

Case report

Amniotic membrane transplantation with and without limbal stem cell transplantation in chemical eye injury

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Abstract

Introduction: Chemical burns of the eyes are one of the important causes of visual disability. Chemical burns particularly alkali burn may lead to gross limbal stem cell deficiency. Amniotic membrane transplantation with limbal graft is a good method for ocular surface reconstruction. **Case:** A 39 years male presented to Biratnagar Eye Hospital after 5 months of chemical injury with redness, pain, photophobia and gradual loss of vision. His visual acuity was counting fingers close to face in both eyes. Amniotic membrane transplantation alone was done in right eye while in left eye limbal stem cell allograft was combined with amniotic membrane transplantation. There was not much visual improvement in right eye while left eye improved significantly to 6/60. **Conclusion:** Limbal stem cell graft with amniotic membrane transplantation can be an effective method of restoring vision and reducing symptoms rather than amniotic membrane transplantation alone in cases with total limbal stem cell deficiency following chemical burn.

Keywords: Limbal stem cell transplant, Allograft, chemical burn, amniotic membrane transplantation.

Introduction

Chemical burns of the eyes are one of the important causes of visual disability. Chemical burns, particularly alkali burns lead to gross limbal stem cell deficiency (Kinoshita et al, 1982). This is characterized by redness, severe photophobia and reduced vision. In a patient with partial limbal stem cell deficiency amniotic membrane transplantation improves both the corneal surface and the vision. If patient has unilateral or focal limbal stem cell deficiency, conjunctival autograft with limbal stem cell transplantation is the treatment of choice. For those with bilateral limbal stem cell

deficiency, however the treatment of choice is allograft limbal transplantation. Here we are reporting the outcome of a case of bilateral severe chemical burn with total limbal stem cell deficiency that underwent two different modalities of treatment in different eye.

Case report

A 39-year-old male had history of accidental chemical (lime) burn in both eyes one year back. Immediately after the injury, he washed his eyes with tap water and sought treatment from local eye hospital after 6 hours of injury. He was given steroid antibiotic combination drops, tear substitute, cyclopentolate eye drops and tablet vitamin C. The patient was noncompliant with prescribed medication. He presented to Biratnagar eye hospital after 6 months with diminution of vision, persistent

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redness and photophobia. At presentation his visual acuity was counting fingers close to face in both eyes. Anterior segment examination with slit lamp biomicroscope revealed diffuse conjunctival congestion in both eyes. There was conjunctivalization of cornea [Figure 1] with 360 degree superficial vascularization and deep vascularization from 9-11 o'clock in the right eye and from 4-6 o'clock in the left eye. Posterior segment details were not visible. A differential diagnosis of bilateral chemical eye injury with total limbal stem cell deficiency was made.

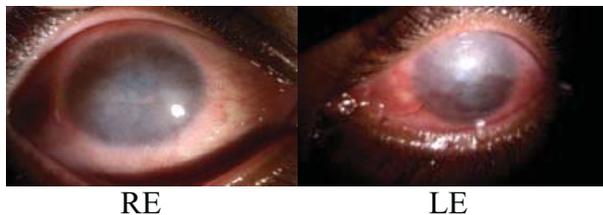


Figure 1: Preoperative photographs of both eyes of the patient with alkali burn showing conjunctivalization and vascularization of cornea

Ocular ultrasonography B-scan of posterior segment showed clear vitreous cavity with attached retina in both eyes. Steroid antibiotic combination drop along with tear substitute was given in both eyes. One dose of subconjunctival injection of bevacizumab 0.2ml was given in both eyes to decrease vascularization in first week. After a week conjunctival resection was performed in right eye followed by freshly prepared amniotic membrane transplantation. At 3 months follow up, apart from mild symptomatic improvement, patient had no visual improvement. So, Amniotic membrane along with limbal allograft transplantation was planned in the other (left) eye. A strip of 3 clock hours about 6mm in length and 3mm width limbal tissue including keratolimbal junction both superiorly and inferiorly was taken from the blood group matched and serological tests negative donor's eye [figure 2].

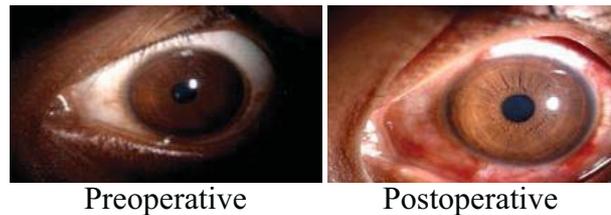


Figure 2: Preoperative and postoperative photograph of donor's RE. A small strip of limbal tissue was taken from superior and inferior limbus.

After resecting the conjunctival overgrowth, donor's limbal tissue was placed with sutures on both superior and inferior limbus of the recipient's left eye followed by freshly prepared amniotic membrane transplantation [Figure 3]. Amniotic membrane transplantation was done with freshly procured amniotic membrane from booked visit patient who underwent lower segment caesarian section. The patient was screened for all necessary investigations including HIV and Hepatitis B during pregnancy. An informed consent was taken from the patient.

After the procurement of amniotic membrane, it was placed on a filter paper and preserved in 100% glycerin for 3 months. Intra-operatively amniotic membrane was placed over the cornea, with stromal side of the amniotic membrane facing towards the epithelium of the recipient. Six interrupted and circumferential 10-0 nylon sutures were placed in the kerato limbal junction. The remaining amniotic membrane flap was sutured in the conjunctiva with interrupted 8-0 vicryl sutures.



Figure 3: 1st postoperative photograph showing limbal allograft in superior and inferior aspect with overlying amniotic membrane.

Postoperatively the patient was managed with topical steroid and antibiotic combination eye drop in a tapering dose over 6 weeks every weekly, topical cyclosporine A-0.05% two times a day along with oral steroid 60mg tapering every week for 1 month. After 3 months of follow up, his visual acuity in right eye remained the same while the best corrected visual acuity in the left eye improved to 6/60. There was mild diffuse congestion in the left eye with no pain and photophobia [Figure 4].



1 month



2 months



3 months

Figure 4: 1, 2 and 3 months postoperative photograph showing gradual clarity of cornea

Discussion

The symptoms of limbal stem cell deficiency may include diminution of vision, photophobia, watering, blepharospasm, and recurrent episodes of pain (epithelial breakdown), as

well as a history of chronic inflammation with redness. Different modalities of surgical treatment have been reported in cases with limbal stem cell deficiency. Tseng et al demonstrated that in eyes with partial or focal limbal stem cell deficiency, amniotic membrane transplantation improves both the corneal surface and the vision. Allograft limbal stem cell transplantation, however, is needed for total limbal stem cell deficiency, and amniotic membrane transplantation in this situation helps to reconstruct the perilimbal stroma with reduced inflammation and vascularization. All these procedures remove the host's altered corneal epithelium and provide a new source of epithelium for the diseased ocular surface (Kenyon et al, 1989). There is generation of transient amplifying cells which migrate onto the denuded corneal surface of the host. The donor tissue can be obtained from fellow eye (autograft) and/or cadaveric whole globe or corneaoscleral rim of the eye bank cornea (allograft) (Dua et al, 1999). Gomes JA et al, 2004 also concluded amniotic membrane transplantation as an efficient adjunct for ocular surface reconstruction in chemical burns with partial limbal stem cell deficiency. When performed in conjunction with limbal stem cell transplantation, it is also effective in most cases of total limbal stem cell deficiency. A HLA-matched tissue is preferred for limbal stem cell transplantation. But in a region like ours where most of the patients are of lower socioeconomic condition, HLA-typing is not an easy and affordable investigation to carry on. Effective immunosuppression is considered essential for at least 12 months after surgery when non-HLA matched limbal allografts are used and sometimes permanent systemic immunosuppression may be needed (Dua et al, 2000). Here in this patient we have not used any immunosuppression as there is no sign of rejection till now. Recent developments have brought about sutureless application techniques to allow simpler and

earlier amniotic membrane transplantation than the conventional suturing to the ocular surface (Kheirkhah et al, 2008). Alternative sources of cells with stem-like properties have also been tested for their potential to replace corneal epithelium. Nakamura et al, 2004) transplanted cultured autologous mucosal epithelial cells to diseased corneal surfaces using AM as a substrate. With these upcoming trends today, here we have tried to manage a case of chemical injury with total limbal stem cell deficiency as per the availability of the resources with us.

Conclusion

Management of severe chemical injury with late presentation is a challenge. In cases of total limbal stem cell deficiencies limbal allograft with amniotic membrane transplantation can be an effective method of restoring vision and reducing symptoms rather than just an amniotic membrane transplantation.

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