References

1. Nazarali S, Lapere S, Somani R, Badilla J. A rare case of perfluoro-n-octane in the orbit following vitreoretinal surgery. *Can J Ophthalmol*. 2017;52:e113–5.
2. Figueroa MS, Casas DR. Inflammation induced by perfluorocarbon liquid: intra- and postoperative use. *Biomed Res Int*. 2014;2014:1–8.
3. Ahmad BU, Barakat MR, Feldman M, Singh RP. Bilateral subcutaneous emphysema from pressurized infusion during pars plana vitrectomy: a case report. *Retin Cases Brief Rep*. 2012;6:22–4.
4. Christoforidis JB, Caruso PA, Curtin HD, Fiore T, D'Amico DJ. CT characteristics of intraocular perfluoro-n-octane. *AJNR Am J Neuroradiol*. 2003;24:1769–71.
5. Lavezzo MM, Hokazono K, Zacharias LC, Ttakahashi WY. Perfluoro-n-octane in orbital cavity after posterior vitrectomy and suture of eye perforating injury: case report [in Portuguese]. *Arq Bras Oftalmol*. 2011;74:296–9.
6. Damasceno EF, Damasceno N, Horowitz S, Rodrigues MM. Emphysema following vitrectomy with fluid-gas exchange: Description of a rare complication. *Clin Ophthalmol*. 2014;8:401–3.
7. Abboud EB, Al-Falah M. Nine years of retained perfluoro-n-octane in the anterior chamber after retinal detachment repair with no signs of ocular toxicity. *Middle East Afr J Ophthalmol*. 2014;21:279–82.
8. Alharbi SS, Asiri MS. Reversible corneal toxicity of retained intracameral perfluoro-n-octane. *Middle East Afr J Ophthalmol*. 2016;23:277–9.

Can J Ophthalmol 2019;54:e87–e90

https://doi.org/10.1016/j.jcjo.2018.06.011

Rhodotorula endophthalmitis associated with Baerveldt shunt implantation

Endophthalmitis is an uncommon complication of glaucoma drainage device surgery.[1] Most cases are secondary to Gram-positive bacteria: *Staphylococcus*, *Streptococcus*, and *Haemophilis*.[2] Cases caused by fungal pathogens are very rare. *Rhodotorula* is a common environmental yeast that has recently been recognized as a human pathogen. Infections are most commonly linked to frequent intensive care unit procedures such as central venous catheters.[3] There is a paucity of literature describing *Rhodotorula* infections of the eye. To our knowledge, this is the first presented case of *Rhodotorula* endophthalmitis following glaucoma drainage device surgery.

An 88-year-old pseudophakic female presented with a painless decrease in right eye visual acuity. The patient's ocular history was significant for primary open-angle glaucoma and bilateral Baerveldt shunt placement (right eye 2009, left eye 2012). Visual acuity was 6/30 in the right eye and 6/15 in the left eye. Intraocular pressures via tonometry were 8 and 15 mm Hg in the right and left eye, respectively. Fundus examination was unremarkable bilaterally. In the right eye, a well-positioned superotemporal Baerveldt shunt was identified; however, the tube was found to have eroded through a scleral graft and there was an overlying conjunctival defect. Mild inflammation was noted on examination by the glaucoma specialist in the right eye. Subsequently, the patient underwent an uncomplicated revision with donor corneal patch graft and conjunctival autograft.

On postoperative day 1, visual acuity was 6/120; slit-lamp examination revealed 4+ cells and a 1 mm hypopyon. A plaque was noted on the anterior surface of the posterior chamber intraocular lens. A fibrinous-appearing extension from the plaque was observed to project into the tube shunt opening (Fig. 1). Posterior pole examination was limited by vitreous haze. Vitreous and anterior chamber aspirations were performed, and empiric ceftazidime 2 mg/0.1 mL and vancomycin 1 mg/0.1 mL were injected intravitreally. Gram stain of the aqueous fluid revealed numerous neutrophils with no bacteria. Aqueous fluid cultures grew *Rhodotorula* and *Cryptococcus laurentii* colonies after 20 days. Vitreous specimens had no growth of bacteria or fungi. Accordingly, the patient received intracameral voriconazole 100 μg/0.1 mL and amphotericin B 10 μg/0.1 mL. Oral voriconazole 400 mg daily was initiated.

The patient was seen in follow-up 1 week later; at that time, visual acuity was 6/24. Anterior chamber examination revealed 1/2+ cells and mild flare. The plaque had decreased in size from initial presentation. Fundus examination revealed an absence of vitritis. The patient has since been followed by their local ophthalmologist and has remained stable. The glaucoma drainage device was not removed secondary to patient stability. The patient's overall frailty and multiple comorbidities was also taken into account.

Rhodotorula is an environmental yeast that is known to infect humans. The majority of known *Rhodotorula* cases are reported in immunocompromised patients.[3] The incidence of fungemia caused by *Rhodotorula* is between 0.5% and 2.3% in the United States and Europe.[3] *Rhodotorula* is a very rare cause of ophthalmologic infection. From our review of the literature, there are 12 cases of this fungus isolated from ocular structures. Four of these case reports were episodes of endophthalmitis.[3] Of these, one case was an exogenous endophthalmitis following cataract surgery.[4] Endophthalmitis can be divided into endogenous and exogenous subtypes. Endogenous endophthalmitis results from hematogenous spread of infection, whereas exogenous endophthalmitis results from direct inoculation of an organism. Direct inoculation can occur secondary to penetrating ocular trauma, intraocular extension of ocular surface infections, and postoperatively. Exogenous endophthalmitis is more common, making up approximately 85%–98% of all cases. Exogenous endophthalmitis is most commonly seen after cataract surgery, with incidence ranging from 0.02% to 0.30% of cases. In our case the *Rhodotorula* infection is possibly an acute exacerbation of a more chronic process. Typically fungal endophthalmitis presents later in the postoperative period than postoperative day 1. In the case of exogenous *Rhodotorula* in the literature, symptoms began approximately 2 months after surgery.[4] There are no other cases in the literature to compare the infectious timeline of *Rhodotorula* postsurgical intervention.

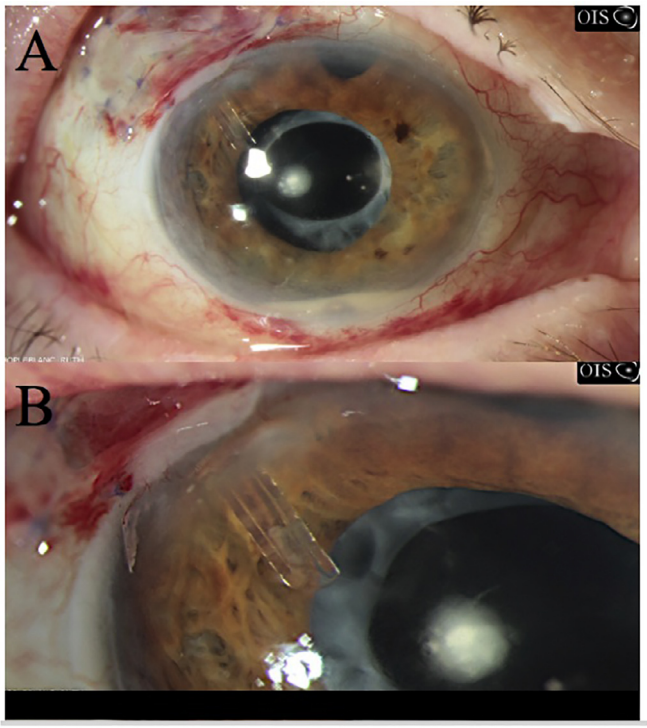

Fig. 1—(A) Anterior segment photograph of *Rhodotorula* endophthalmitis. Circular posterior chamber intraocular lens (PCIOL) plaque is noted as well as 0.8 mm hypopyon. (B) Anterior segment photograph illustrating fibrin extension of PCIOL plaque feeding into tube shunt.

Endophthalmitis following glaucoma drainage device surgery is a complication described in the literature. Incidence of endophthalmitis ranged between 1.10% and 2.77%, with the Baerveldt implant having an incidence of 1.10%.[1] Common infectious organisms include *Haemophilis*, *Streptococcus*, and *Pseudomonas* species. To our knowledge there are no known cases of *Rhodotorula* infection following glaucoma drainage device implantation.

Treatment of systemic *Rhodotorula* includes antifungal agents such as amphotericin B and azoles (fluconazole, voriconazole, itraconazole). *In vitro* susceptibilities have shown that amphotericin B had the lowest minimum inhibitory concentration (MIC).[5] Treatment of fungal endophthalmitis does not have a standardized protocol. Therapy often includes intravitreal injections of antifungal agents with systemic antifungal administration. Silva et al. investigated fungal susceptibilities in cases of exogenous fungal endophthalmitis.[6] In their case series, susceptibilities were highest to intravitreal voriconazole; unfortunately this study did not include any cases of *Rhodotorula* endophthalmitis.[6] Treatment regimens described in the literature include use of intravitreal amphotericin B and an intravitreal azole. Upon review of the 4 cases of *Rhodotorula* endophthalmitis described in the literature, the antifungal regimens included amphotericin B, ketoconazole, or a combination of the 2. Vitrectomy was performed in these cases as patients did not improve with antifungals alone. Unlike those cases, our patient did not require enucleation or vitrectomy and had improvement of vision with anterior chamber and vitreous tap and antifungal injection alone.

In conclusion, fungal endophthalmitis associated with glaucoma drainage procedure is exceedingly rare, with most infections caused by bacteria. In cases where bacterial cultures are negative, fungal pathogens should be suspected. *Rhodotorula* is an emerging fungal pathogen that affects the eye and should now be considered in postoperative endophthalmitis cases. Our patient received an anterior chamber (AC) aspiration along with intracameral and systemic antifungal agents and had improvement of vision.

Supplementary Materials

Supplementary material associated with this article can be found in the online version at doi:10.1016/j.jcjo.2018.06.017.

Amit Vikram Mishra Mark E. Seamone Amr Zaki Darrell Lewis Marcelo Nicolela R. Rishi Gupta
Dalhousie University, Halifax, N.S., Canada

Correspondence to:
Amit Vikram Mishra, MD; avmishra@gmail.com.

References

1. Ang GS, Varga Z, Shaarawy T. Postoperative infection in penetrating versus non-penetrating glaucoma surgery. *BJO*. 2010;94:1571–6.
2. Al-Torbak AA, Al-Shahwan S, Al-Jadaan I, et al. Endophthalmitis associated with the Ahmed glaucoma valve implant. *BJO*. 2005;89:454–8.
3. Wirth F, Goldani LZ. Epidemiology of rhodotorula: an emerging pathogen. *Interdiscip Perspect Infect Dis*. 2012;2012:465717.
4. Gregory JK, Haller JA. Chronic postoperative *Rhodotorula* endophthalmitis. *Arch Ophthalmol*. 1992;110:1686–7.
5. Tuon FF, Costa SF. *Rhodotorula* infection: a systematic review of 128 cases from literature. *Rev Iberoam Micol*. 2008;25:135–40.
6. Silva RA, Sridhar J, Miller D, et al. Exogenous fungal endophthalmitis: an analysis of isolates and susceptibilities to antifungal agents over a 20-year period (1990–2010). *Am J Opthahlmol*. 2015;159:257–64.

***Can J Ophthalmol* 2019;54:e90–e92**

https://doi.org/10.1016/j.jcjo.2018.06.017