Chronic fungal saccular endophthalmitis by *Alternaria alternata* following cataract surgery

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We describe the case of a 70-year-old woman who presented with an irregular postoperative course after apparently uneventful phacoemulsification with intraocular lens implantation in the left eye 1 year earlier. The inflammatory process started after a neodymium:YAG laser posterior capsulotomy was performed. Chronic saccular endophthalmitis was suspected, and the microbiological study of the aqueous and vitreous humor yielded *Alternaria alternata*. The treatment was vitrectomy, amphotericin, and voriconazole. Because of the treatment delay, there was a poor clinical response, resulting in phthisis bulbi.

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Post-cataract surgery endophthalmitis can be classified according to the time of onset of clinical signs: acute, within the first week; subacute, with symptoms in the first 4 weeks; chronic saccular, which can appear months or even years after surgery. Chronic saccular endophthalmitis is a rare complication after modern cataract surgery; fungal etiology is uncommon in western countries but has an incidence of up to 15% in tropical countries such as India. *Alternaria alternata* is a conidiophores filamentous fungus whose spores can be found suspended in the air, on the ground, on objects, and in water both outside and inside the home. As an allergen, it is responsible for respiratory or hypersensitivity reactions. It causes opportunistic infections in immunocompromised individuals.

*Alternaria alternata* ocular infection is extremely rare; the first of the few articles that refer to this endophthalmitis was published in 1991. The keratitis due to this microorganism is more frequent and is the first cause of this particular infection. Exogenous endophthalmitis by *A. alternata* may have a latent period of weeks to months before clinically detectable disease occurs. The infection can remain in the saccular space until an exogenous factor, such as a laser shot, disperses the fungus into the anterior chamber, pupillary space, or anterior vitreous.

The case we describe illustrates our experience in the management of this complicated endophthalmitis. The delay in diagnostic confirmation and initiation of specific treatment was instrumental in the poor outcome despite specific medical and surgical treatment.

**CASE REPORT**

A 78-year-old woman with panuveitis in the left eye was referred to our department in February 2010. Cataract surgery with hydrophobic acrylic intraocular lens (IOL) implantation had been performed under topical anesthesia in June 2009. Postoperatively, the course was irregular with progressive loss of visual acuity without pain and redness. The posterior capsule developed an early opacification, and neodymium:YAG laser capsulotomy was performed in October 2009, giving rise to a latent panuveitis unresponsive to 2 repeated injections of intravitreal antibiotics—cefazidine and vancomycin.

On arrival at our department, the patient's visual acuity was hand motion at 50 cm in the left eye. Biomicroscopy showed ciliary hyperemia, an anterior reaction with 10 cells per field, and intense vitritis preventing retinal observation (Figure 1). B-scan ultrasound showed vitreous bands originating from the optic disc. Surgery was performed and
included obtaining samples of aqueous and vitreous humor for cultures and polymerase chain reaction (PCR), anterior chamber cleanup, a vitrectomy with band release, and an intravitreal injection of 2 mg of cefazidime and 1 mg of vancomycin.

Standard media cultures were negative. The PCR was positive for *A. alternata*. An intravitreal injection of voriconazole (100 mg) was given, and oral voriconazole 200 mg every 12 hours was started. An additional intravitreal voriconazole injection (100 mg) was given a week later due to persistent vitritis. Little improvement was observed; the visual acuity was hand motion. Because of persistent vitritis and an anterior reaction with thick Tyndall 2 weeks later (Figure 2), another surgery was performed. Anterior chamber and vitreous samples for culture and PCR were obtained, the IOL and capsular bag were explanted and also sent for culture and PCR, a vitrectomy was performed during which white plaques on the entire retina (Figure 3) were seen, and liposomal amphotericin B (10 μg), vancomycin, and cefazidime were administered intravitreally. The culture identified *A. alternata* (Figure 4). Postoperatively, 2 additional intravitreal injections of amphotericin B were given. Intravenous liposomal amphotericin was started but suspended because of secondary renal failure. The eye was phthisical, and the visual acuity was light perception. There was no anterior or posterior vitreous reaction.

**DISCUSSION**

The most common cause of fungal endophthalmitis is keratitis, followed by intraocular surgery and penetrating ocular trauma. *Alternaria alternata* is a filamentous fungus not usually detected in chronic saccular endophthalmitis. Chronic saccular endophthalmitis is usually due to less virulent bacteria such as *Propionibacterium acnes* or *Corynebacterium* and fungi such as

![Figure 1. Slitlamp image of the anterior chamber reaction, 10 cells per field.](image1)

![Figure 2. Anterior chamber reaction. Thick Tyndall and previous second surgery (vitrectomy) can be observed.](image2)

![Figure 3. White plaques on the entire retina seen during the vitrectomy.](image3)

![Figure 4. Alternaria alternata filamentous fungus (microbiology).](image4)
Candida spp, Aspergillus, and Fusarium spp. Other less frequent seen bacteria are Mycobacterium chelonei, environmental or nontuberculous mycobacteria, and Nocardia spp.

The classic antifungal agent for the treatment of systemic and ocular fungal infections is intravenous amphotericin B, previously used as deoxycholate and more recently in liposomal form, which can also be administered intravitreally. Voriconazole is a more recently available antifungal drug, belonging to the group of triazoles with broad spectrum; it can be administered intravitreally. Voriconazole is increasingly used as a first-line antifungal drug, replacing the former due to its wide spectrum. Voriconazole works by inhibiting cytochrome P450-dependent fungal sterol 14-α-demethylase, an enzyme essential in the biosynthesis of ergosterol with a greater safety profile than any currently used antifungal agents.

Amphotericin is especially useful for yeasts, but voriconazole is increasingly used as a first-line antifungal for endophthalmitis, displacing the former due to its wide spectrum. Voriconazole works by inhibiting cytochrome P450-dependent fungal sterol 14-α-demethylase, an enzyme essential in the biosynthesis of ergosterol with a greater safety profile than any currently used antifungal agents.

Intravitreal antifungals have a relatively short half-life, and no consensus exists about a pattern of use by this route. Unlike with antibiotics, a large number of injections are usually required, which increases toxicity. In a recent series of exogenous fungal endophthalmitis, a final vision of 20/400 or better was achieved in 54% of eyes and 24% were enucleated.

Fungal endophthalmitis requires regular follow-ups. Aggressive surgery, IOL removal, and full vitrectomy should be performed when the infection is not responding well. A delay can lead to irreversible damage. Silicone oil has been used increasingly as an internal tamponade because no microorganisms appear able to penetrate and grow in this inert material. It is an alternative that can be used to prevent progression in cases with a poor prognosis.

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