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Treatment of Inflammatory Corneal Perforations with Laparoscopic Implantation of Amniotic Membranes without Sutures

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Description

Numerous studies have demonstrated the numerous properties of the amniotic membrane, including its ability to alleviate pain, its anti-inflammatory capacity, and its antiadhesive and antiangiogenic properties. Over the course of the past two decades, a number of ophthalmic conditions, including bullous keratopathy, Stevens-Johnson syndrome, chronic corneal epithelial abnormalities, chemical burns, and ocular pemphigoid, have gradually been treated with the amniotic membrane. Depending on the disease that is underlying the condition, there are three major surgical options [1]. The first treatment for stromal deficiencies is an inlay or graft. The AM is positioned with its epithelial side facing upward. The transplant is secured with 10-0 nylon sutures at the edge of the corneal defect.

Corneal stromal wound healing is a very complex and well-organized process that involves keratocyte death and repopulation, sequential keratocyte transformation into fibroblasts and myofibroblasts, infiltration of limbal and circulating immune cells, and remodelling of the structure of the corneal extracellular matrix (ECM). Several factors account for the advantages of AM transplantation for restoring the ocular surface. The AM's primary function is mechanical, encouraging the growth of ocular surface epithelial cells. Additionally, it produces epithelial growth factor (KGF), hepatocyte growth factor, and keratinocyte growth factor, all of which aid in epithelialization.

The anti-inflammatory effect is caused by suppressing pro-inflammatory cytokine production on the injured ocular surface. Inflammatory cells that undergo apoptosis are also caught in the AM stroma, as has been demonstrated. Additionally, AM stromal and epithelial cells express FAS receptor, which causes fibroblast and inflammatory cells to die off. Because there is no immunogenicity and no need for immunosuppressive therapy, AMT is more advantageous. The anti-angiogenic and antimicrobial properties of AM have finally been established. The graft or patch of AM is sutured across the ocular surface during current AMT procedures [2].

Additionally, the inflammatory effect of the corneal suture may result in a futile attempt at repair if the corneal damage was caused by an inflammatory illness. As a result, procedures that don't require sutures have been developed, one of which makes use of cyanoacrylate adhesive. Although it has been demonstrated that this type of adhesive is effective, its toxic nature can also result in consequences such as persistent inflammation and a delay in wound healing. Fibrin glue is the preferred method of attachment for the AM to the ocular surface. The main drawback of using blood donors is the possibility of disease transmission. The applications of the amniotic membrane to a contact lens or an ocular conformer are two additional methods that were reported by SAMT.

The postoperative eye underwent daily evaluation until the end of each animal's observation period. Every day, clinical assessments of photophobia, blepharospasm, conjunctival hyperemia, and chemosis were taken. Additionally, measurements of the cornea's pigmentation, edoema, and vascularization, the hypopyon and fibrin in the anterior chamber, and the hyphema, hypopyon, and fibrin in the lens (opacity) were taken. The onset of uveitis-related symptoms, the presence or absence of miosis, edoema, and iris color changes were also evaluated. The fluorescein dye test was carried out (defined as positive or negative) beginning 48 hours after surgery. Until the results came back negative, tests were done every day. In the G3 and G4 animals that had received an amniotic membrane bandage as part of their therapy, the fluorescein dye test was only initiated after the bandage had fallen off on its own.

Again, the 15 samples selected for each group were randomly divided into five subgroups, each with three animals. Corneas were obtained for histological and morphometric examination based on the following criteria: T1: Subgroup 1. Two days following surgery; T2: Subgroup 2. Seven days after the procedure; T3: Subgroup 3. Fifteen days after the procedure; T4: Subgroup 4. Twenty-one days after the operation; likewise, Subgroup 5 (T5): Three months after surgery [3,4].

The operated eyes were removed from the animals after they were put to sleep, and the corneas were prepared for paraffin embedding. 4 m slices were stained with hematoxylin and eosin (H&E). Histology and morphometry were carried out with an optical microscope to check for the presence of leucocytes, edoema, and vasculature in the cornea as well as the degree of epithelialization. The presence or absence of leucocytes, edoema, and newly formed vasculature, as well as the presence or absence of corneal epithelialization, were all determined. The grafts do not adhere to the eye's surface. The grafts and the contact lens will not move if a contact lens is put on immediately and the lids are sealed with 3M Steri-stripTM. We chose to use a tape bandage rather than a traditional suture tarsorrhaphy in order to avoid local complications like trichiasis, adhesion between the upper and lower eyelids following tarsorrhaphy lysis, premature opening of the temporary tarsorrhaphy, pyogenic granuloma, and keloid formation of the eyelid [5]. The lid closure not only keeps the contact lens and AM in place, but it also speeds up corneal surface healing and makes it easier for AM to heal by creating a safe environment.

An alternative SAMT strategy for treating corneal perforation caused by ocular surface inflammatory diseases is the goal of this work. For a quick and complete resolution of corneal perforation without corneal infections, it was demonstrated that the use of SAMT was maintained to a 100% level up to three months after the initial treatment. This approach is advantageous because it reduces the pro-inflammatory effects of long surgical procedures and sutures. Another advantage is that patients no longer need to use topical medications, which simplifies the procedure and minimizes discomfort.

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Conflict of Interest

The author shows no conflict of interest towards this manuscript.

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