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CASE REPORT

Symblepharon ring-amniotic membrane application in persistent corneal epithelial defect

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Abstract

The aim of this study was to assess the efficacy of sutureless amniotic membrane (AM) technique using a symblepharon ring-AM patch on the persistent epithelial defects and resistant to medical treatment. Two patients to whom an AM patch was applied to the ocular surface using a polymethyl methacrylate symblepharon ring due to corneal surface disorders are evaluated. The implantation of ring-AM was not complicated. Irritation and epithelial defect decreased in both cases. Eventually, vascularized leukoma developed. Ring-AM implantation is a non-invasive and easy procedure in the treatment of ocular surface disease. Ring-AM is an effective and safe biologic bandage in patients, who refuse surgical procedure or to whom surgery is contraindicated due to systemic diseases.

Keywords: Amniotic membrane; corneal epithelial defects; symblepharon ring.

Amniotic membrane (AM), the innermost layer of the placenta, has been shown to possess various kinds of biologic effects such as anti-inflammatory, anti-fibroblastic, anti-microbial, anti-angiogenic properties, and promote epithelization.^[1] Human AM has been used to promote healing of the corneal surface for more than a decade.^[2] It has been widely used in eyes with ocular surface diseases such as persistent corneal epithelial defects, pterygium, symblepharon, and stem cell deficiency.^[2,3]

Running or interrupted sutures are recommended in the literature for AM patch fixation; however, there are a number of complications associated with this method.^[4] Symblepharon rings are commonly used in the prevention of sym-

blepharon formation.^[4,5] We created a sutureless method to attach an AM patch using the symblepharon ring to coat the surface completely. Our study shows a technique for repairing the ocular surface while using AM. This technique is more affordable and might be a convenient substitute for the proper clinical follow-ups together with medication compliance.

Case Report

Description of the Technique

The placenta was extracted intact and treated in sterilized environment for AM preparation and the chorioamnion was removed from the placenta. Polymethyl methacrylate



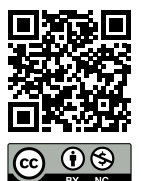
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was used to make the symblepharon ring (18 mm open fornix conformer) (IMKA, Ankara, Türkiye) (Fig. 1a). The symblepharon ring was of standard size as it would be located in the upper and lower fornix regardless of corneal epithelial defect. Using fibrin tissue glue (TissueAid, Genejet Biotech, Taipei City, Taiwan), AM with the epithelial side up was adhered throughout the symblepharon ring (Fig. 1b). The stromal side of the AM came in contact with the ocular surface as a graft. At this stage, the AM covered symblepharon ring was ready to be attached to the ocular surface. The AM with symblepharon ring was gently placed on the eye first on the upper fornix and then on the lower fornix by pulling the eyelids. Our reason for using the symblepharon ring was not to separate the symblepharon, but to keep the AM on the surface and stabilize it. The ocular surface healing and AM melting were followed through biomicroscopic examination, and the mean AM melting time was 20 days.

During the treatment, the ocular surface was re-epithelialized and there was no need for AM replacement. In this report, two cases of symblepharon ring-AM application on a ocular surface disorders were presented.

Case 1– A 71-year-old woman who had suffered from pain, loss of vision, and redness in her right eye after a trauma with fingernail 2 months ago was admitted to our clinic. At presentation, patient's visual acuity was hand motions. In her right eye, she had a persistent corneal epithelial defect after fingernail injury that was resistant to medical treatment for 2 months (Fig. 2a). The ocular surface was covered with an AM that was attached to the symblepharon ring thoroughly. Postoperatively, the patient received topical moxifloxacin 0.5% (Vigamox, Alcon Laboratories, Inc., Fort Worth, TX) (6×1) and topical artificial eye drops sodium hyaluronate 0.15% (Eystil, SIFI, Rome, Italy) (12×1). At the

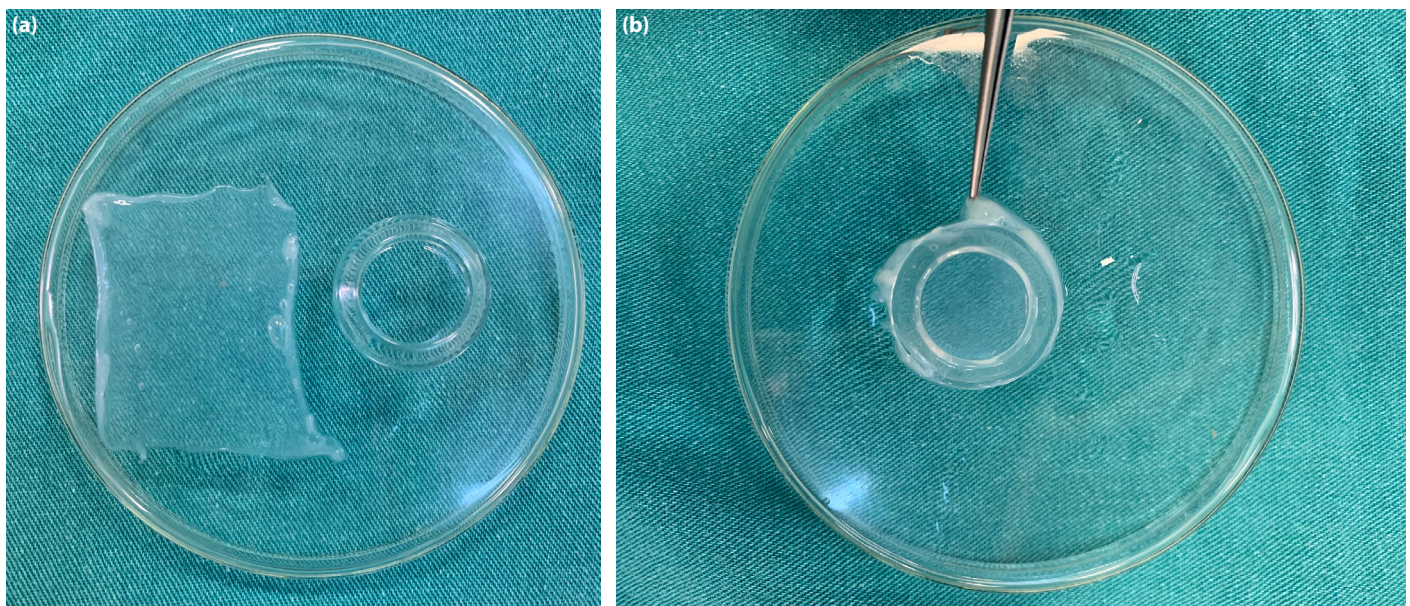


Fig. 1. (a) Polymethyl methacrylate symblepharon ring and amniotic membrane graft. (b) Placement of the amniotic membrane around the symblepharon ring with fibrin glue.

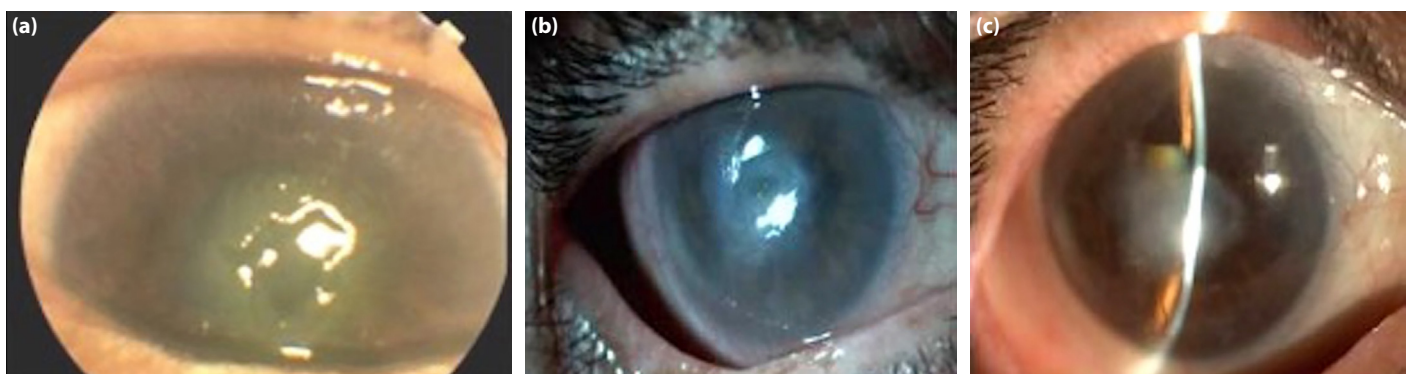


Fig. 2. (a) Persistent corneal epithelial defect after the trauma (Case 1). (b) The corneal epithelial defect had healed in the 2nd week after ring amniotic membrane implantation. (c) Complete epithelization was observed in the 1st month follow-up.



Fig. 3. (a) Chronic recurrent corneal epithelial defect due to herpetic keratitis (Case 2). (b) Ocular surface after application of ring-amniotic membrane. (c) Complete epithelialization was seen in 2 weeks.

end of the 2 weeks follow-up period, the corneal epithelial defect was healed, and the redness and pain had regressed (Fig. 2b). With this procedure, the AM -covered surface demonstrated complete epithelialization (Fig. 2c) and symblepharon ring was removed at the end of the 1 month of follow-up. The patient's visual acuity did not change after surgery. There was no recurrence in control examinations on the 6-month follow-up.

Case 2– A 55-year-old man with a chronic recurrent corneal epithelial defect due to herpetic keratitis and corneal melting in his right eye was referred to our tertiary university hospital (Fig. 3a). At presentation, his visual acuity was hand motions. He had AM transplantation sutured onto the cornea with 10-0 nylon in his ocular history. Because of his chronic herpetic keratitis and recurrent corneal epithelial defect, the patient rejected resurgical AM implantation with suture. Under oral anti-herpetic treatment and intensive lubrication treatment, it was considered to do symblepharon ring-AM application for this patient. The stromal side of the ring-AM was used to make contact with the epithelial defect and symblepharon ring placed to the fornix by gently (Fig. 3b). It was ordered topical moxifloxacin 0.5% (Vigamox, Alcon Laboratories, Inc., Fort Worth, TX) (6×1) and topical artificial eye drops sodium hyaluronate 0.15% (Eystil, SIFI, Rome, Italy) (12×1) to the patient, postoperatively. In 2 weeks after surgery, complete epithelialization was accomplished without complications (Fig. 3c), and the symblepharon ring was removed. The patient's visual acuity did not change after surgery. Over the next 12 months, the ocular surface remained stable, with no signs of inflammation or recurrence.

Discussion

The human AM has been increasingly used for ocular surface reconstruction.^[6] The cytokines and growth factors present in the AM have been shown to effectively pro-

mote re-epithelialization of the corneal surface.^[6,7] AM is reducing inflammation and maintaining the integrity of the ocular surface.^[8,9] Anti-inflammatory cytokines such as interleukin-10 and interleukin-1 receptor antagonist are released in the epithelium and stroma of the AM and may modulate inflammatory processes.^[6–9] The inhibition of TGF- β signals in ocular surface fibroblasts explains anti-scarring effect in the treatment of various disorders of the ocular surface disease.^[7–10] The usefulness of the AM has been attributed to its anti-inflammatory, antifibrotic effects, and to its ability to enhance epithelial healing.^[2–4] AM as a corneal epithelial substrate has been used in the management of pterygium, corneal ulcers, chemical burns, limbal stem cell deficiency, and persistent epithelial defects.^[4,6] Our two patients had persistent epithelial defects.

Running or interrupted sutures are recommended for AM patch fixation.^[2] However, the conventional sutured AM patch covers only the cornea and bulbar conjunctiva surrounding the limbus, leaving the deep fornix unreachable.^[2–5] The placement of sutures inflicts trauma on the ocular surface with prolonged operative time; thus, technical skills are required for effective suture placement.^[2–5,7] Moreover, this may lead to late complications such as shortened fornix and symblepharon.^[2–5,7,8] There are a number of complications and drawbacks associated with running or interrupted sutures method.^[4,7,8] First of all, it is difficult to monitor the epithelialization process. Second, protection is lost if the amniotic patch falls off.^[2,7–9] In addition, recent case reports have shown chronic conjunctival inflammation caused by the retained suture.^[2,4,7–9]

It is important to develop a sutureless approach to avoid the limitations of conventional fixation of AM patch.^[2,7–9] Symblepharon rings are commonly used in the prevention of symblepharon formation.^[2,3,9] The ring exhibits beneficial effects by reducing scarring and keeping the eyelids away from the damaged ocular surface.^[2,9] This technique

had a lower incidence of complications with shorter surgical time than the conventional suture method.^[2,9,10] In the literature, AM transplantation with a modified ocular surface ring using a feeding tube is described in a case with ocular chemical burn.^[5] However, it is thought that adjusting the feeding tube to form a ring in this technique may not be suitable for every eye anatomy and every case. Liang et al.^[9] evaluated the sutureless approach with a modified PMMA ring for ocular surface burns in a series of 75 patients. In this study, sutureless approach with modified ring was used in 39 of 75 patients.^[9] In the modified ring sutureless patient group, shorter epithelialization time and less symblepharon formation were seen.^[9] In this study, similar to our report, it was observed that the epithelialization time was shortened. Differently, patients with ocular surface burns were studied and the formation of symblepharon was also evaluated in this study.^[9] Our simple sutureless method with symblepharon ring allows for convenient manipulation of an AM patch and facilitates the rapid changing of a membrane.^[2,3,9] This new method allows changing of the AM patch to prolong exposure of the cornea to anti-inflammatory and growth factors.^[3,5,9,10] With this technique, suture complications and surgical time are reduced.^[2,5,6,9,10] This sutureless AM patch with symblepharon ring technique had seen to be effective in the treatment of persistent epithelial defects, according to our report.

There are some limitations in this report. There are only two patients in our case report. Despite limited data, this technique may provide practical resolution for corneal epithelial defects. This technique might be useful for maintaining ocular surface health.

Conclusion

The use of an AM graft with a symblepharon ring for ocular surface rehabilitation without any need for suturing is represented in this report. Symblepharon ring-AM application provides less invasive approach in corneal epithelial healing. Further studies are needed to evaluate the efficacy and the complications symblepharon ring-AM technique in ocular surface disorders.

Informed Consent: Written informed consent was obtained from the patients for the publication of the case report and the accompanying images.

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Conflict of Interest: None declared.

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