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Miracles of Amniotic Membrane Graft in a Case of Severe Alkali Burn of the Eye

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Abstract: ***Chemical injury to the eye is a medical emergency and needs immediate attention, Else visual impairment invariable ensues. Alkali burns are much more harmful than acids. A 21 year old man presented with injury to his left eye with caustic soda (Strong alkali) and vision 1/60. Amniotic membrane graft was put over the cornea in conjunction with topical medication. At 9-month follow up, he had a BCVA of 6/9. We present such a medical miracle.***

Keywords: Alkali, Amniotic membrane, Chemical, Graft

1. Introduction

Chemical injuries to the eye represent between 11.5%-22.1% of ocular traumas (1). About two thirds of these injuries occur in young men. The vast majority occur in the workplace as a result of industrial accidents. A minority of injuries occur in the home or secondary to assault. Alkali materials are found more commonly in building materials and cleaning agents and occur more frequently than acid injuries (2).

The purpose of Amniotic membrane graft (AMG) is to rapidly restore the conjunctival surface and to reduce limbal and stromal inflammation. We also wanted to observe the effect of the AMG on limbal ischaemia.

2. Case Report

A 21-year old Male patient came to the emergency of our hospital after accidental injury with caustic soda (An Alkali) over his left half of the body, including left half of face and the left eye, while working in a sugar factory. Following which, he complained of sudden, painless, diminution of vision. On examination, total Burn Surface Area (BSA) was 26%. On examination, Vision in R/E was 6/6.Vision in the L/E was 1/60.

Lids were normal in position, movements. Edema and Blisters were present on the skin. Conjunctiva showed marked Chemosis and congestion; Mucoid discharge was present. Cornea was normal in size and shape; Widespread sloughing of epithelium and diffuse opalescence was present. Limbus showed Ischaemia, present in Superior, Inferior and Nasal quadrants. Based on these findings, the injury was classified as a Grade III – IV chemical injury (Roper Hall). {Figure 1}

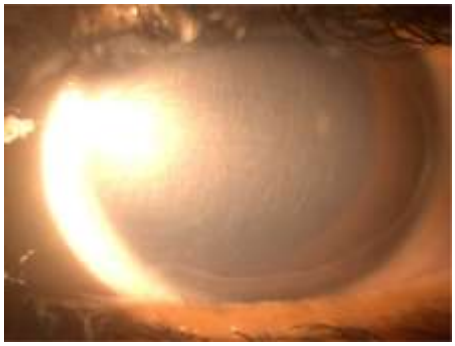

Figure 1: Day 0

Immediate rinsing of the eye was done with ringer lactate for 30 minutes, followed by topical medication, which included E/D Moxifloxacin with Dexamethasone LE qid, E/D Atropine LE tds, E/D Carboxy Methycellulose LE qid, E/D Timolol + Brimonidine LE bd, E/O Chloramphenicol LE hs, Tab. Vitamin C TDS.

At the end of the 1st week, Amniotic membrane graft was placed on the cornea. Topical Dexamethasone (Strong steroid) was replaced with Loteprednol (A weaker steroid). Topical ointment was discontinued. Rest treatment continued as before.

AMG was left in-situ for 2 weeks, after which spontaneous expulsion of the AMG was seen, which was probably attributed to the patient rubbing his eye vigorously.

At the end of week 3, Epithelium started regrowing, outside inwards, except nasally. Resolution of limbal ischaemia followed the epithelium. Topical steroids were tapered. [Figure 2]

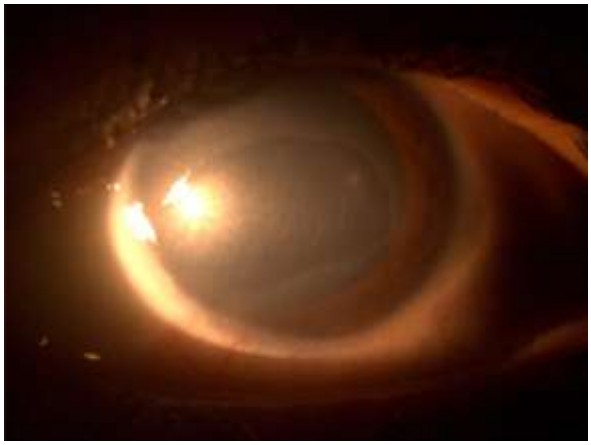

Figure 2: End of Week 3

At the end of week 4, Only a small central area of denuded epithelium left. Nasal limbal ischaemia persisted [Figure 3]. Topical lotepredol was replaced with a locally acting steroid (Fluoromethalone).

Figure 3: End of Week 4

At the end of 5 weeks, epithelium fully recovered, except a triangular area immediately adjacent to the area of nasal limbus. Area of limbal ischemia covered by a cystic swelling of conjunctiva. BCVA improved to 6/60 [Figure 4].

Figure 4: End of week 5

At the First follow-up (WEEK 8), Limbal ischaemia almost gone. Cystic swelling persisted. BCVA LE improved to – 6/60. [Figure 5]

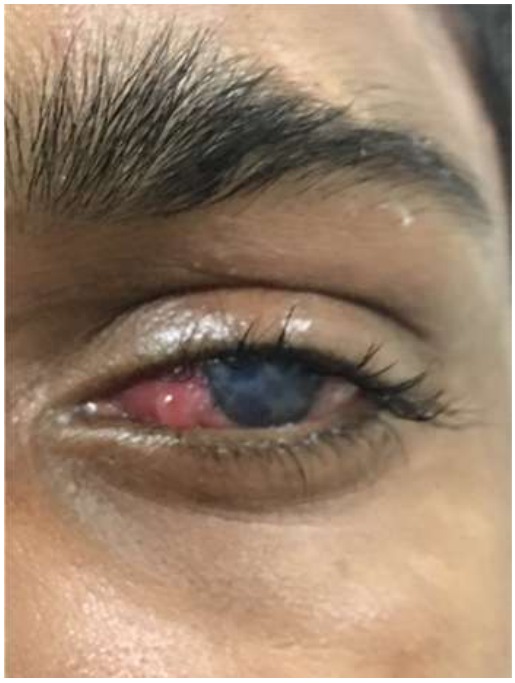

Figure 5: Week 8

At the 2ND FOLLOW UP (WEEK 12), Conjunctival vessels seen encroaching the cornea. Conjunctival Cystic swelling reduced in size and the stain +ve area reduced further. BCVA **6/24**P. (Figure 6)

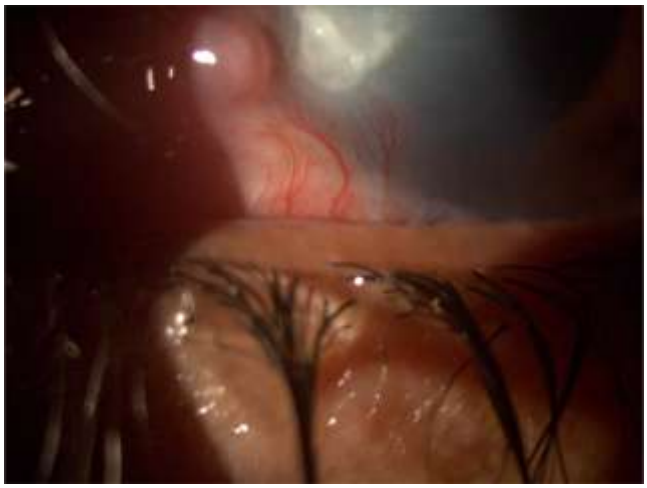

Figure 6: Week 12

On the 3rd FOLLOW UP (WEEK 16), Epithelium healed completely. Conjunctivalisation of nasal cornea persisted. Conjunctival swelling gone. BCVA 6/12. (Figure 7)

Figure 7: Week 16

At the 4th FOLLOW UP (WEEK 20), Central Cornea was clear. Conjunctivalisation of nasal cornea started to regress. BCVA ultimately improved to 6/9p. [Figure 8]

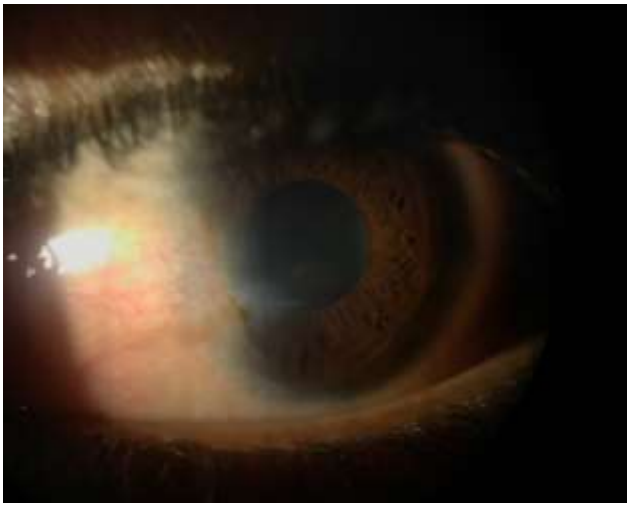

Figure 8: Week 20

3. Discussion

Alkali agents are lipophilic and therefore penetrate tissues more rapidly than acids. They saponify the fatty acids of cell cell membranes, penetrate the corneal stroma and destroy proteoglycan ground substance and collagen bundles. The damaged tissues then secrete proteolytic enzymes, which lead to further damage (3,4).

Once the epithelium is compromised, alkaline solutions penetrate more rapidly into the underlying tissues, destroying proteoglycan ground substance and the collagen matrix. If the agent reaches the collagen fibrils of the trabecular meshwork, it can cause scarring inhibiting aqueous outflow, leading to secondary glaucoma. Strong alkaline agents penetrate into the anterior chamber and cause widespread inflammation of iris, lens, and ciliary body (5,6).

Subsequent progression of the injury and the healing process may fall anywhere between a highly active inflammatory process to a hyporeactive nonviable process due to complete tissue necrosis (7,8).

Identifying the stage of a chemical eye burn is particularly helpful in prediction of the outcome. Most importantly, the relative proportion of surviving limbal tissue has been shown to be a major prognostic factor. Several classifications have been proposed: the Roper-Hall classification system was initially developed in the mid 1960s, first by Ballen (9), and then modified by Roper-Hall (10). [Table 1]

Table 1: Roper-Hall classification for the severity of ocular surface burns

Grade	Clinical Findings		Prognosis
	Cornea	Conjunctiva/ Limbus	
I	Corneal epithelial damage	No limbical ischemia	Good
II	Corneal haze, iris details visible	<1/3 limbical ischemia	Good
III	Total epithelial loss, stomach haze, and iris details obscured	1/3-1/2 limbical ischemia	Guarded
IV	Cornea opaque, iris and pupil obscured	>1/2 limbical ischemia	Poor

Amniotic membrane transplantation (AMG) can be used both as a graft which can provide a basement membrane for epithelialization and/or as a patch where it acts as a biological bandage contact lens (11,12,13). In addition, it is often used as an adjunct to medical therapy to decrease ocular surface inflammation and reduce scarring. Besides, multilayered AMG is an appropriate surrogate in severe corneal thinning (14,15). Further, amniotic membrane may also be applied to the cornea using a contact lens type.

4. Conclusion

Amniotic membrane grafting is a very effective method of managing chemical corneal burns with an alkali, given that it is placed as early as possible. However, Amniotic membrane must be placed in conjunction to other topical medication.

References

[1] Clare, G., et al., Amniotic membrane transplantation for acute ocular burns. Cochrane database of systematic reviews, 2012. 9: p. CD009379.
[2] Wagoner, M.D., Chemical injuries of the eye: current concepts in pathophysiology and therapy. Survey of ophthalmology, 1997. 41(4): p. 275-313.
[3] Fish, R. and R.S. Davidson, Management of ocular thermal and chemical injuries, including amniotic membrane therapy. Current opinion in ophthalmology, 2010. 21(4): p. 317-21.
[4] Barouch F, Colby KA. Evaluation and initial management of patients with ocular and adnexal trauma. In: Miller JW, Azar DT, Blodi B eds. Albert and Jakobiec's Principles and Practice of Ophthalmology, 3rd ed. Philadelphia: WB Saunders Elsevier: 2008: 5071-5092.
[5] Lin, N. Patel, D. Yoo, S. Demartelaere, and C. Bouchard, "Management of ocular conditions in the burn unit: thermal and chemical burns and stevens-johnson syndrome/toxic epidermal necrolysis," Journal

of Burn Care & Research, vol. 32, no. 5, pp. 547–560, 2011.
[6] M. D. Wagoner, "Chemical injuries of the eye: current concepts in pathophysiology and therapy," Survey of Ophthalmology, vol. 41, no. 4, pp. 275–313, 1997.
[7] N. F. Schrage, S. Langefeld, J. Zschocke, R. Kuckelkorn, C. Redbrake, and M. Reim, "Eye burns: an emergency and continuing problem," Burns, vol. 26, no. 8, pp. 689–699, 2000.
[8] C. A. Paterson and R. R. Pfister, "Intraocular pressure changes after alkali burns," Archives of Ophthalmology, vol. 91, no. 3, pp. 211–218, 1974.
[9] P. H. Ballen, "Treatment of chemical burns of the eye," Eye, Ear, Nose & Throat Monthly, vol. 43, pp. 57–61, 1964
[10] M. J. Roper-Hall, "Thermal and chemical burns," Transactions of the Ophthalmological Societies of the United Kingdom, vol. 85, pp. 631–653, 1965.
[11] S. Shimmura, J. Shimazaki, Y. Ohashi, and K. Tsubota, "Antiinflammatory effects of amniotic membrane transplantation in ocular surface disorders," Cornea, vol. 20, no. 4, pp. 408–413, 2001.
[12] H. S. Dua, J. A. P. Gomes, A. J. King, and V. S. Maharajan, "The amniotic membrane in ophthalmology," Survey of Ophthalmology, vol. 49, no. 1, pp. 51–77, 2004.
[13] C. S. Bouchard and T. John, "Amniotic membrane transplantation in the management of severe ocular surface disease: indications and outcomes," Ocular Surface, vol. 2, no. 3, pp. 201–211, 2004
[14] J. L. Alió, M. Abad, and D. H. Scorsetti, "Preparation, indications and results of human amniotic membrane transplantation for ocular surface disorders," Expert Review of Medical Devices, vol. 2, no. 2, pp. 153–160, 2005.
[15] K. Hanada, J. Shimazaki, S. Shimmura, and K. Tsubota, "Multilayered amniotic membrane transplantation for severe ulceration of the cornea and sclera," American Journal of Ophthalmology, vol. 131, no. 3, pp. 324–331, 2001.