Two separate methods of stem cell transplantation in both eyes of a single patient presented with bilateral stem cell deficiency following exposure to *Euphorbia* latex

Jayanta Dutta · Somnath Mukhopadhyay ·
Kapil. D. Lahiri · Himadri Datta

Received: 21 April 2013 / Accepted: 3 June 2013 / Published online: 12 June 2013
© Springer Science+Business Media New York 2013

Introduction

Limbus is the most dynamic area of ocular surface which is the “home” of stem cells especially in the region of palisades of Vogt. Stem cell deficiency is manifested by ingrowth of vessels into the cornea with resultant corneal haze that results in decreased vision [1]. Stem cell deficiencies are treated by transplantation of stem cells. The methods are varied and includes transplantation from cadaveric tissue, from living related donor (in bilateral cases) and from fellow eye (in unilateral cases). In vitro cultured stem cells in human amniotic membrane (HAM) base may also be utilised.

We report here the successful outcome of stem cell implantation in a patient with end stage limbal stem cell deficiency following exposure to the latex of *Euphorbia*. The Euphorbiaceae family includes trees, succulents and herbaceous plants. Different species of *Euphorbia* grow all over the world. The milky latex or sap is toxic and may cause intense inflammation of the skin and the eye [2, 3]. Ocular toxic reaction varies

from mild conjunctivitis to keratouveitis to severe corneal vascularisation in neglected cases. Ocular toxicity can be caused by three different species of *Euphorbia*, namely, *Euphorbia trigona* (African milk tree), *Euphorbia neriifolia* (Indian Spurge tree) and *Euphorbia milii* (crown-of-thorns houseplant). In this present case, the patient (female, aged 45 years) with bilateral stem cell deficiency was treated by transplantation of stem cell from living related donor (mother) in the left eye and in vitro cultured stem cell on HAM base in the right eye.

A normotensive, non-diabetic, patient (female, aged 45-years) presented to our clinic with loss of vision in both eyes. She gave a history of exposure to *Euphorbia* latex 5 months back in her both eyes. She neglected the condition and there was gradual decrease in his vision following the brief acute episode. Visual acuity in RE was 1/60, in LE it was finger counting at 2 m. There was no improvement in vision with refractive correction. Schirmer test values in both eyes measured 15 mm. Corneal sensation in both eyes were normal. Intraocular pressure in BE were 18 mmHg and USG (A+B) scans in both eyes were normal. Anterior segment of both eyes revealed 360° limbal vascularisation with diffuse stromal haze up to the extent that anterior chamber details including the pupil is barely visible (Fig. 1).

A decision for transplantation of stem cells was made. She was put on systemic steroids (1 mg/kg/day) 3 days prior to admission. From the mother, two separate conjunctivolimbal lenticules were prepared [4×2 mm each], one from each eye to reduce chances of development of iatrogenic stem cell loss.

The recipient bed in LE was prepared by marking two separate areas: one centred around 6 o'clock hours and the other around 12 o'clock region of the limbus. Peritomy was done and bleeding controlled by cauterisation. The donor lenticules were sutured to the recipient bed with interrupted 10-0 monofilament nylon sutures.

J. Dutta (✉)

Department of Ophthalmology, Institute of Post Graduate Medical Education And Research (IPGME&R), 244 A.J.C Bose Road, Kolkata 700 020, West Bengal, India
e-mail: jayanta.mickey@gmail.com

S. Mukhopadhyay

NRS Medical College and Hospital, 138 Acharya Jagadish Chandra Bose Road, Kolkata 700014, West Bengal, India

K. D. Lahiri

Department of Biochemistry, RG Kar Medical College, 1, Kshudiram Bose Sarani, Kolkata 700004, West Bengal, India

H. Datta

Regional Institute of Ophthalmology, Medical College and Hospital, Kolkata, West Bengal, India

Fig. 1 Right eye showing limbal vascularisation with diffuse stromal haze up to the extent that anterior chamber details including the pupil is barely visible

In the post-operative period, the patient was put on systemic steroids (1 mg/kg/day) in a tapering dose, topical steroid (pred acetate 1 %), topical antibiotic (topical moxifloxacin) and artificial tears (carboxymethyl cellulose). Both topical and systemic steroids were tapered slowly over a period of 6 weeks and topical antibiotics were withdrawn after the first 2 weeks. The patient was advised weekly visit at the cornea clinic.

Four months after the first operation, her RE was operated. Recipient bed was prepared as described before and in vitro cultured stem cells on HAM base were sutured at around 360° of limbus with interrupted 10-0 monofilament nylon sutures. The whole of cornea including transplanted discs were covered by preserved HAM and sutured to adjacent conjunctiva with interrupted 10-0 monofilament nylon. Patient was placed on same post-operative regimen as before. The patient also underwent cataract surgery in both eyes 5 months after her last operation in RE.

Results

In the first week, the vision in both eye remained the same as the preoperative visual acuity; graft was in place, nicely covered by amniotic membrane. From the fourth week onward, the amniotic membrane dissolved, corneal vascularisation and stromal haze gradually decreased and BCVA was 3/60, PR accurate (Fig. 2). Till the last visit (which is 1 year after the operation), her BCVA in BE was 6/9 with disappearance of corneal vascularisation and minimal stromal haze with restoration of stable ocular surface (Fig. 3).

Fig. 2 Amniotic membrane dissolved, corneal vascularisation and stromal haze gradually decreased in right eye at 4 weeks post-operative period

Discussion

Accidental ocular exposure to the milky sap of *Euphorbia* species is a serious condition. The initial symptoms in all cases are severe burning sensation with blurring of vision. Clinical findings vary from keratoconjunctivitis, mild to severe corneal oedema, epithelial defects, anterior uveitis and secondary elevated intraocular pressure and in rare cases stem cell deficiency. Stem cells from living related donor (in this case patient's mother) is effective in restoring vision in this patient [4–7]. The transplantation of stem cell from limbal region has helped in restoring normal vision to many patients suffering from unilateral or bilateral ocular surface disorders [8, 9]. Success or failure of limbal transplantation may be determined by visual acuity, ocular surface stability, recurrence of conjunctivalisation or symblepharon, complica-

Fig. 3 Disappearance of corneal vascularisation and minimal stromal haze with restoration of stable ocular surface in right eye

tions like limbal allograft rejection that may result in stem cell death and duration of follow-up. One may also utilise cultured stem cells on human amniotic membrane base for restoration of stable ocular surface. Whether the later procedure is as efficacious as the former one requires further investigation with a larger group of patients but it is surely an effective alternative when related donor tissue is unavailable.

References

1. Lajtha LG. Stem cell concepts. *Differentiation*. 1979;14(1–2):23–34.
2. Sofat BK, Sood GC, Chandel RD, Mehrotra SK. *Euphorbia royleana* latex keratitis. *Am J Ophthalmol*. 1972;74:634–7.
3. Grant WM, Schuman JS. *Toxicology of the eye*. 4th ed. Springfield: Charles C Thomas; 1993. p. 680–2.
4. Kinoshita S, Friend J, Thoft RA. Biphasic cell proliferation in transdifferentiation of conjunctival to corneal epithelium in rabbits. *Invest Ophthalmol Vis Sci*. 1983;24(8):1008–14.
5. Potten CS, Morris RJ. Epithelial stem cells in vivo. *J Cell Sci Suppl*. 1988;10:45–62.
6. Pfister RR. Corneal stem cell disease: concepts, categorization, and treatment by auto- and homotransplantation of limbal stem cells. *CLAO J*. 1994;20(1):64–72.
7. Leblond CP. The life history of cells in renewing systems. *Am J Anat*. 1981;160(2):114–58.
8. Ebato B, Friend J, Thoft RA. Comparison of limbal and peripheral human corneal epithelium in tissue culture. *Invest Ophthalmol Vis Sci*. 1988;29(10):1533–7.
9. Jenkins C, Tuft S, Liu C, Buckley R. Limbal transplantation in the management of chronic contact-lens-associated epitheliopathy. *Eye (Lond)*. 1993;7(Pt 5):629–33.