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Case Report

Management and outcome of a case of severe ocular chemical injury

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ABSTRACT

Ocular chemical injuries may produce extensive damage to surface epithelium, cornea & anterior segment of eye. Most severe injuries have an unfavorable prognosis, but timely & optimal surgical management like Amniotic membrane grafting, Stem cell transplantation, penetrating keratoplasty and in indicated cases, a keratoprosthesis. This case report presents a case of bilateral alkali injury, the management of which was a long drawn & challenging process

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Introduction

Severe chemical injuries of the eye are one of the most challenging situations in ophthalmology. Such injuries produce extensive damage to the ocular surface epithelium, cornea, ciliary body, iris & lens, resulting in permanent unilateral or bilateral visual impairment. They are more prevalent among young males between 20- 40 years of age, working in factories, chemical industries & laboratories. The vision impairment or blindness has important health, socioeconomic & quality of life implications. Especially devastating are the alkali injuries because of their inherent ability to lyse cell membranes & penetrate intraocular structures [1].

Severe Grade IV alkali injuries do not epithelise well, are more prone to stromal corneal melts, with ulcers, perforations & even endophthalmitis in acute phase. The chronic phase recovery is hampered by sequelae like loss of eyelid tissue, cicatricial entropion, fornicial shortening, symblephera formation, extensive fibrovascular pannus growing over cornea, glaucoma due to direct injury to angle structures or due to chronic inflammation. The management of such injuries is a long haul, requiring many surgical interventions for correction of lid abnormalities, stabilisation of ocular surface and restoration of corneal clarity.

Case Report

We report a case of bilateral alkali injury in a patient, the management of which, continued for many months, with multiple surgical procedures and finally, required a keratoprosthesis as the last resort for visual rehabilitation.

A 42-year-old male patient presented to the cornea OPD in June 2013, with history of lime going in both eyes due to bursting of 'chuna' (lime) packet. Earlier he had been to a private practitioner where eye wash with normal saline had been given & patient was referred to our hospital at presentation, the patient had total epithelial loss with severe corneal stromal edema with total limbal ischemia & severe conjunctival chemosis. (Ruper Hall Grading IV/ Dua Grading VI) [2]. The patient was started on oral doxycycline, Vitamin C and topically, ascorbic acid eye drops (10% Na Ascorbate), antibiotics, artificial tears, mydriatics & low dose steroid drops. At next follow up after 5 days, the patient had developed bilateral corneal infiltrates (Figure A, B). Steroids were discontinued, smear & culture of corneal scraping was done, which was negative. The patient was started on intensive hourly fortified cefazolin & moxifloxacin eye drops. The infiltrates resolved but patient continued to have non healing epithelial defects with stromal thinning in both eyes. The patient was operated for bilateral Amniotic Membrane Grafting.

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A few days after that, the patient again developed bilateral keratitis (figure C, D) with early peripheral sclerocorneal melt in right eye. So bilateral therapeutic DALK (Deep Anterior Lamellar Keratoplasty) was done in first, the right eye & then the left eye, a few days later. Unfortunately, the patient again developed bilateral graft infection. Tear film assessment showed severely reduced quantity (Schirmer's test without paracaine, 7mm at 5 min) with very poor-quality tear film with lot of debris. So punctal occlusion was done with pieces of 5/0 chromic catgut, in both eyes. Patient was managed conservatively with intensive topical tear substitutes & antibiotic drops. After a few days, there was resolution of keratitis with bilateral failed corneal grafts (Figure E, F).



Fig: A) Right eye-Lime(alkali) injury
Fig: B) Left eye- alkali injury

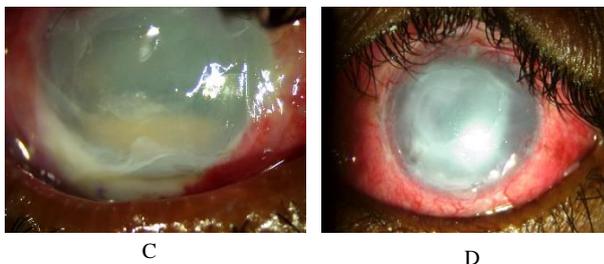


Fig: C) RE- Post AMG infective Keratitis
Fig: D) LE- Post AMG infective Keratitis

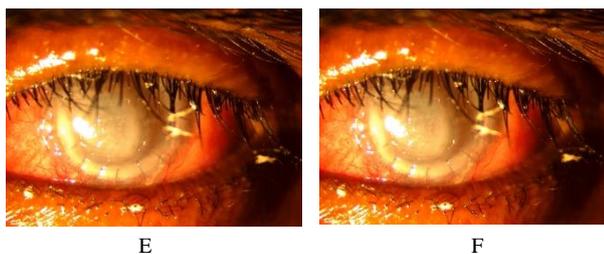


Fig: E) RE- Post DALK- graft infection
Fig: F) LE- Post DALK- Graft Infection



Fig: G) LE- Auro KPro

The patient had also developed trichiasis & cicatricial entropion, so Oculoplasty consult was done and patient was operated for both eyes

upper lid tarsotomy with oral mucous membrane grafting. The clinical picture after all these procedures and 8 months after the initial injury was bilateral fornicial shortening with symblephera, failed corneal grafts with 360° florid corneal deep stromal neovascularisation, but a healed & relatively non-inflamed ocular surface. So, after a detailed discussion with the patient & his relatives, for visual rehabilitation, a keratoprosthesis surgery was planned, for his Left eye which was worse than right eye in terms of stability of ocular surface. The vision of patient was HM in right eye & PL PR accurate in left eye. Intraocular pressure was normal, B scan ultrasonography of left eye was normal. Vector B scan showed axial length 23.20 mm. An aphakic design of indigenously manufactured, Type I Keratoprosthesis, Auro KPro (Auro Labs India), of power +58 D was ordered [3]. Main steps in Surgery were Trephination of central 8.5 mm of patient's cornea, Cataract extraction, Assembly of K Pro & Suturing it to the host bed like a standard corneal graft, with 16 10/0 interrupted Nylon sutures (Figure G). In the end, a lateral tarsorrhaphy was done & a BCL (Bandage Contact Lens) was applied. Postoperatively, the patient was given oral Diamox & steroids (tapering dose) for a few days and topical Vancomycin & moxifloxacin drops 6 times a day with topical antiglaucoma & tear substitutes. The topical treatment needs to be continued lifelong.

At each follow up visit, careful slit lamp examination to rule out any stromal melt or sterile necrosis of host bed, disc evaluation to rule out any cupping or pallor, fundus examination to rule out any vitritis, retinal detachment, endophthalmitis, Intraocular pressure measurement is done. Once in every 3 months, perimetry with 10-2 visual fields is done to rule out any glaucomatous changes. The postoperative course has been uneventful, with retention of KPro and patient maintaining a central vision of 6/9, for the last 5 years.

Discussion

Most patients with mild to moderate chemical injuries can achieve a stable ocular surface, if the immediate treatment & acute phase (< 6 weeks) is optimal. Usually the surface gets epithelised completely without any sequelae. However severe chemical injuries have a very unfavourable prognosis. There is no reepithelisation in the early or late reparative phase and patient develops conjunctivalisation of cornea with fibrovascular pannus, symblephera, cicatricial entropion with trichiasis, corneal scarring with neovascularisation, Sometimes even progressive sterile melts, or infective melts with perforation. Acute phase management requires amniotic Membrane transplantation [4].

Chronic phase management comprises of:

1. Surgery to correct lid entropion & trichiasis
2. Ocular surface Transplantation in the form of Conjunctivolimbic autografts from the other healthy eye, or a modified new technique, Simple Limbal Epithelial Transplant (SLET) in unilateral cases [5]. However, in bilateral cases, situation is even more challenging. Such patients require Cultivated Limbal stem cells/ Limbal epithelial cells (LSCT) from allografts from a living related donor or cadaveric eye for ocular surface reconstruction. other modalities tried for bilateral cases are COMET (Cultivated Oral Mucosal Epithelial Transplantation), keratolimbic allografts etc.
3. Then after 6-12 weeks, a penetrating or lamellar keratoplasty is required for visual rehabilitation. Results of surgery are better

when a two staged procedure - LSCT followed by keratopasty is performed rather than single stage.[6]

Our patient had bilateral injury, we did not have access to a stem cell lab for Ex-Vivo expansion /cultivated limbal stem cell grafts. Moreover, after the AMT & Therapeutic DALK, the ocular surface had healed & was not inflamed. But due to the diffuse deep vascularisation with prior failed grafts & poor tear film, it would have been an immunologically very high-risk case for conventional P.K. with poor chances for graft survival. Also, the patient was bilaterally blind, so we thought of Type I Keratoprosthesis as a viable option. After a detailed discussion with the patient & relative about all the options, risk of the procedure, need for regular follow up and adherence to topical treatment, the surgery was undertaken.

In conclusion, the management of severe chemical injuries is long drawn process requiring multiple surgical procedures, success or failure of previous procedure determines the course of next surgery. A thorough understanding of various surgical modalities & tailored treatment plan for each patient, improves the outcome.

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