CASE REPORT

Oral mucosal grafting combined with tenonplasty for ocular surface and lid margin reconstruction in an atypical sectorial chemical burn

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SUMMARY

A 46-year-old woman presented with chemical injury in both eyes after the instillation of undefined eye-drops prescribed by quack. She had an atypical presentation in the form of bilateral severe necrosis of both lids and whole palpebral conjunctiva. Extensive debridement with conjunctival epitheliectomy, tenonplasty and amniotic membrane transplantation (AMT) was performed. Characteristic differences from typical chemical injuries were a sectorial involvement of ocular surface and keratinisation over distorted lid margins. Lid margin needed replacement by labial mucous membrane for the restoration of ocular surface. Ocular surface reconstruction with AMT in acute phase and mucous membrane grafting for involved lid margins in late phase achieves vision salvage and avoids late complications in drug-induced chemical injury.

BACKGROUND

Ocular chemical injury is an ophthalmic emergency, which is challenging in its management.^{1 2} The prognosis depends on the type of chemical (acid or alkali), extent of involvement and rapid institution of treatment. Associated lid involvement adds to poor prognosis because of mechanical injury and exposure keratopathy.³ Siegel in 1944 advocated prompt use of buccal mucous membrane grafting (MMG) for conjunctival and corneconjunctival burns.⁴ MMG was used as a substitute for bulbar and palpebral conjunctiva in immediate postinjury period in the past, which is now replaced with limbal stem cell transplantation along with amniotic membrane transplantation (AMT).⁵⁻⁷ Promising results of MMG have been shown in cicatricial ocular surface disease, lid margin keratinisation and recalcitrant sclerocorneal melts.⁸⁻¹⁰ Its use in chemical injury is scarcely published in literature.

Sectorial necrosis localised to lid margin and nasal ocular surface is observed rarely in chemical injury. Here in, we report such atypical presentation of chemical injury and its multimodal management employing MMG for lid margin rehabilitation.

CASE PRESENTATION

A 55-year-old woman presented with redness and watering in both eyes of 3 weeks duration following instillation of an unknown drug. She typically complained of severe burning sensation with topical instillation of drug. Her best-corrected

visual acuity (BCVA) was 6/12 and 6/18 in right and left eye, respectively. External examination showed pale white areas of remarkable ischaemic necrosis in both upper and lower eyelid margins concentrated along posterior lid margin (figure 1B,D). Eyelid skin was uninvolved. Extent of conjunctival involvement trailed from lower palpebral to inferior bulbar conjunctiva reaching up to inferior limbus from 6.30 to 8'o clock hours in the left eye (figure 1C). Left eye had an area of episcleral necrosis adjacent to limbal area. Right eye had inferior bulbar conjunctival involvement 5 mm beyond limbus with diffuse involvement of upper and lower tarsal conjunctiva (figure 1A). Slit lamp examination revealed corneal epithelial defect with stromal necrosis measuring 3 mm×1.5 mm near 7'o clock limbus in left eye. Right eye cornea had inferior punctate erosions. Positive fluorescein uptake was noted in all the above-mentioned areas of conjunctival involvement. Anterior chamber had no cells or flare. Intraocular pressures were 14 and 16 mm Hg in right and left eye, respectively. Diagnosis of chemical injury, both eyes grade 4 (75% conjunctival involvement, as per Dua's classification) was made.¹¹

TREATMENT

She was managed with thorough saline wash and debridement of necrotic areas (conjunctival and episcleral epitheliectomy) followed by glue-assisted preserved AMT with bandage contact lens placement in both eyes. Tarsal plate was stony hard with no visible bed vascularity postdebridement of whitish necrotic layers. Tenonplasty was performed as far as possible to cover the raw avascular areas. Topical moxifloxacin 0.5% four times a day, prednisolone acetate 1% six times a day, hourly lubricants and oral vitamin C, doxycycline were started. At 1 week follow-up, amniotic membrane graft (AMG) was in place with no further worsening. At 3 weeks from presentation, left eye conjunctival epithelial defects started worsening which was managed with repeat debridement with AMT (figure 2). Her BCVA was 6/18 and 6/24 in right and left eye, respectively. Three months from presentation, inferior fornix still had focal necrotic area at the site of episcleral necrosis in left eye. Repeat debridement with AMT and permanent tarsorrhaphy was performed. Posterior lid margin, that is, conjunctiva was sent for histopathological examination (HPE) while

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Figure 1 At presentation. (A) Right ocular surface with diffuse conjunctival congestion and inferior conjunctival necrosis. (B) Left ocular surface with corneal epithelial defect and stromal necrosis measuring 3 mm×1.5 mm near 7'o clock limbus along with an adjacent area of episcleral necrosis. (C,D) Showing pale white areas of remarkable ischaemic necrosis in eyelid margins concentrated along posterior lid margin and tarsal conjunctiva in both eyes.

performing tarsorrhaphy. HPE revealed hyperplastic stratified squamous epithelium with speckly necrosis and stromal fibrosis. Her BCVA was 6/24 in both eyes. Eyelid margin had a thickened appearance with loss of architecture and distichiasis in left eye. Schirmer I was 15 mm in both the eyes. Her ocular surface started stabilising but eyelid margin started showing keratinisation, which was progressing beyond posterior lid margin, and thereby inducing microabrasions over corneal surface (figure 3A,B). She underwent lid margin MMG in both eyes. Involved strip of lid margin beyond lash line measuring 35 mm×5 mm was excised. Free buccal mucosa graft was harvested from lower lip. Defatting of graft was performed with Westcott's scissors and graft anchored with 8–0 vicryl continuous sutures to the denuded areas. Excision of distichiasis was done in the form of a wedge incorporating root of hair follicle.

OUTCOME AND FOLLOW-UP

At last follow-up of 9 months, her BCVA was 6/9 in both eyes with stable ocular surface (figure 3C,D). MMG uptake was good in both eyes except recurrence of keratinisation focally in left eye.

Figure 2 After 3 months. (A) Lid margins with effacement of meibomian gland orifices. (B) Residual conjunctival defect inferiorly with thickened eyelid margins and visible nasogastric tube near canthi.

Figure 3 Final follow-up. (A,B) Keratinised lower lid margins in right and left eye, respectively. (C,D) After MMG, stabilised ocular surface with visible mucous membrane graft along lid margins in right eye, and residual inferior corneal scarring in left eye.

DISCUSSION

Ocular surface reconstruction with AMT in acute phase and MMG for involved lid margins in late phase achieves vision salvage, and avoids late complications in drug-induced chemical injury. Typical sectorial involvement in chemical injury should raise suspicion of topical drug/chemical usage.

Present case had sectorial involvement of ocular surface, indicating medication to be in gel form, which settled inferiorly and glued the lid margins. Such peculiar localised involvement of lids and ocular surface is rarely seen in chemical injuries. These drops most likely stayed for longer time medially under the influence of tear flow dynamics, which can be correlated with the more severe necrosis noted in these areas specifically. Prognostication in such cases by existing grading of chemical injury lacks the assessment of lid margin involvement. Classification of chemical injuries by Roper-Hall or Dua *et al* does not talk about involvement of either palpebral conjunctiva or lid margin.^{11 12} Palpebral conjunctiva involvement portends poor prognosis due to an underlying avascular tarsal plate. Destruction of meibomian orifices and marginal conjunctiva in current case resulted in thickened eyelids with irregularities in tear film spread. Anterior lamella was thickened with loss of differentiation from posterior lamella. Cicatrisation of posterior lid margin in association with keratinisation resulted in microabrasions over cornea. Labial mucosa is technically easy to harvest, thin and resilient with a stratified squamous epithelium—good substitute for lid margin.¹³ Regular and smooth posterior lid margin is essential for uniform spread of tear film with blinking. Current case had persistent corneal microabrasions, and photophobia as her insistent complaint. There was no cicatricial entropion or trichiasis of any of eyelids. Persistent keratinisation also results in ocular surface inflammation with unstable tear film. Buccal mucosa has shown promising results when used for cicatricial entropion, lid margin keratinisation in Stevens-Johnson syndrome, and ocular surface reconstruction in corneal melts in chemical injury.^{8–10} MMG uptake was good in all areas except at the site of episcleral necrosis, where recurrence of keratinisation and symblepharon was noted. No intervention was done in view of smooth central margins and stabilised ocular surface. Lid margin involvement with keratinisation is rarely reported in chemical injuries. Ocular surface is more commonly involved.

This case was novel in its different presentation as well as usage of MMG for lid margins.

Many studies have shown that AMT facilitates epithelialisation and reduces inflammation, vascularisation, and scarring in ocular chemical injury.⁷ This case presented to us after 3 weeks of drug use, where bulbar ocular surface could be restored with combined tenonplasty and AMT. Tenonplasty acts via advancing the vascular supply from surrounding area and anchoring it to bare sclera. No limbal stem cell transplant was needed in our case.

Most common late complication of chemical injury is symblepharon formation, which is preventable if taken care of in acute stage.¹ A newer self-conceptualised device was used to prevent symblepharon formation. Nasogastric tube (Romsons Scientific & Surgical Industries, Uttar Pradesh, India) made of silicone, size 6 was placed along whole length of left inferior fornix. No suture was needed to anchor it. Tube was removed after 3 weeks and forniceal conjunctiva healed with minimal focal symblepharon inferomedially not involving bulbar area. Patient reported no specific symptoms related to this tubing. Neither any complications nor granuloma were noted. This was a cost-effective, easily available and ocular surface friendly choice in place of symblepharon ring.

Differences based on nature of chemical whether acid or alkali has been reported extensively in literature. Drug used in our case was most likely acidic due to ischaemic changes localised on

surface and absence of any signs in anterior chamber. However, exact composition of this drug could not be traced due to fugitive tantric. Community awareness was created to avoid further usage of such drugs in that area.

To conclude, prompt management of chemical injury achieves favourable visual outcome with ocular surface rehabilitation. MMG should be performed for associated lid margin injury to prevent worsening of ocular surface.

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Competing interests None declared.

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Learning points

- Labial mucous membrane can be employed for lid margin keratinisation in chemical injury even without positional abnormality.
- Nasogastric tube can be used as an emergency substitute for symblepharon ring in cases with extensive surface involvement.
- Sectorial involvement of ocular surface especially nasally, should raise suspicion of topical drug-induced chemical injury.

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