Fungal Keratitis After Nonpenetrating Glaucoma Surgery

Nevbahar Tamcelik, M.D., Akif Ozdamar, M.D., Melda Kizilkaya, M.D., Kazim Devranoglu, M.D., Can Ustundag, M.D., and Cuyan Demirkesen, M.D.

Purpose. The purpose was to report a case of fungal keratitis that occurred following viscocanalostomy. Methods. A 63-year-old man who underwent viscocanalostomy in his left eye presented with pain, redness, watering, and a decrease in visual acuity. Slit lamp examination showed teardrop-like stromal infiltration of the superior cornea. Corneal and conjunctival scrapings were obtained and a corneal biopsy was performed. Results. Microscopic examination of smears demonstrated no bacteria and fungi. Corneal biopsy revealed dichotomously branching, septate hyphae suggestive of Aspergillus species. Culture identified no microorganism. The patient responded to amphotericin B treatment and the corneal infiltration resolved, leaving a plaquelike corneal scar. Conclusion. Fungal keratitis may occur after viscocanalostomy, but prompt diagnosis and treatment can preserve the eye.

Key Words: Fungal keratitis—Nonpenetrating glaucoma surgery—Viscocanalostomy.

For several years, trabeculectomy has been a standard surgical procedure for management of glaucoma. Despite the high rates of successful diminishment of intraocular pressure, there are several postoperative complications, most notably hyphema, anterior chamber shallowing, overfiltration with hypotony, choroidal detachment, anterior chamber inflammation, and endophthalmitis.1–3 Viscocanalostomy is a new, nonpenetrating procedure for glaucoma that causes less anterior chamber hyphema, less anterior chamber inflammation, and no hypotony, choroidal detachment, or endophthalmitis.5

In this study we report a case in which a teardrop-shaped fungal keratitis occurred after viscocanalostomy.

CASE REPORT

A 63-year-old man underwent uneventful viscocanalostomy in the left eye. Preoperative visual acuity was 20/63 and intraocular pressure was 23 mm Hg with two medications in the eye. There was no history of ocular trauma, contact with soil, contact lens wear, or long-term medications, except topical timolol and dorzolamide. Viscocanalostomy was performed in the upper quadrant under local anesthesia.

Following the creation of a limbus-based conjunctival flap, a 5 × 5-mm parabolic cut was made with a diamond knife about 200 μm in thickness. The flap was dissected anteriorly in clear cornea. A 4 × 4-mm parabolic incision was made beneath the outer flap. With use of a beveled crescent knife, a precise dissection was advanced until Schlemm’s canal was reached. Following deroofing of the Schlemm’s canal, a paracentesis track was made in the temporal quadrant with a microvitrectorial (MVR) blade.

With a cannula (number 14940, Grieshaber, Switzerland), high-molecular-weight sodium hyaluronate (Healon GV; Pharmacia, Kalamazoo, MI) was injected into the Schlemm’s canal by cannulating the two ostia. Descemet’s window was created by pulling the inner scleral flap upward and depressing the floor of the canal with the tip of a sponge. Following excision of the inner scleral flap, the outer scleral flap was secured with five 10-0 nylon sutures, and high-molecular-weight sodium hyaluronate was injected under the flap. The conjunctiva was closed with interrupted 7-0 polyglactin suture. Topical tobramycin and prednisolone (four times daily) were prescribed following the surgical procedure.

Seven days after the procedure, the patient reported pain, redness, watering, and a decrease in visual acuity. When the left eye was examined, visual acuity was counting fingers and the conjunctiva was diffusely injected in the upper quadrant. Slit lamp examination showed teardrop-like stromal infiltration in the superior half of the cornea and keratic precipitates in the central cornea (Fig. 1). There was an infiltration line between the stromal lesion and the viscocanalostomy area.

Fluorescein staining of the cornea showed only a diffuse punctuate pattern, and there was no fluorescein staining over the stromal infiltration area. Anterior chamber examination revealed minimal cells, and there was a posterior synechia at the 7 o’clock position. No vitreous cells or vitreous opacity was noted. Intraocular pressure was measured as 30 mm Hg with noncontact tonometry.

Corneal and conjunctival scrapings were obtained from the ocular surface with a spatula, and a corneal biopsy specimen was obtained from the leading edge of the lesion with a metal blade. The incision was deepened with the metal blade, and the tissue, which was grasped with 0.12-mm forceps, was excised with small scissors. The scrapings were subjected to microscopic examination and were inoculated on blood agar and Sabaroud agar.
The patient began treatment with a regimen of topical cefazolin (50 mg/mL hourly), vancomycin hydrochloride (25 mg/mL hourly), and tobramycin sulfate (14 mg/mL hourly). In addition, oral acetazolamide was added to the regimen at a dosage of 250 mg four times daily.

Microscopic examination of smears with gram staining and potassium hydrochloride (10%) revealed no bacteria or fungi. The corneal biopsy specimen was a 1×0.5-mm piece of firm tissue.

Histopathologic examination of a specimen that was stained with periodic acid-Schiff (PAS) showed dichotomously branching, septate hyphae suggestive of *Aspergillus* species (Fig. 2). The patient started treatment with an hourly application of topical amphotericin B (2 mg/mL) and cyclopentolate (four times daily). The topical steroid was withdrawn.

All cultures were negative. After hourly treatment with topical amphotericin B, the subjective complaints decreased. By day 7 of treatment, a decrease in density of the stromal infiltration occurred at the peripheral area of the lesion. Anterior chamber examination revealed minimal cells, and the posterior synechia was still present. The size of the corneal epithelial defect caused by the biopsy had decreased.

Three weeks after topical amphotericin B treatment, the ciliary injection disappeared. The corneal epithelium was intact over the stromal lesion, and the stromal infiltration had resolved. There was a white, opaque, vascularized, plaque-like midstromal corneal scar (Fig. 3). The scar tissue extended from near the limbus to the paracentral cornea. Anterior chamber examination revealed no KP or inflammatory cells and no posterior synechia. Visual acuity was measured as 20/200. Intraocular pressure was 16 mm Hg with one β-blocker (betaxolol).

**DISCUSSION**

Viscocanalostomy is a new, nonpenetrating procedure for glaucoma that has many important advantages over standard trabeculectomy. The absence of anterior chamber penetration reduces the risk of infection, hypotony, and flat anterior chamber and cataract formation. Postoperative inflammation, as assessed by laser flare and cell measurement, is less than after trabeculectomy. To our knowledge there have been no other reports of the occurrence of fungal keratitis following viscocanalostomy. In the current report we have described an infectious corneal complication that occurred following viscocanalostomy.

Fungal keratitis following intraoperative inoculation of microorganisms is uncommon. Although the occurrence of fungal keratitis is uncommon, it is a potentially devastating condition and is difficult to treat successfully. One source of infection is contaminated surgical material, and other routes include contiguous spread from fungal scleritis.

The occurrence of fungal infection depends on the presence of viable microorganisms and the mechanism of corneal inoculation. Since fungi cannot penetrate the intact corneal epithelium and do not enter from limbal vessels, the main routes of inoculation are a mechanical injury, surgery, and a corneal epithelial defect. Organisms that infect preexisting epithelial defects are the indigenous microflora of the conjunctiva and adnexa, predominantly *Candida* species.

The absence of a corneal epithelial defect and the type of fungi present in our case suggest that inoculation of the microorganism occurred during the surgical procedure. In addition, the creation of
Descemet’s window during the viscocanalostomy might have caused the inoculation of fungus into deeper corneal structures.

Although definitive identification requires culture, histopathologic examination can be of value to confirm the presence of fungal elements and may be able to implicate a certain organism. Histopathologic examination of corneal biopsy material showed dichotomously branching, septate hyphae growing as mycelia, suggestive of *Aspergillus* species. The hyphae are broader than hyphae of *Candida* species and do not reach the width of *Zygomycetes*. However, the absence of growth in culture prevented identification of the genera and species of these filamentous fungi.

Following trabeculectomy surgery, the fluid in the subconjunctival space is continuous with the anterior chamber. The subconjunctival space may be considered an exteriorized portion of the anterior chamber. Therefore, inoculated microorganisms at the surgical site have a real potential to rapidly spread intraocularly.

The absence of intraocular involvement with the fungal infection in our case is an important point that must be emphasized. In viscocanalostomy, the trabeculo-Descemet’s membrane probably act as a barrier. Therefore, invasion of microorganisms in the internal eye structure might have been prevented by trabeculo-Descemet’s membrane in our case.

Our case highlights the occurrence of infectious keratitis due to fungi following nonpenetrating glaucoma surgery and the importance of prompt diagnosis and treatment to salvage the eye.

**REFERENCES**