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A peculiar case of corneal autograft in a patient with bilateral advanced glaucoma

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Abstract
The technique of autograft employs the use of a clear corneal graft from an otherwise blind eye that is transplanted to the fellow eye, which has a visual potential in the same patient. A patient with advanced glaucoma in both eyes presented to us with pseudophakic bullous keratopathy with Ahmed glaucoma valve in the right eye, and cataract and patent peripheral iridotomy with no perception of light in the left eye. The autograft and allograft corneas for bilateral penetrating keratoplasty (PK) were obtained from the contralateral eye and a cadaver eye, respectively. Central corneal button was used for PK. One year after the surgery, the graft host junction was well apposed with no vascularization, corneal surface was clear, sutures were intact, and best corrected visual acuity improved in right eye to 1 logMAR. Bilateral simultaneous PK with autograft in one eye and allograft in the other was done to decrease the chances of rejection.

Keywords: *autograft, keratoplasty*

Introduction

The technique of autograft employs the use of a clear corneal graft from an otherwise blind eye that is transplanted to the fellow eye, which has a visual potential in the same patient. The common indications for the procedure of autografts are aphakic bullous keratopathy, pseudophakic bullous keratopathy (PBK), and healed herpetic keratitis.[1,2] The donor eye must have a clear cornea and must be blind, possibly due to posterior segment pathology, which in this case is advanced glaucoma. A homologous donor transplantation in the blind eye is done in order to provide cosmesis. The main advantage of autograft is that there is no risk of immune graft rejection.

In this case, the patient's left eye was blind with no perception of light, while the right eye had PBK. Simultaneous bilateral penetrating keratoplasty (PK) was planned for her with the right eye cornea receiving an autograft and the left eye cornea receiving an allograft.

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Case report

A 75-year-old female came to our hospital with advanced glaucoma in both eyes and on antiglaucoma medication, Misopt (dorzolamide 2%, timolol 0.5%) (Microlabs, India) eye drops two times a day since four years. She gave a history of cataract surgery and glaucoma surgery five years and three years back, respectively. On ophthalmic examination, best corrected visual acuity (BCVA) in the right eye was 1.7 logMAR, while the left eye had no perception of light. On slit-lamp examination, the right eye was status post Ahmed glaucoma valve implant with PBK, while the left eye had cataract with a clear cornea. Intraocular pressure (IOP) in the right eye was 16 mmHg and 14 mmHg in the left eye on applanation tonometry. Posterior segment examination of the right eye was not possible due to dense corneal oedema, while the left eye fundus was hazy due to dense cataract. B-scan ultrasonography revealed posterior vitreous detachment in both eyes and advanced optic nerve head cupping in the left eye. Specular microscopy of the left eye revealed a cell count of 3,029 cells/mm^2, coefficient of variance of 38, and central corneal thickness of 535 µ. A healthy donor cornea with specular count of 3,100 cells/mm^2 was chosen for the left eye. Preoperatively, anaesthetic clearance was obtained and informed consent was taken from the patient, and all surgical risks were explained to the patient, including graft rejection. Patient was started on intravenous mannitol 20 g/100 ml half an hour before surgery. Simultaneous bilateral PK was performed, with the right eye cornea trephined and transplanted with the blind eye (left eye) cornea, while the latter was transplanted with donor tissue. Viscoat (sodium chondroitin sulphate and sodium hyaluronate; Alcon, Fort Worth, TX) was injected into the anterior chamber, after which trephination of the left cornea was done. Donor corneas were oversized by 0.5 mm with respect to the recipient. Graft host junction was well apposed with interrupted 10-0 nylon suture bandaged after placing the contact lens. Postoperative regimen given was topical steroid prednisolone acetate (Alcon), Vigamox (moxifloxacin 0.5%; Alcon) and Homide (homatropine 1%; Warren, India) in both eyes. Patient was advised to continue antiglaucoma medication (Misopt eye drops) in both eyes until further instruction. Follow-up examinations were performed on day 1, 1 week, 1 month, 3 months, 6 months, 9 months, and 12 months. IOP measurement using the Tono-Pen was performed during each visit. No intraoperative complications occurred. Postoperatively, the graft host junction was well opposed with no vascularization and sutures were intact in both eyes (Figs. 1 and 2). There was no sign of infection, graft failure, or slippage of tissue. The BCVA improved to 1 logMAR by 1 week and N10 for near visual acuity. IOP remained normal at 16 mmHg. Topical steroids were gradually tapered in the right eye to only twice a day by the end of the third month, while steroids were maintained at four times a day at the end of the third month in the left eye. Homide was stopped after two weeks. BCVA was

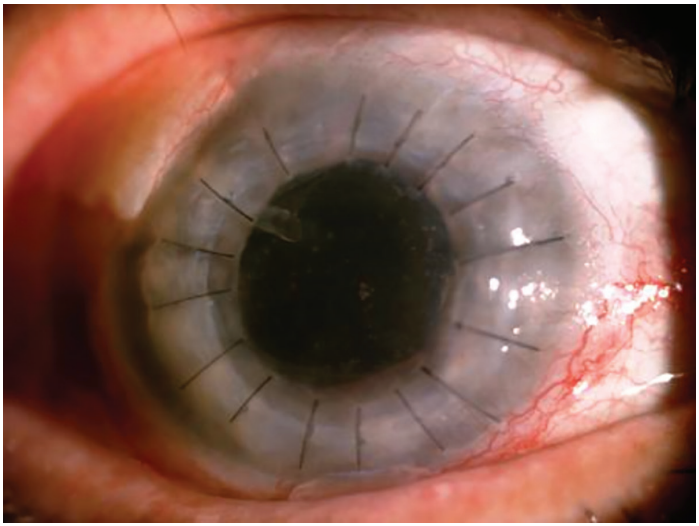

Fig. 1. Autograft with clear cornea with tube *in situ*.

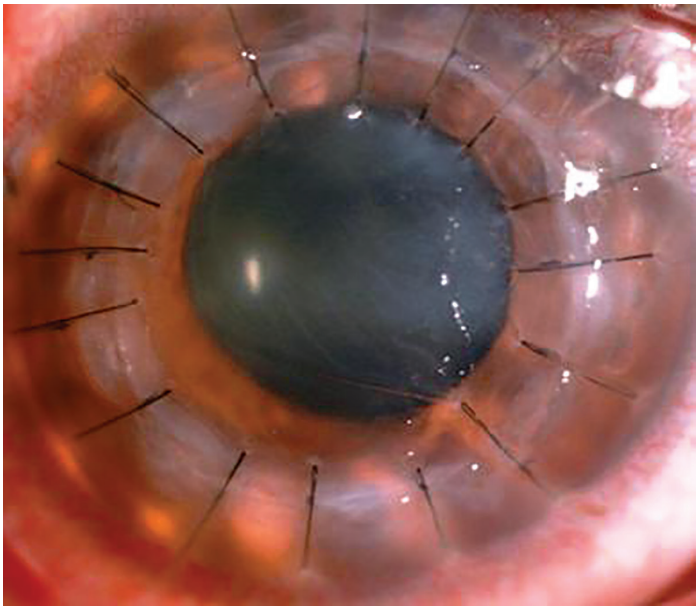

Fig. 2. The other eye with clear graft.

maintained at 1 logMAR with clear graft. In the left eye, the graft remained clear at the end of one year after surgery. A dilated fundus examination in the right eye revealed optic disc cupping of 0.85:1. Patient is on constant follow-up with us.

Discussion

It has long been recognized that bilateral simultaneous PK significantly increases the risk of corneal graft rejection, and it can be due to the pre-existing corneal disease. With recent advances in surgical techniques like phacoemulsification, simultaneous bilateral cataract surgeries are commonly done worldwide. The use of topical anaesthesia and minimal tissue damage in these new techniques have aided in early visual recovery and reduced the incidence of postoperative infections and complications in patients undergoing simultaneous cataract surgeries. But simultaneous bilateral PK has not gained much acceptance due to increased risk of graft rejections and postoperative complications, leading to visual morbidity. Strict operation theatre asepsis and efficient sterilization techniques can aid in preventing these complications. As per our knowledge, there has not been any report on bilateral simultaneous PK in the Indian scenario, which makes our case unique: the blind eye (left eye) cornea was transplanted to the seeing eye (right eye) diagnosed with PBK, while the former received a donor cornea. This patient is a case of advanced glaucoma in both eyes with right-eye PBK, both of which are known risk factors for allograft failure.[2,3] Stewart *et al*. retrospectively analyzed transplants in eyes with and without glaucoma.[4] The three-year graft survival was 86% in eyes without pre-existing glaucoma and 72% in eyes with pre-existing glaucoma. The risk of failure was dependent on the indications of PK.[5] Patients undergoing PK for PBK or Fuchs' dystrophy with pre-existing glaucoma had significantly increased risks of graft failure (1.5 and 1.9 with topical and 2.0 and 3.1 with oral antiglaucoma medication, respectively) compared to those without pre-existing glaucoma. Graft failure after successful keratoplasty most often results from inflammatory reactions that represent immune-mediated corneal allograft rejection[6]; therefore, the use of autograft, would solve the problem of immunologically mediated damage in corneal transplantation, the procedure first being described by Plange in 1908. Since there has not been much evidence on autograft rejection in glaucomatous or PBK eyes, this procedure was innovative in its own kind with less chances of rejection; however, a larger sample size with a longer follow-up would substantiate the efficacy better.

Conclusion

This is a unique case of bilateral simultaneous PK with an autograft used from the fellow eye to prevent any chance of graft rejection and failure in the only seeing eye. Three months postoperative follow-up showed good surgical outcome and graft survival.

Acknowledgements

Written informed consent was obtained from the patient for publication of this case report and any accompanying images.

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