Medicine

HUMAN AMNIOTIC MEMBRANE FOR ACUTE SEVERE ALKALI BURN - 100 % VISUAL ACUITY RECOVERY

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ABSTRACT:
OUR PURPOSE IS TO REPORT TWO CASES OF ACUTE ALKALI EYE BURN TREATED WITH AMNIOTIC MEMBRANE PATCH. BECAUSE THE OCULAR BURNS WERE RECENT WE PATCHED THE EYE IN THE ACUTE PHASE WITH AMNIOTIC MEMBRANE. BY THIS APPROACH THE AMNIOTIC MEMBRANE SERVES AS GROWTH PROMOTING AND ANTI INFLAMMATORY AGENT. ALTHOUGH AT THE BEGINNING THE LIMBUS AND THE CORNEA OF BOTH PATIENTS WERE AFFECTED, AFTER THE INTEGRATION OF THE AMNIOTIC MEMBRANE, WITH PROPER TREATMENT, NO FURTHER SURGICAL TREATMENT WAS NEEDED, WITH 100 % VISUAL ACUITY RECOVERY. THE AMNIOTIC MEMBRANE REPRESENTS A POSSIBLE TREATMENT IN OCULAR BURNS NOT ONLY IN THE CHRONIC PHASE , FOR BURNS GRADE 3 OR 4 WITH LIMBAL STEM CELL DEFICIENCY, BUT ALSO IN THE ACUTE PHASE.

KEY WORDS: ALKALI OCULAR BURNS, AMNIOTIC MEMBRANE, ACUTE PHASE, CORNEA, LIMBUS

INTRODUCTION

Chemical trauma to the external eye is a common problem that can range in severity from mild irritation to complete destruction of the ocular surface causing loss of vision and even loss of eye.[5] The majority are accidental, and a few are due to assault. Two- thirds of accidental burns occur at work and the remainder home. Alkali burns are twice as common as acid burns since alkalis are more widely used both at home and in industry. A chemical burn is the only eye injury that requires emergency treatment without first taking a history and

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performing a careful examination.[6] Strong alkalis raise the pH of tissues and cause saponification of fatty acids in cell membranes and ultimately cellular disruption. Once the surface epithelium is damaged, alkaline solution penetrate the corneal stroma, where they destroy the proteoglycan ground substance and collagen fibers of the stromal matrix. Strong alkaline substance produce severe tissue damage and intense inflammation. Proper management of chemical injuries remains a challenge. After immediate and copious irrigation, the next phase of the management should be directed at decreasing inflammation, limiting matrix degradation and promoting reepithelialization of the cornea.[7] Early surgery may be necessary . Amniotic membrane transplantation may be helpful in suppressing inflammation, restore the limbal cell population and re-establish the fornices. The first documented ophthalmologic application of the amniotic membrane was in the 1940's when it was used in the treatment of ocular burns[8].Following initial reports, its use in ocular surgery, as indicated by reports in the scientific literature, abated until recently. The amniotic membrane is now increasingly being used in ocular surface surgery for a wide range of indications[9]. In modern ophthalmology its use was described by Tseng and co-workers[10]. Amniotic membrane promotes epithelization by keeping the preexisting epithelial phenotype. Amniotic membrane acts like a basement membrane by being an excellent substrate (the tissue growths from the healthy epithelium beneath the membrane), inhibits scarring and vascularisation reduces inflammation, provides a substrate for cell growth, has antimicrobial effects and offers a mechanical protection as a biological bandage. The mechanisms of action of the membrane are attributed to and inferred from its physical structure and its molecular constituents. The amniotic membrane is composed of a single layer of epithelial cells, basement membrane and avascular stroma. Enzymes, cytokines (IL-6, IL-10) , growth factors (EGF, KGF, HGF, TGF), metalloproteases and Inhibitors of metalloproteases have been identified in amniotic membrane layers[11].

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MAIN TEXT

We report two cases of two men who addressed the emergency department after alkali eye burn. They both presented earlier that 24 hours from the incident. They both had corneo conjunctival chemical burn with intense ocular pain, photophobia, excessive tearing, fronto - parietal headache. First was a 39 year old man from countryside who at submission his best corrected visual acuity of right eye was 0.1. On slit lamp examination on his right eye : second degree eyelid burn , massive eyelid edema, conjunctival hemorrhages and chemosis, faded nasal conjunctiva (milk-like) , glossless , adherent to the adjacent tissue, conjunctive denuded sclera in the nasal perilimbic area , and presenting a deep lesion corneal ulcerations in the ½ nasal , surrounded by corneal edema (Fig.1).

The second patient is 56 year old man. When submitted his best corrected visual acuity was 0.6. On slit lamp examination on his right eye: conjunctival chemosis and hemorrhages, faded nasal conjunctiva, adherent to the adjacent tissue, necrotic tissue (Fig. 2), limbic and perilimbic ischemia, nasal corneal ulceration (Fig.3) with corneal haze.

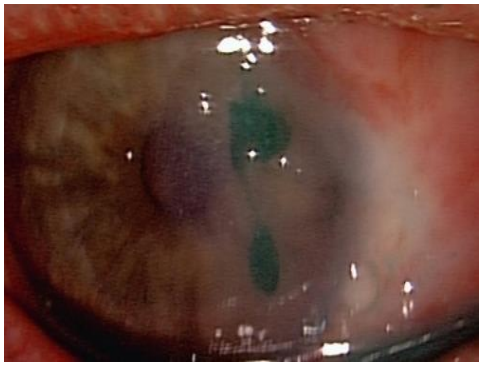

Fig.1 Corneal ulceration surrounded by corneal edema and conjuctival necrotic tissue

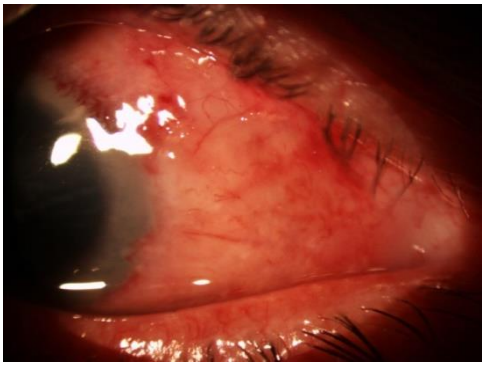

Fig.2 Conjuctival chemosis and hemorrhages, faded nasal conjunctiva and necrotic tissue

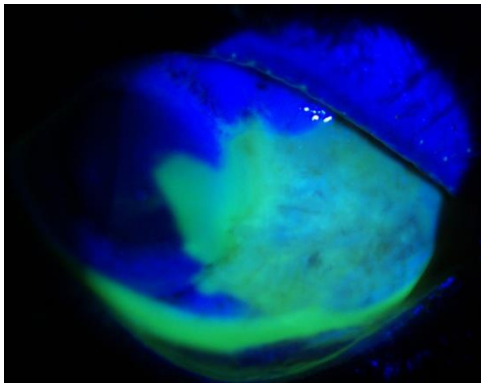

Fig.3 Limbic and perilimbic burn with ischemia and nasal ulceration

After copious irrigation and denudation of the surrounding necrotic tissue we have decided to patch the eye with human amniotic membrane. We used preserved human amniotic membrane according to European legislation. Amniotic membrane patch is performed with 10.0 nylon sutures with the epithelial face of the membrane facing upward and the membrane attached to the stroma. By this approach the membrane is covering the eye burn and serves as growth promoting and anti inflammatory agent for about 1-2 weeks after which the membrane detaches from the surface of the eye.

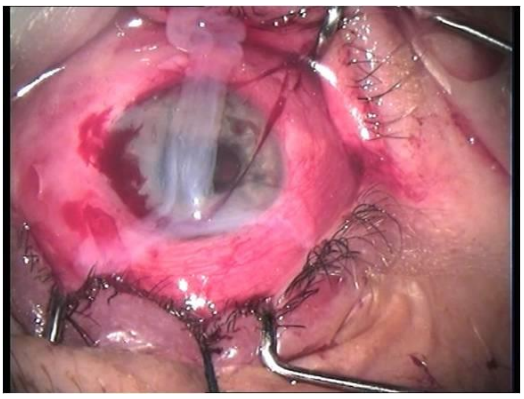

Fig 4. Amniotic membrane. Epithelial side facing upward.

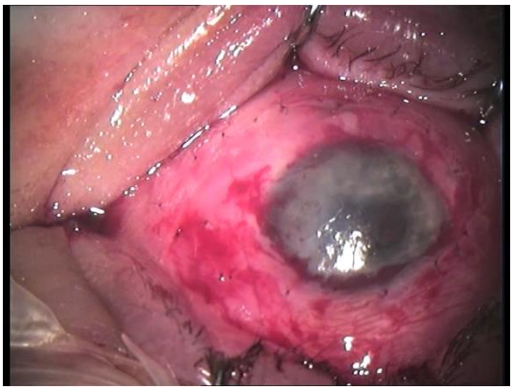

Fig 5. Amniotic membrane covering eye surface. Suture with nylon 10.0

Two weeks from the procedure, following strict local hygiene and treatment with artificial tears and hyaluronic acid ointment both patients recovered 20/20 visual acuity. On slit lamp examination corneal edema was reduced, no corneal ulceration, no limbic ischemia, good conjunctival healing without symblepharon.

Fig 6. Reduced corneal edema, no corneal ulceration (the 39 year old patient)

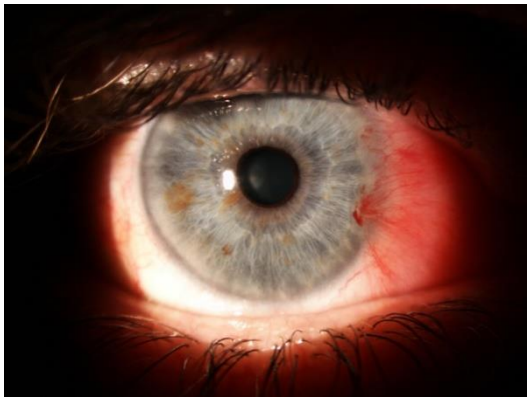

Fig 7. No corneal edema, good conjunctival scaring (the 56 year old patient)

DISCUTION: According to the Roper- Hall grading system[12], chemical injuries grade 1 and 2 are treated with topical medication (antibiotic ointment, hyaluronic acid, artificial tears, cycloplegics, steroids, ascorbic acid). Most eye burns not only affects the cornea but also the conjuctiva. So the healing process interest the cornea, the limbus and the conjunctiva, trying to treat corneal edema, haze and ulceration, limbic ischemia and to prevent symblepharon. Due to the nature of the burn, the uncontrolled inflammation, necrotic and scarring process we find the use of amniotic membrane very useful as acute phase surgery.

CONCLUSION

The purpose of amniotic membrane was to act as a patch, graft or both. Amniotic membrane transplant was carried out to fulfill one or more of the following objectives: to establish epithelial cover in an area where none existed, to prevent corneal perforation in eyes

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at risk due to stromal melting, to limit scarring where the clinical likelihood was high, and to limit inflammation and neovascularization .

Although used since the 40's nowadays amniotic membrane is starting to be reused because is a useful adjunct in the management of many ocular conditions. Several mechanisms of action have been attributed to the membrane based on its structure and biochemical composition. But many more healing properties are to be studied since the absence of randomised controlled studies.

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