

Sutureless amniotic membrane fixation with fibrin glue in symptomatic bullous keratopathy with poor visual potential

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PURPOSE. *To report a sutureless method of amniotic membrane fixation using fibrin glue in two cases of symptomatic bullous keratopathy with poor visual potential.*

METHODS. *Under topical anesthesia, the loose epithelium was debrided up to 1.0 mm from the limbus and fibrin glue was applied uniformly and thinly onto the corneal surface. Cryopreserved amniotic membrane was evenly placed over the cornea and once a firm and uniform adhesion was achieved, excess membrane was trimmed off. A bandage contact lens was applied.*

RESULTS. *In both the cases, complete relief from symptoms was obtained and 3 weeks later, the ocular surface had completely re-epithelialized. At 6 months follow-up, both patients were symptom free without the need for any medication. No complications were observed.*

CONCLUSIONS. *This technique of amniotic membrane fixation is a simple, effective, and safe procedure whereby a stable and secure adherence of the amniotic membrane with the corneal surface is achieved avoiding the use of sutures. (Eur J Ophthalmol 2008; 18: 998-1001)*

KEY WORDS. *Amniotic membrane, Bullous keratopathy, Fibrin glue*

Accepted: April 23, 2008

INTRODUCTION

Amniotic membrane transplantation (AMT) has been found to be a safe and effective treatment modality for alleviating symptoms in patients with bullous keratopathy with poor visual potential (1). While the conventional technique of anchoring amniotic membrane (AM) to the ocular surface involves the use of sutures (1), several drawbacks are associated with suture use.

Bioadhesive fibrin glue can obviate the need for sutures and has been found to have several applications in ophthalmic surgery. It has been successfully used for closure of the conjunctiva in strabismus surgery (2), wound closure in glaucoma surgery (3), in primary pterygium surgery (4), in sutureless lamellar keratoplasty and scleral patch adhesion (5), for prevention of epithelial ingrowth after laser in situ keratomileusis (6), to improve stability of temporary keratoprotheses during vitreoretinal procedures

(7), and to enhance the anatomic and functional outcome of surgery in full-thickness macular holes (8). Recently, tissue adhesives such as cyanoacrylate and fibrin glue have been investigated as an alternative to sutures in sealing cataract incisions prophylactically (9).

Sutureless AMT with fibrin glue has been effectively used in the management of corneal ulcers refractory to conventional management (10, 11). In a study by Hick et al (10), the success rate of achieving re-epithelialization and a stable corneal surface in corneal ulcers with perforations up to 3 mm was 92% following management with AMT and fibrin glue. In another study (11), AMT with fibrin glue was used to repair corneal perforations with a diameter of 2 mm associated with significant stromal loss. The authors concluded that this modality of treatment was a good alternative to delay penetrating keratoplasty for treating corneal perforations, especially in acute cases.

We herein report a new indication for symptomatic bul-

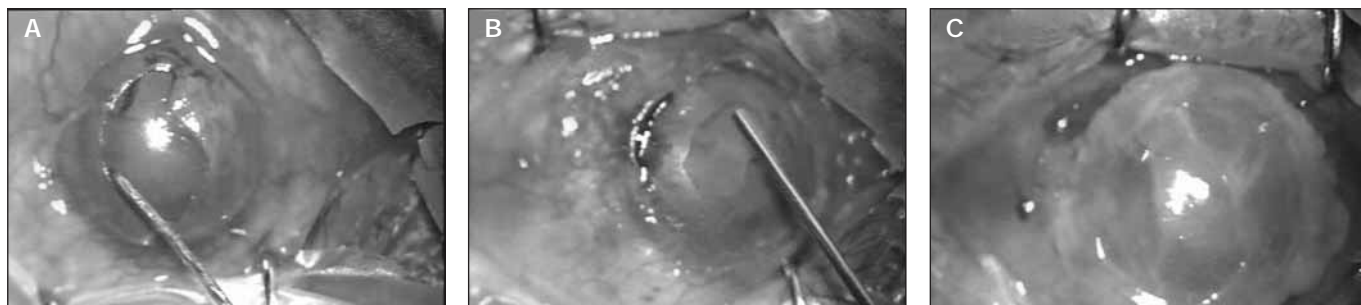


Fig. 1 - (A) Loose epithelium being debrided during the surgical procedure. **(B)** Fibrin glue being applied to the corneal surface after epithelial debridement. **(C)** A firm and uniform adhesion of the amniotic membrane with the corneal surface was obtained after the application of fibrin glue.

lous keratopathy with poor visual potential for which fibrin glue with AMT can be used to alleviate severe pain and describe our technique and experience.

Case reports

Case 1

A 70-year-old man presented to our center with complaints of intractable pain, watering, and photophobia in his left eye for 6 months. Past history was significant for cataract extraction 8 years ago. Visual acuity was light perception with inaccurate projection. Slit lamp biomicroscopy revealed the presence of multiple ruptured epithelial bullae with diffuse stromal edema. Intraocular pressure was elevated. Anterior chamber and fundus details could not be visualized. B-scan ultrasonography of the posterior segment was unremarkable. A diagnosis of aphakic bullous keratopathy with secondary glaucoma was made. The right eye was aphakic with BCVA of 20/30.

For symptomatic relief, the patient underwent AMT with fibrin glue under topical proparacaine hydrochloride 0.5% eyedrops. The loosely adherent epithelium was removed with a blunt spatula sparing 1.0 to 2.0 mm from the limbus (Fig. 1A). After epithelial debridement, three to four drops of reconstituted freeze dried Tisseel VH Fibrin Sealant (Baxter AG, Vienna, Austria, Tisseel kit available as 1.0 mL and 2.0 mL) were ejected onto the corneal surface using the Duploject system consisting of two identical disposable syringes with a common plunger. The drops were evenly spread into a thin layer on the corneal surface with the help of the tip of application needle (Fig. 1B). While reconsti-

tuting freeze dried Tisseel, the quick solidification method (desired thrombin concentration of 500 IU/mL) was used. Cryopreserved AM was removed from the nitrocellulose paper disc and placed onto the corneal surface with epithelial side up. It was spread evenly in a thin layer and a waiting time of 4 minutes was given to ensure firm and uniform adhesion to the cornea (Fig. 1C). Excess frill of AM was trimmed off and a bandage contact lens (BCL) was applied. No sutures were required to secure the AM. Postoperatively, the patient was advised topical prednisolone acetate 1%-ofloxacin 0.3% combination four times a day for 3 weeks along with preservative free lubricants. Marked relief from pain and foreign body sensation was obtained starting the day following surgery. The BCL was removed 3 weeks later and the corneal surface was found to be completely re-epithelialized. At 6 months of follow up, the patient was symptom free without the need for any medication. Visual acuity remained unchanged. No complications such as retraction of the membrane, granuloma formation, or infection were observed.

Case 2

A 75-year-old woman with a diagnosis of pseudophakic bullous keratopathy and recurrent retinal detachment in the right eye underwent AMT with fibrin glue using the technique described above. Visual acuity preoperatively was inaccurate projection of light. She obtained complete symptomatic relief postoperatively. The BCL was removed after 3 weeks and total re-epithelialization of the corneal surface was observed. Six months later, the patient was symptom free. No complications were observed during follow-up.

DISCUSSION

Penetrating or endothelial keratoplasty is required for visual rehabilitation in patients with bullous keratopathy with good visual potential. However, in bullous keratopathy with poor visual potential, various treatment strategies such as bandage contact lenses, stromal micropuncture, conjunctival flaps, and phototherapeutic keratectomy have been employed for symptomatic relief. AMT has been successfully used to alleviate symptoms in bullous keratopathy with poor visual potential (1). AMT provides a new and nonantigenic human basement membrane for renewed expansion of epithelial cells (12, 13). AM also possesses antiangiogenic and antiinflammatory effects and the stroma contains growth factors which may contribute to more rapid corneal healing.

The technique of anchoring AM to the corneal surface involves the use of 10-0 nylon sutures. However, sutures may be associated with inherent drawbacks (Fang JP, Baratz KH. Comparison between fibrin glue and sutures to attach preserved human amniotic membranes to rabbit corneas. Invest Ophthalmol Vis Sci 2004 ARVO e-abstract 3943). Not only does it make the procedure time consuming and tedious, suture knots can incite corneal irritation, with subsequent inflammation. Also, the membrane can shrink and retract postoperatively, causing sutures to loosen. Removal of sutures can also add to patient discomfort. Bioadhesive fibrin glue can obviate the need for sutures and has several interesting applications in ophthalmology. However, the standard use of bioadhesives has been reported to be unsuitable for AM fixation onto the cornea (14). A study published recently has reported success with sutureless AM fixation using fibrin glue for ocular surface reconstruction in a rabbit model using a consecutive gluing technique (Fang JP, Baratz KH. Comparison between fibrin glue and sutures to attach preserved human amniotic membranes to rabbit corneas. Invest Ophthalmol Vis Sci 2004 ARVO e-abstract 3943). An alternative technique of fibrin glue application has been recommended for successful fixation of AM in sterile corneal ulceration (15). In both our cases, we were able to achieve a firm and steady adherence of the AM using the simultaneous injection technique as recommended by the manufacturer, thereby avoiding the use of sutures. Moreover, the procedure could be carried out under topical anesthesia with considerable shortening of surgical time. While both cyanoacrylate and fibrin glue are widely used tissue adhesives, they have certain disadvantages. Fibrin-

based adhesives have been shown to be as effective as cyanoacrylate glue with the added advantage of biocompatibility, potentially less corneal and conjunctival inflammatory reaction, the ability to be applied over a larger surface area, and an enhanced ability to secure amniotic membrane or conjunctival graft for further reinforcement and promotion of re-epithelialization (16). However, potential disadvantages of fibrin glue include the theoretical risk of viral transmission due to human thrombin and the complexity of its preparation and application (16, 17). Another disadvantage is that it is costly and comes in relatively large quantities leading to wastage during ocular use (16). We have reported phototherapeutic keratectomy (PTK) as an efficacious treatment modality for symptomatic relief and visual gain in cases of bullous keratopathy (17). We recently concluded a randomized study comparing the efficacy of PTK versus AMT as treatment strategies to alleviate pain in symptomatic bullous keratopathy with poor visual potential and found both PTK and AMT to be efficacious. However, we found that the use of sutures in securing the AM is often cumbersome and time-consuming. Moreover, as some of these eyes are inflamed and vascularized, bleeding can occur during surgery. We therefore tried using fibrin glue for fixation of AM and found the results to be encouraging in the two cases described herein. We suggest that this sutureless technique can be used in other patients with bullous keratopathy and a randomized study comparing AMT and fibrin glue with other treatment strategies can provide valuable information about the long term outcome.

AM fixation with fibrin glue is a simple, effective, and safe procedure whereby a stable and secure adherence of the AM with the corneal surface can be achieved and can provide symptomatic relief in patients with painful bullous keratopathy and poor visual potential.

The authors have no proprietary interest in the products mentioned in this article.

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