Fungal keratitis and endophthalmitis after implantation of type 1 keratoprosthesis

Chintan Malhotra, Arun Kumar Jain, Nikhil Aggarwal

Abstract:
A 70-year-old patient who underwent uneventful primary implantation of Auro K Pro (a Type I Boston Keratoprosthesis-based device), developed infiltrates in the deep stroma of the carrier corneal graft and exudates on the optic stem of the keratoprosthesis assembly, 6 weeks postoperatively, which subsequently progressed to endophthalmitis. Vitreous tap was positive for a panfungal polymerase chain reaction, although corneal scrapings for both Gram stain and KOH wet mount yielded negative results. Aggressive management with systemic, topical, intravitreal, and intrastromal antifungal agents resulted in an initial resolution, but residual inflammatory vitreous membranes persisted. The patient was then lost to follow-up and presented 3 months later with a total, inoperable retinal detachment. Fungal infections after keratoprosthesis implantation remain a significant concern and may be associated with poor outcomes in the developing countries due to interplay of environmental and socioeconomic factors. Management protocols may need to be modified in accordance with the prevailing conditions in these regions.

Keywords:
Endophthalmitis, fungal infections, keratitis, keratoprosthesis

Introduction

Keratoprosthesis implantation is performed for a variety of ocular surface disorders including multiple failed penetrating keratoplasties, severe corneal vascularization, chemical injuries with stem cell loss, and autoimmune cicatrizing disorders such as Steven Johnson syndrome.[1,2] The “Auro K Pro” (Aurolab, Aravind Eye Care System, Chennai) is a keratoprosthesis made in India and is based on the Boston Type 1 keratoprosthesis design.

Although outcomes of keratoprosthesis implantation have improved over the years, complications have not been completely eliminated and include retroprosthetic membranes, persistent epithelial defects, glaucoma, stromal necrosis, infectious keratitis, and endophthalmitis.[3,4] Fungal infections are being increasingly reported[5-6] and have been attributed partly to the prolonged use of broad-spectrum antibiotics and therapeutic contact lenses.[5] In this communication, we report the clinical course of fungal keratitis and endophthalmitis in a patient implanted with the Auro K Pro.

Case Report

A 70-year-old patient presented with corneal vascularization and limbal stem cell deficiency secondary to trachoma in the right eye (OD). He reported having undergone intracapsular cataract extraction 20 years ago OD. Visual acuity was the perception of light (PL+) with accurate projection of rays and intraocular pressure (IOP) was 16 mm of Hg. The left eye (OS) had no perception of light, an opaque, and heavily vascularized cornea and an IOP of 40 mm of Hg. Ultrasonography OD

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was unremarkable with an axial length of 23.5 mm and no shadow of the crystalline lens or acoustic reverberations from an IOL confirming the aphakic status. Advanced optic nerve head cupping was seen OS. The patient also had fingernail onychomycosis for which he had taken 6 months of antifungal therapy. After obtaining informed consent, primary implantation of an aphakic Auro K Pro (+61.5 dioptres) was done with an initial uncomplicated course [Figure 1a and b] on a postoperative regimen of topical vancomycin (5%), moxifloxacin (0.5%), prednisolone acetate (1%), and 1% carboxymethyl cellulose each instilled 6 times/day. The epithelial defect had healed by the 10th postoperative day and the best corrected visual acuity (BCVA) by the end of the 3rd week was 20/80.

At the 6 weeks' follow-up, BCVA had decreased to 20/200. Deep stromal infiltrates in the carrier graft [Figure 1c], and fluffy deposits on the back of the keratoprosthesis stem, along with a missing bandage contact lens and presence of an epithelial defect were noted [Figure 1d]. Considering a clinical diagnosis of fungal keratitis, topical steroids were stopped and topical (G. Amphotericin B 0.15% and G. Natamycin 5% 1 hourly) and systemic antifungals (oral Fluconazole 200 mg twice a day) were started. Three days later, BCVA had deteriorated to 20/400 and infiltrates in the corneal stroma and on the stem of the K Pro optic had increased [Figure 1e] along with development of vitritis [Figure 1f]. A presumptive diagnosis of fungal endophthalmitis was made, vitreous tap was taken and intravitreal amphotericin B (5 µg/0.1 ml), dexamethasone (400 µg/0.1 ml), and moxifloxacin (500 µg/0.1 ml) injected. The decision to inject intravitreal dexamethasone under cover of antifungal agent was taken based on a beneficial effect of intravitreal dexamethasone in promoting faster clearance of inflammation in fungal endophthalmitis reported previously.[7] The gram stain, KOH wet mount, and culture from the vitreous sample were negative. Polymerase chain reaction of the vitreous sample was strongly positive for a panfungal genome [Figure 1g, lane no 2, sample no 537].

Due to lack of significant resolution of the colonies at back of optic stem and increasing confluence of the corneal infiltrates [Figure 1h], amphotericin B 5 µg/0.1 ml was repeated intravitreally after 72 h and was also injected intrastromally into the carrier graft around the edge of the infiltrates [Figure 1h-dotted line] after corneal scrapings had been taken for Gram stain and KOH wet mount (both of which later returned negative results). Over the course of the next 2 weeks, the colonies at the back of the optic stem and the infiltrates in the corneal stroma of the carrier graft started resolving [Figure 1i and j]. BCVA improved to 20/200. Cryopreserved amniotic membrane was applied subsequently to deal with a persistent 360\(^\circ\) nonhealing epithelial defect [Figure 1k].
epithelial defect on the carrier graft [Figure 1k]. The patient remained stable for the next month with healing of the epithelial defect and resolution of the keratitis and endophthalmitis. Some inflammatory vitreous membranes persisted for which he was advised close follow-up. However, he missed a scheduled follow-up and 4 months later reported with decreased visual acuity when he was detected to have developed an inoperable closed funnel retinal detachment [Figure 1l].

Discussion

Barnes et al. reported fungal colonization of the ocular surface in K Pro eyes to be approximately 10%, with yeast (Candida parapsilosis) being the most common organism.[5] In their series, of the 5 eyes which developed fungal infections, 4 patients recovered vision better than or equal to their vision before the K Pro surgery. Chan and Holland in their series of 126 patients implanted with the Boston type 1 keratoprosthesis reported 5 cases of fungal keratitis of whom 2 patients retained their preinfection best vision while 2 patients recovered vision to within two lines of their preinfection best visual acuity.[6]

Experience from developing countries like India has however been less encouraging. Jain et al.[6] reported 2 cases of fungal keratitis and endophthalmitis where one eye was eviscerated and the other lost potential for useful vision. The case reported here also had a poor outcome in spite of aggressive management and initial resolution. Although we could not identify the causative fungus, the fluffy mulberry like colonies seen on the stem of the Auro K Pro appeared to resemble the clinical description of Candida deposits described by Barnes et al.,[3] on the soft contact lens covering the keratoprosthesis. C. parapsilosis in particular has been shown to have an increased propensity to adhere to prosthetic materials.[9] The presence of onychomycosis also may have been a predisposing factor as Candida and nondermatophytic molds are frequently the causative agents of fingernail infections in tropics and areas with a hot and humid climate.[10]

As previously reported by Jain et al.[6] an interplay of environmental (e.g., hot and humid climate) and socioeconomic factors (predominant involvement in agricultural activities, delay in seeking medical care) may be responsible for the poorer final outcomes in patients implanted with keratoprosthesis in developing countries. Management protocols may hence need to be defined separately for these areas. Primary implantation of a keratoprosthesis device perhaps needs to be avoided altogether. Topical povidone-iodine wash once a month,[11] and prophylaxis in the form of short bursts of antifungals for 1 week every month as a routine part of the postoperative management protocol, are areas which need to be evaluated more extensively.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

References

1. Ilhan-Sarac O, Akpek EK. Current concepts and techniques in keratoprosthesis. Curr Opin Ophthalmol 2005;16:246-50.
2. Yaghouti F, Nouri M, Abad JC, Power WJ, Doane MG, Dohlman CH, et al. Keratoprosthesis: Preoperative prognostic categories. Cornea 2001;20:19-23.
3. Aldave AJ, Kamal KM, Vo RC, Yu F. The Boston type 1 keratoprosthesis: Improving outcomes and expanding indications. Ophthalmology 2009;116:640-51.
4. Ciolino JB, Belin MW, Todani A, Al-Arfaj K, Rudinsky CJ; Boston Keratoprosthesis Type 1 Study Group. Retention of the Boston keratoprosthesis type 1: Multicenter study results. Ophthalmology 2013;120:1195-200.
5. Barnes SD, Dohlman CH, Durand ML. Fungal colonization and infection in Boston keratoprosthesis. Cornea 2007;26:9-15.
6. Jain V, Mhatre K, Shome D, Fineda R. Fungal keratitis with the Type 1 Boston keratoprosthesis: Early Indian experience. Cornea 2012;31:841-3.
7. Majji AB, Jalali S, Das T, Gopinathan U. Role of intravitreal dexamethasone in exogenous fungal endophthalmitis. Eye (Lond) 1999;13(Pt 5):660-5.
8. Chan CC, Holland EJ. Infectious keratitis after Boston Type 1 keratoprosthesis implantation. Cornea 2012;31:1128-34.
9. Panagoda GJ, Ellepola AN, Samararayake LP. Adhesion of Candida parapsilosis to epithelial and acrylic surfaces correlates with cell surface hydrophobicity. Mycoses 2001;44:29-35.
10. Kaur R, Kashyap B, Bhalla P. Onychomycosis – Epidemiology, diagnosis and management. Indian J Med Microbiol 2008;26:108-16.
11. Magalhães FP, do Nascimento HM, Ecker DJ, Sannes-Lowery KA, Sampath R, Rosenblatt MI, et al. Microbiota evaluation of patients with a Boston type I keratoprosthesis treated with topical 0.5% moxifloxacin and 5% povidone-iodine. Cornea 2013;32:407-11.