate coverage, predisposing the eye to endophthalmitis.[3] A revision surgery is often warranted and involves coverage of the exposed tube with patch graft material, including scleral, corneal, or pericardial tissue.[4–6] In some cases, removal of the tube is required.

In Boston Keratoprosthesis (B-KPro) population, glaucoma continues to be one of the most difficult complications to manage.[7] GDD have become the most common surgical option to control glaucoma in these patients when medical therapy is insufficient. However, GDDs exposure has been shown to be much more prevalent in this patient population, and is often at a higher risk of recurrence despite adequate surgical revision.[8]

In this report, we describe the use of a collagen matrix for recurrent tube exposure revision in an eye with B-KPro type 1.

2. Case report

2.1. History of the disease

A 50-year-old female with a history of Axenfeld-Reiger syndrome presented to our department with new-onset ocular discomfort and redness in the left eye. The patient was followed for advanced glaucoma in this eye. She had had a penetrating keratoplasty and trabeculectomy surgery done twenty years ago, followed by implantation of an Ahmed glaucoma valve (AGV) in the AC ten years ago. Five years later, she developed AGV tube exposure that was treated with tube repositioning to the pars plana, with coverage of the exposed part of the tube with a conjunctival autograft and a scleral patch. Two years later, she developed primary graft failure secondary to multiple intraocular surgeries and underwent implantation of a B-KPro type 1 after being deemed at high risk of graft rejection.

On presentation, she was found to have a best-corrected visual acuity (BCVA) of 20/100 and an intra-ocular pressure (IOP) of 20 mmHg in the left eye on palpation. On slit-lamp examination, a conjunctival buttonhole of 4 × 2 mm with exposed tube was found a

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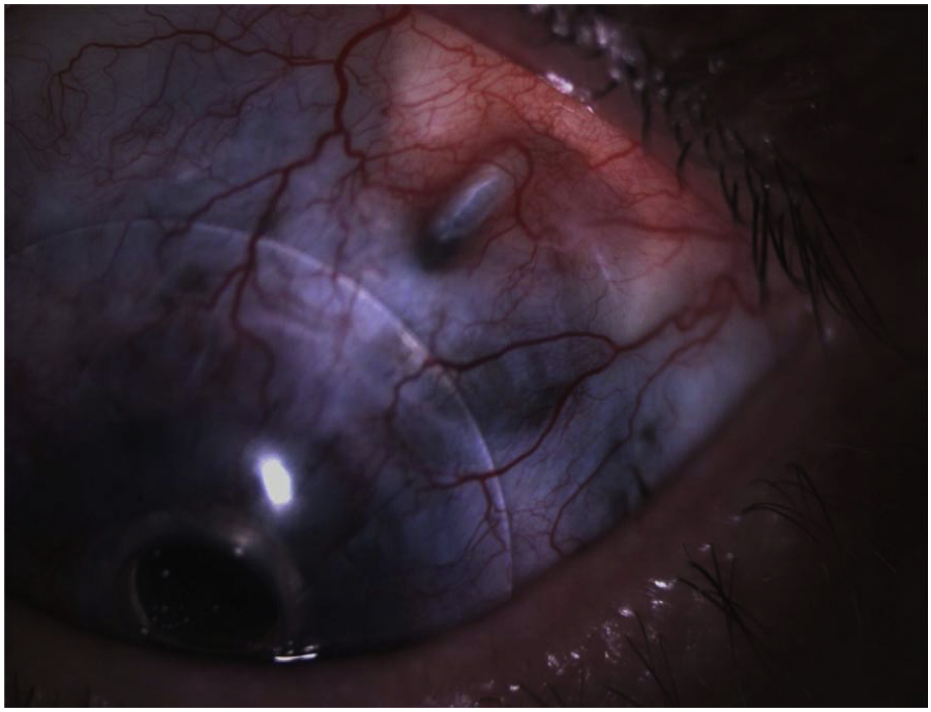

Fig. 1. Exposed glaucoma drainage device through conjunctiva at the edge of the bandage contact lens.

few millimeters posterior to the limbus, at the edge of the bandage contact lens (BCL) (Fig. 1). There were no signs of endophthalmitis. It was decided to remove the contact lens and put the patient on topical moxifloxacin QID and topical artificial tears six times a day. She was observed for 3 months, at which time she spontaneously closed which is believed to be due to the cessation of friction of the BCL on the ocular surface and to increased surface lubrication. Two weeks later, the area re-opened. It was then decided to bring the patient to the operating room for tube coverage using a collagen matrix graft (Ologen).

2.2. Surgical technique

In the operating room, a superotemporal oval subconjunctival pocket beginning with the existing open conjunctiva and extending approximately 2–3 mm beyond the edge of the exposed tube in every direction was carried out with Westcott scissors. An Ologen sheet that comes as a 10 × 10 × 2 mm sheet was cut in the proper dimensions of 6 × 8 mm and placed in the subconjonctival pocket to fully cover the area of tube exposure. No sutures were needed at the time as the collagen quickly becomes adherent to the moist scleral bed and remains immobile once properly covered. After careful measurement of the conjunctival opening, a conjunctival autograft of 5 × 3 mm is dissected from the super-nasal quadrant, which was deemed to have sufficient healthy conjuncitval tissue with adequate surgical exposure. The autograft was then placed on the Ologen matrix. Using 10-0 nylon sutures, the autograft along with underlying Ologen implant were secured to the sclera. Every effort was made to ascertain that the collagen was not exposed and that the conjunctiva was well secured in place. The bed of the conjunctival autograft was primarily closed using 10-0 Vicryl sutures. Finally an amniotic membrane was carefully cut to cover an area twice as large as the area of tube exposure. The amniotic membrane was then placed on the conjunctival autograft and secured using 10-0 Vicryl sutures.

3. Results

Overall, the surgery was well tolerated and there were no serious intra-operative complications. On post-operative day 1, BCVA remained stable at 20/100, IOP was 20 mmHg and the tube was adequately and completely covered with no signs of wound dehiscence. There were no signs of ologen-specific side-effects, such as allergy or translocation of the implant. Two years post-operatively, there are no signs of tube exposure recurrence and the ologen implant is not visible anymore on examination (Fig. 2). BCVA and IOP remained stable over the entire examination period.

4. Discussion

GDDs are very useful adjunct for the treatment of refractory glaucoma. However these devices come with an array of potential serious complications.[9] The most common delayed complication is exposure of the tube overlying eroded conjunctiva.[10,11] Tube exposure can be multifactorial, related to either dehiscence of the suture in early cases, or to scleral/graft patch melting in later cases. Mechanical factors due to blinking and ocular movements are believed to also influence the occurrence of late tube exposure.[12]

Late-onset tube exposure is even more prevalent in eyes with the B-KPro type 1, ranging from 14.6% to more than 50% of cases, and is often harder to treat.[8,13] It was found that one important risk factor for tube erosion is the duration that the tube has been in place before surgery, with older glaucoma drainage devices more likely to develop erosions.[8] Another risk factor is the chronic wear of BCL (typically a 16.0 mm Kontur contact lens), which is believed to cause conjunctival breakdown at the edge of the contact lens.[14] Finally, the ocular surface of patients requiring Boston KPro implantation is already compromised and may lead to melts.[15,16]

Different patch graft material have been described in the literature for tube exposure repair, including autologous fascia lata,[17] donor pericardium,[18] sclera,[2] cornea,[5,19] and dura mater.[20] In 2012, Rosentreter et al.[21] reported the first successful case of tube exposure revision surgery using a novel biodegradable collagen implant, the ologen implant. The ologen implant is a porous material consisting of > 90% lyophilized porcine atelocollagen, a highly purified pepsin-treated type I collagen and < 10% lyophilized porcine glycosaminoglycan with a

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