Chronic endophthalmitis from *Aquamicrobium lusatiense*

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1. Introduction

Chronic postoperative endophthalmitis is a vision-threatening complication of ophthalmic surgery that can be caused by a range of organisms, from *Propionibacterium acnes*, to *Staphylococcus epidermidis*, to other atypical bacteria and select fungal species. These cases often pose a diagnostic challenge, typically presenting with smoldering inflammation, which can respond initially to corticosteroid therapy. Herein we describe the first case of *Aquamicrobium lusatiense* causing endophthalmitis, or indeed, disease in a human, in the English language literature.

2. Case report

A 71 year-old immunocompetent Caucasian woman underwent uncomplicated phacoemulsification surgery with an outside provider. Immediately following surgery, Snellen visual acuity was measured at 20/20. At the one-month post-operative visit, anterior chamber cell was noted, and she was treated with topical 0.1% preservative-free dexamethasone due to a self-reported allergy to 1% prednisolone acetate. After completing a taper, she presented with rebound inflammation and was treated with twice daily 0.05% difluprednate for three days before transitioning back to 0.1% dexamethasone, remaining on twice daily dosing for maintenance. At her six-month follow-up visit she underwent yttrium-aluminum-garnet (YAG) laser posterior capsulotomy without complication. Sixteen months after cataract surgery, she transferred care to a new provider who tapered her off dexamethasone drops. She returned one month later with acute-onset unilateral hypopyon uveitis with a visual acuity of 20/400 and was initiated on topical 0.05% difluprednate every 2 hours and referred for evaluation to the retina service at Vanderbilt Eye Institute.

Initial examination showed mild corneal edema with diffuse, pigmented keratic precipitates and 3+ anterior chamber cell in the right eye. The vitreous was clear and there was no macular edema on optical coherence tomography (OCT). Serologic testing for treponemal IgG, herpes simplex virus (HSV) type 1 and 2 IgM, quantiferon gold, and Lyme ELISA were negative. Chest radiography was normal. Due to the corneal edema and pigmented keratic precipitates, herpetic etiology remained high on the differential. Therefore, empiric oral valacyclovir was started and difluprednate slowly tapered. One month later she returned with 20/60 visual acuity. The anterior chamber was quiet, and she transitioned to 0.1% fluorometholone taper. She returned two months later with stable exam findings but reported that she had flared twice and resumed difluprednate after consultation with an outside provider. Oral prednisone and 15 mg weekly methotrexate were started. Her disease quieted and vision improved to 20/70, but she remained active, with 2+ anterior chamber and vitreous cell, and was started on adalimumab 40mg every other week.

Following initiation of adalimumab, her visual acuity deteriorated to count fingers. Slit lamp examination showed increase in keratic compromised, repeated her per oral therapy, and completed with three days of intravenous ceftriaxone. Serologic testing for typhoid, brucellosis, and hepatitis were negative. Following chronic low back pain with low-grade fever, her visual acuity improved to 20/70 at one week. She was referred for evaluation to the retina service at Vanderbilt Eye Institute.

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precipitates (Fig. 1A) with a hazy view of the anterior and posterior chambers. B-scan ultrasonography demonstrated hyperechoic vitreous opacities concerning for vitritis (Fig. 1B). Her inflammation continued to worsen despite immunosuppression, and a diagnostic vitrectomy was performed.

Intraoperatively, polymerase chain reaction (PCR) testing of aqueous for HSV 1 and 2, varicella zoster virus, and cytomegalovirus was negative. Vitreous biopsy and biopsy of the posterior capsule were sent for microbiology and the patient was treated with 1mg intravitreal vancomycin due to suspicion for *P. acnes* endophthalmitis. Cultures from vitreous and posterior capsule demonstrated light growth of a Gram-negative rod that was sent to the Tennessee state laboratory for identification. The state laboratory identified the organism as *A. lusatiense*.

Immune modulating therapy was discontinued, and the patient underwent repeat vitrectomy with explantation of the intraocular lens as well as intravitreal injections of 2mg ceftazidine and 160μg moxifloxacin to cover the Gram negative organism. Additionally, she was treated with six months of oral ciprofloxacin 500mg daily. She continued to improve; two months after completion of her course of ciprofloxacin, the eye remained quiet and a scleral fixated intraocular lens was placed. One year after diagnostic vitrectomy at her most recent follow-up, the keratic precipitates, anterior chamber cell, and vitreous cell had resolved (Fig. 2), and best-corrected Snellen visual acuity was measured at 20/30–2.

3. Discussion

*A. lusatiense* is an aerobic Gram-negative, catalase- and oxidase-positive rod. Formerly *Defluvibacter lusatiensis*, the species was first described in 1999 after isolation from waste water. The organism was transferred to the *Aquamicrobiium* genus in 2009 due to genetic similarity to *A. defluvii*. While *Aquamicrobiium* spp. are most commonly isolated from waste water, they have also been identified in contaminated soil and in tidal areas.

Based on literature review, this is the first case of *A. lusatiense* causing endophthalmitis as well as human disease. PubMed and Cochrane Library databases were searched on June 20, 2020 using the following terms: *Aquamicrobiium*, *Defluvibacter*, and *endophthalmitis*. Literature review did not reveal reports of infection caused by this species. However, Venkat et al. recently described a case of postoperative endophthalmitis secondary to another organism within the same genus, *A. terrae*, representing the only other human infection secondary to *Aquamicrobiium* spp. This case also presented as hypopyon uveitis with large, pigmented keratic precipitates.

There is no consensus for the management of chronic bacterial endophthalmitis. There are reports of successful treatment with nonsurgical therapy; however, in cases with persistent inflammation after intravitreal antibiotic injection, bacteria have been shown to remain on explanted lenses on electron microscopy, and intraocular lens explantation with removal of the entire capsular bag complex can be curative. Case series on patients with *P. acnes* endophthalmitis also support a role for intraocular lens explantation. Based on these reports and the severity of the infection in the present case, we elected for surgical removal of the intraocular lens implant and 6 months of antibiotic treatment with an excellent outcome.

4. Conclusion

To our knowledge, this is the first report of *A. lusatiense* causing endophthalmitis after cataract surgery. Our patient responded completely to broad-spectrum intravitreal antimicrobial therapy along with intraocular lens explantation and adjunct oral quinolones. Greater awareness of this previously unreported causative organism of endophthalmitis may assist in the diagnosis and management of future cases.

Patient consent statement

Consent has been obtained from the patient.

Funding

Supported in part by a VitreoRetinal Surgery Foundation Research Award and a Research to Prevent Blindness unrestricted grant to the Vanderbilt Eye Institute. The sponsor or funding organizations had no role in the design or conduct of this research.
Authorship

All authors attest that they met the current ICMJE criteria.

Declaration of competing interest

The authors declare that there are no conflicts of interest related to this manuscript.

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