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Surgically Implanting Amniotic Membranes without Sutures to Treat Inflammatory Corneal Perforations

Dalia G. Said*
Department of Ophthalmology, Queen's Medical Centre, Nottingham, UK

Abstract

The thickest of the three membranes that make up a foetal body is the amniotic membrane (AM), sometimes known as an amnion. A single layer of amnion epithelial cells anchored to a thick basement membrane, as well as an avascular stromal matrix, make up this semi-transparent membrane. In addition to integrin, fibronectin and laminin, it has been shown that the human amniotic membrane also includes collagen types IV and VII, as seen with the Bowman membrane cornea. Its earliest documented usage in ophthalmology was by De Rotth, who utilised the foetal membrane (both amniotic membrane and chorion) to correct epithelial conjunctival abnormalities in patients with symblepharon. It was first used therapeutically in 1910 by Davis for skin transplantations.

Keywords: Keratophakia • Decellularization • Lenticule, Inlay • Femtosecond laser • Regulatory framework

Introduction

The amniotic membrane's many qualities, including pain relief, anti-inflammatory activity and antiadhesive and antiangiogenic effects, have been shown in several research. The amniotic membrane has gradually been utilised to treat a variety of ophthalmic disorders during the past 20 years, including bullous keratopathy, Stevens-Johnson syndrome, chronic corneal epithelial abnormalities, chemical burns and ocular pemphigoid. Three major surgical procedures can be applied, depending on the underlying disease [1]. The first method, called an inlay or graft, is used to treat stromal deficiencies. The epithelial side of the AM is placed facing up. At the edge of the corneal defect, 10-0 nylon sutures are used to secure the transplant.

Description

With keratocyte death and repopulation, sequential keratocyte transformation into fibroblasts and myofibroblasts, infiltration of limbal and circulating immune cells and remodelling of the corneal extracellular matrix (ECM) structure, corneal stromal wound healing is a very intricate and well-ordered process. The advantages of AM transplanting for ocular surface restoration are explained by a number of factors. The primary role of the AM is mechanical, which promotes the development of epithelial cells on the ocular surface. Additionally, it promotes epithelialization by producing keratinocyte growth factor, hepatocyte growth factor and epithelial growth factor (KGF).

The suppression of pro-inflammatory cytokine production from the injured ocular surface causes the anti-inflammatory effect. Additionally, it has been shown that the stroma of the AM serves as a trap for inflammatory cells that go through apoptosis. Furthermore, FAS receptor is expressed by AM stromal and epithelial cells, which induces apoptosis in fibroblast and inflammatory cells. AMT is more advantageous because there is no immunogenicity and no need for any immunosuppressive therapy. Finally, AM's anti-angiogenic and anti-microbial activities have been established. Current AMT procedures entail suturing the graft or patch of AM across the ocular surface [2].

Additionally, if the damage to the cornea was caused by an inflammatory illness, the inflammatory impact of corneal suture may result in a futile effort at repair. Because of this, sutureless procedures have been created, one of which uses cyanoacrylate adhesive. This kind of adhesive has been shown to be successful, but because of its toxicity, it can also lead to consequences like persistent inflammation and a delay in wound healing. The AM should preferably be attached to the ocular surface using fibrin glue. The potential of disease transmission from blood donors is the main disadvantage of its use. Other SAMT-reported techniques include putting the amniotic membrane on a contact lens or an ocular conformer.

Up to the conclusion of each animal's observation period, the postoperative eye underwent daily evaluation. Clinical evaluations of photophobia, blepharospasm, conjunctival hyperemia and chemosis were performed every day, along with measurements of the cornea's pigmentation, edoema and vascularization, the anterior chamber's hypopyon and fibrin and the lens's hyphema, hypopyon and fibrin (opacity). Additionally assessed was the development of uveitis-related symptoms, the existence or absence of miosis, edoema and iris colour changes. Starting 48 hours following surgery, the fluorescein dye test was performed (defined as positive or negative). Daily tests were conducted until the outcome was negative. The fluorescein dye test was initiated only after the bandage had fallen off on its own in the G3 and G4 animals that had received an amniotic membrane bandage as part of their therapy.

The 15 samples that were chosen for each group were again randomly split into 5 subgroups, each of which had three animals. According to the following criteria, corneas were obtained for histological and morphometric evaluation: Subgroup 1 (T1): two days after surgery; Subgroup 2 (T2): seven days following surgery; Subgroup 3 (T3): fifteen days following surgery; Subgroup 4 (T4): twenty-one days following surgery; and Subgroup 5 (T5): thirty days following surgery [3,4].

Animals were put to sleep, the operated eyes were removed and the corneas were then prepared for paraffin embedding. Hematoxylin and eosin was used to stain 4 m slices (H&E).

Under an optical microscope, histology and morphometry were performed to assess the cornea's level of epithelialization and the presence of leucocytes, edoema and vasculature. Leucocytes, edoema and newly created vasculature were categorised as present or missing and when present, as full or incomplete epithelialization of the cornea.

***Address for Correspondence:** Dalia G. Said, Department of Ophthalmology, Queen's Medical Centre, Nottingham, UK; E-mail: dgsaid@gmail.com*

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The grafts are not adhered to the surface of the eye. Applying a contact lens right away and sealing the lids with 3M Steri-stripTM prevents the grafts from shifting and the contact lens from moving. To prevent local complications like trichiasis, adhesion between the upper and lower eyelids after tarsorrhaphy lysis, premature opening of the temporary tarsorrhaphy, pyogenic granuloma and keloid formation of the eyelid, we decided to use the tape bandage rather than the conventional suture tarsorrhaphy [5]. The lid closure serves to keep the contact lens and AM in place, but it also speeds up corneal surface healing and supports AM healing abilities by establishing an environment free from outside influences.

Conclusion

This work aims to offer an alternate SAMT approach for treating corneal perforation brought on by inflammatory illnesses of the ocular surface. The use of SAMT was demonstrated to be 100% maintained up to three months of follow-up for a quick and full resolution of corneal perforation without corneal infections. The benefit of this method is that it lessens the pro-inflammatory effects of sutures and extended surgical procedures. Another benefit is that patients don't have to use any topical medications anymore, which makes the operation simple and causes them little discomfort.

Acknowledgement

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Conflict of Interest

The author shows no conflict of interest towards this manuscript.

References

1. El-Sebaie, Medhat, Mohamed Saad Zaghloul, Grahame Howard and Alaa Mokhtar, et al. "Squamous cell carcinoma of the bilharzial and non-bilharzial urinary bladder: a review of etiological features, natural history and management." *Int J Clin Oncol* 10 (2005): 20-25.
2. Ismail, Alaa, Rafik Ramsis Marcos, Amr A. Sherif and Aly Thabet, et al. "Amniotic stem cells repair ureteric defect: a study to evaluate the feasibility of amniotic membrane as a graft in surgical reconstruction." *Indian J Surg* 71 (2009): 121-127.
3. Kalpravidh, Marissak, Pranee Tuntivanich, Simon Vongsakul and Sudson Sirivaidyapong, et al. "Canine amniotic membrane transplantation for corneal reconstruction after the excision of dermoids in dogs." *Vet Res Commun* 33 (2009): 1003-1012.
4. Malak, T.M and S.C. Bell. "Structural characteristics of term human fetal membranes: a novel zone of extreme morphological alteration within the rupture site." *BJOG Int J* 101 (1994): 375-386.
5. Niknejad, Hassan, Habibollah Peirovi, Masoumeh Jorjani and Abolhassan Ahmadiani, et al. "Properties of the amniotic membrane for potential use in tissue engineering." *Eur Cells Mater* 15 (2008): 88-99.

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