Original Research Paper

Volume-7 | Issue-9 | September-2017 | ISSN - 2249-555X | IF : 4.894 | IC Value : 79.96

Ophthalmology

MANAGEMENT OF CORNEAL OPACITY FOLLOWING CHEMICAL BURNS

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ABSTRACT Chemical injuries of the eye produce extensive damage to the ocular surface epithelium, cornea, anterior segment and limbal stem cells resulting in permanent visual impairment and disfigurement. Various treatment modalities have been reported for the management of chemical burns. In the present case, an 18 year old female presented with corneal opacity of the right eye with limbal stem cell deficiency and corneal vascularization. She underwent amniotic membrane transplantation with autologous limbal stem cell transplantation followed by penetrating keratoplasty. 2 months post operative best corrected visual acuity was 6/36. Graft was clear and no complications were seen after keratoplasty.

KEYWORDS : .chemical injury, amniotic membrane transplantation, limbal stem cell transplantation, keratoplasty

Introduction:

Despite various medical and surgical treatments having been developed, management of severe chemical burns remains unsatisfactory.[1] The overall goal of treatment is restoration of the normal ocular surface anatomy. Amniotic membrane is the innermost layer of the placental membrane .It is a 0.02-0.5mm membrane which consists of three basic layers; epithelial monolayer, basement membrane, avascular stromal matrix.[2] The use of amniotic membrane in ocular surgery was first reported by de Rotth. Later, Kim and Tseng further developed this concept of amniotic membrane transplantation in ophthalmology.[3]

We report the outcome of combined amniotic membrane grafting with autologous limbal stem cell transplantation and penetrating keratoplasty in the treatment of corneal opacity following chemical burns in a young female.

Case Report:

An 18 year old female had severe chemical burns of her right eye 8 years back presented to us. On examination best corrected visual acuity in the right eye was counting fingers 2 metres and in the left eye was 6/6. Slit lamp examination of the right eye revealed vascularized corneal opacity with 360 degrees limbal stem cell deficiency and symblepharon. (Fig) Left eye was unremarkable. Intraocular pressure was normal.

She underwent a 2 staged procedure : contralateral limbal autograft /amniotic membrane transplantation followed by penetrating keratoplasty.

In the first sitting, amniotic membrane transplantation and transplantation of limbal stem cell graft was performed simultaneously in the right eye. Symblephara were released. Surface keratectomy was performed to remove the vascularized pannus. Limbal stem cell autograft from contralateral eye was performed simultaneously. 3 clock hours of limbal tissue and a moderate amount of conjunctiva was harvested (from 12 and 6 o' clock areas). At the time of harvesting the graft, dissection was performed into the peripheral cornea approximately 1mm beyond the peripheral vascular arcades. Graft was placed and sutured over the recipient bed. Dry, preserved amniotic membrane was then anchored to the cornea using multiple interrupted 10-0 non absorbable sutures. Post operatively a bandage contact lens was placed to protect the ocular surface.

The corneal surface showed a complete and stable epithelialisation within a few weeks. The initially semi-transparent amniotic membrane became more translucent and biomicroscopically invisible within two months of surgery. Regression of neovascularisation was noted.(Fig 2,3,4) Other eye did not show any signs of limbal stem cell deficiency.

6 months later she underwent penetrating keratoplasty for the right eye. 2 months post-operative best corrected visual acuity improved to 6/36. Graft was clear. Graft rejection and infection were not observed. (Fig 5,6)

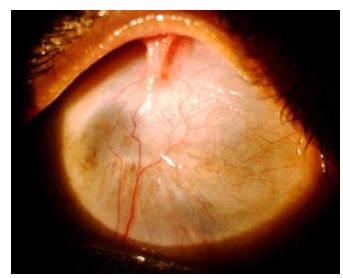

Fig 1. Pre-operative appearance showing vascularized cornea and symblepharon post chemical injury

Fig 2. Same patient 1 week after conjunctival limbal autograft and amniotic membrane transplantation

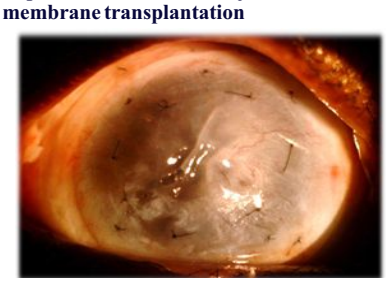

Fig 3: 1 month following AMT and limbal autograft

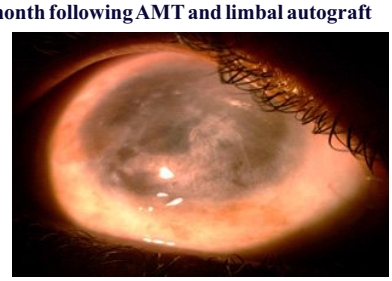

Fig 4: 3 months following AMT and conjunctival limbal autograft

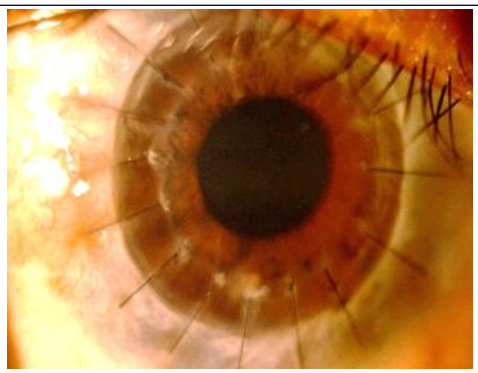

Fig 5: 1 month post penetrating keratoplasty

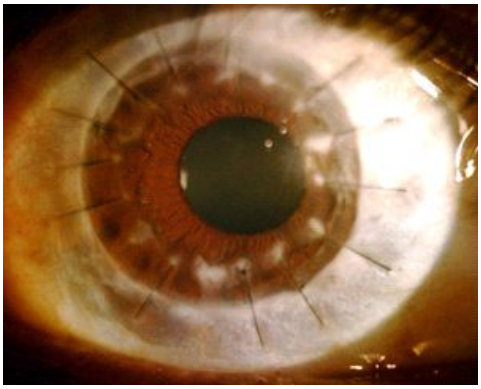

Fig 6: 6 months post penetrating keratoplasty

Discussion:

Chemical injuries to the eye represent between 11.5% to 22.1% of all ocular trauma.[4] Simple removal of fibrous tissue or conventional keratoplasty results in a high recurrence in cases with severe chemical burns.[5] In this case ocular surface was reconstructed successfully using the combined surgical procedure.

Limbal grafts act as a barrier to the conjunctival invasion of the cornea and also supply stem cells to the cornea. The transplanted amniotic membrane helps in promoting normal conjunctival epithelialization and preventing excessive fibrosis. [5] Amniotic membrane promotes corneal epithelialization and reduces vascularization, perilimbal inflammation and scarring.[6] Advantages of amniotic membrane transplantation in ocular surface reconstruction enhance the success of subsequent limbal stem cell transplant and/or penetrating keratoplasty. [7,8] Also Amniotic membrane has a strong anti-adhesion effect and its placement is suitable in cases with symblepharon which is a common sequelae of ocular surface burns.[1]

Shimazaki et al reported that Amniotic membrane transplantation along with limbal autograft transplantation was effective for the treatment of ocular surface burns.[5] Marchini et al in another study reported that autologous limbal stem cell grafts cultured on fibrin glue discs can regenerate corneal epithelium in patients with severe partial stem cell deficiency which further allows a successful cornea transplantation.[9] In a recent study by Mutuoglu et al amniotic membrane transplantation was performed in combination with conjunctival limbal autograft or keratolimbal autograft in grade III-IV chemical burns prior to penetrating keratoplasty with an average interval of 9.3+/- 27.4 months between the procedures. The two procedures were done at different times in order to place the corneal graft on a relatively non inflamed surface and increase the likelihood of success of keratoplasty.[10]

In conclusion, penetrating keratoplasty combined with amniotic membrane grafting and limbal stem cell transplantation is an effective treatment for severe corneal burns at a late stage.

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