A 68-year-old woman presented with a red and scratchy left eye 4 weeks after uneventful cataract surgery. On presentation, the corrected distance visual acuity (CDVA) was 20/25 in the affected eye; slitlamp examination revealed 2+ anterior chamber cells with keratic precipitates. No vitreous cells were noted. Topical prednisolone acetate was started. During the antiinflammatory therapy, a capsular plaque developed with persistent anterior chamber uveitis. An anterior chamber tap and intracameral injection of vancomycin were performed. The aqueous culture grew Corynebacterium species. Two additional anterior chamber washouts and intracameral injections of vancomycin were performed, which resulted in removal of the capsular plaque; however, the inflammation recurred. A pars plana vitrectomy with complete capsulectomy and removal of the posterior chamber intraocular lens (IOL) was eventually performed. A sulcus IOL was sutured secondarily, resulting in a CDVA of 20/30.

**CASE REPORT**

A 68-year-old woman with no prior medical or ocular history had uneventful cataract extraction by phacoemulsification with intraocular lens (IOL) placement in the left eye. A beveled incision was made with a 2.6 mm keratome. No intraoperative antibiotics were given. Four weeks after the surgery, the patient presented with a 3-day history of a red, scratchy left eye. She had completed the postoperative prednisolone acetate taper 5 days earlier. The CDVA was 20/25 in both eyes with round and reactive pupils. The right eye examination demonstrated pseudophakia but was otherwise normal. Slitlamp biomicroscopy of the left eye revealed 2+ conjunctival injection with a few keratic precipitates on the corneal endothelium and 2 to 3+ cells and flare in the anterior chamber. There was no wound leak, fibrin, hypopyon, or capsular plaque. Fundus examination was unremarkable, with no evidence of vitritis. Prednisolone acetate was restarted and resulted in improvement of the inflammation.

Three weeks later, the patient returned with worsening pain in the left eye while on prednisolone acetate. The CDVA was 20/30. A capsular plaque was noted in the superotemporal quadrant with persistent anterior chamber cells. No vitreous cells were present. An anterior chamber tap and washout were performed with intracameral injection of 0.2 mL of 1.0 mg/0.1 mL vancomycin.

Six days after the collection, the vitreous sample grew Corynebacterium species. The organism had intermediate susceptibility to ciprofloxacin but was susceptible to all other antibiotics including vancomycin. The capsular plaque was removed. Anterior chamber washout was repeated with an intracapsular injection of 0.2 mL of 1.0 mg/0.1 mL vancomycin.
vancomycin and of moxifloxacin 0.1%. Intravitreal injection of 0.1 mL of 1.0 mg/0.1 mL vancomycin was also performed. The postoperative course of prednisolone acetate taper was unremarkable. One month after the plaque removal, the CDVA was 20/25. The patient again presented with left eye irritation 3 days after completion of the prednisolone acetate taper. Rebound anterior chamber cells and flare were noted with no vitritis. A repeat anterior chamber tap and washout with injection of intracameral (0.2 mL) and intravitreal (0.1 mL) 1.0 mg/0.1 mL vancomycin were performed. The patient refused IOL removal.

Six months after the initial cataract surgery, the anterior inflammation with rare vitreous cells continued. A pars plana vitrectomy (PPV) with complete capsulectomy, removal of the posterior chamber IOL, and intravitreal vancomycin injection were performed. Secondarily, the IOL was sutured in the sulcus. The final CDVA was 20/30.

**DISCUSSION**

*Corynebacterium* is a genus of gram-positive pleomorphic rods comprising more than 46 species.² According to Murube,² it was first recognized in 1896 by Lehmann and Neumann. It shares many chemotaxonomic features with other gram-positive rods such as *Propionibacterium*. Both *Propionibacterium* and *Corynebacterium* species are catalase-positive non-spor-forming rods. These 2 species are distinguished by their oxygen tolerance. *Propionibacterium* is a facultative anaerobe; *Corynebacterium* is an aerobic organism.³ This distinguishing factor of *Corynebacterium* probably explains why the organism is rarely associated with intraocular infectious processes, although it is a common conjunctival flora, second only to coagulase-negative *Staphylococcus*.⁴

*Corynebacterium* is a rare causative agent of pseudophakic endophthalmitis.⁵ A retrospective study reported 1 of 19 delayed pseudophakic endophthalmitis cases caused by *Corynebacterium* species over a 10-year period.⁶ To our knowledge, only 5 cases of pseudophakic *Corynebacterium* endophthalmitis have been reported (Table 1).⁶–⁹

| Study*   | Study Design       | Organism                          | Cataract Surgery/ Complications | Onset of Symptoms | Time to Diagnostic Culture | Initial Visual Acuity | Clinical Features                      |
|----------|--------------------|-----------------------------------|---------------------------------|------------------|--------------------------|----------------------|---------------------------------------|
| Fox⁶     | One case in a case series | *Corynebacterium* species | ECCE with IOL implantation      | 6 wk             | 2 mo                     | LP                   | Hypopyon, white plaque on posterior capsule, dense vitritis |
| McManaway⁷| Case report         | Coryneform A-4                    | Uneventful ICCE with secondary IOL implantation 7 y later | 16 wk            | 10 d after secondary IOL implantation | HM                   | Vitritis                              |
| McManaway⁷| Case report         | Coryneform A-4                    | Un eventful ICCE with anterior chamber IOL | 18 wk            | 5-6 wk after IOL placement | HM                   | Anterior chamber cells and flare with vitritis |
| Ferrer⁸  | Case report         | *Corynebacterium macginleyi*      | ECCE with IOL implantation, complicated by RD 1 mo postop | 1.5 mo after cataract surgery | 4 mo                     | HM                   | Hypopyon, posterior synechiae, fibrin clot, no posterior view |
| Hollander⁹| Case report         | *Corynebacterium* species          | ECCE with IOL implantation      | 4 mo after cataract surgery or 3 d after Nd:YAG posterior capsulotomy | 7-8 mo after cataract surgery | HM                   | Granulomatous inflammation with anterior chamber fibrin |
| Current case | Case report         | *Corynebacterium*                 | Uneventful ECCE with IOL implantation | 6 wk             | 20/25                    | Anterior chamber cells, white capsular plaque |

ECCE = extracapsular cataract extraction; HM = hand motion; ICCE = intracapsular cataract extraction; IOL = intraocular lens; LP = light perception; RD = retinal detachment

*First author
The onset of the inflammatory symptoms in *Corynebacterium* pseudophakic endophthalmitis in the reported cases ranged from 10 days to 16 weeks after surgery. The time to diagnostic culture was further delayed from 6 to 28 weeks. The diagnosis is often complicated by other complications, such as retinal detachment (RD), partial response to antiinflammatory drugs, and the fastidious growth of this organism (Table 1).

Of the 5 reported cases of *Corynebacterium* pseudophakic endophthalmitis, 2 cases followed uneventful intracapsular cataract extraction. A case series of delayed-onset pseudophakic endophthalmitis reported 1 case of *Corynebacterium* pseudophakic endophthalmitis after extracapsular cataract extraction with IOL implantation. One case of uneventful phacoemulsification with IOL implantation was complicated by RD surgeries prior to the diagnosis of *Corynebacterium* pseudophakic endophthalmitis. In another case after uneventful phacoemulsification and IOL placement, RD developed 3 days after neodymium:YAG capsulotomy; *Corynebacterium* pseudophakic endophthalmitis was eventually diagnosed.

All the *Corynebacterium* cases reported pain and redness at the onset of symptoms, with delayed development of intense anterior chamber inflammation including hypopyon and fibrin. Two cases, including our case, demonstrated white capsular plaque similar to *Propionibacterium* endophthalmitis; *Corynebacterium* species are known to incite macrophage reaction, again similar to *Propionibacterium* endophthalmitis cases; however, only 1 *Corynebacterium* pseudophakic endophthalmitis case demonstrated granulomatous inflammation.

The choice of antibiotics for *Corynebacterium* endophthalmitis is not established. Penicillin and

### Table 2. Treatment and outcome in reported cases of pseudophakic *Corynebacterium* endophthalmitis.

| Study* | Initial Treatment | Follow-up Treatment | Final Visual Acuity |
|--------|------------------|---------------------|---------------------|
| Fox6,7 | Vitreous tap and intraocular cefazolin and gentamycin | PPV with central capsuleotomy and intracocular vancomycin | HM* |
| McManaway7,1 | Oral penicillin | (1) Subconjunctival betamethasone and oral prednisone with no improvement | 20/30 |
| McManaway7 | Subconjunctival dexamethasone injections | (2) PPV with intravitreal gentamycin and cefazolin, subconjunctival gentamycin, intravenous gentamycin and cefazolin for 10 d | 20/50 |
| Ferrer8,9 | Aqueous tap and intracameral vancomycin | (1) Daily subconjunctival dexamethasone injections for 7 d | NLP (phthisis bulbi) |
| Hollander8,1 | 60 mg oral prednisone started but with no improvement | PPV with IOL removal, total capsuleotomy, and intravitreal vancomycin and ceftazidime | 20/60 |
| Current case7 | Aqueous tap with intracameral vancomycin | (1) Removal of capsular plaque with intracameral injection of vancomycin and intravitreal injection of vancomycin | 20/30 |
| | | (2) Intracameral vancomycin and intravitreal antibiotics | |
| | | (3) PPV with complete capsuleotomy, removal of posterior chamber IOL, and intravitreal vancomycin | |
| | | (4) Sutured sulcus IOL | |

IOL = intraocular lens; NLP = no light perception; PPV = pars plana vitrectomy

*First author

†Cases initially treated with topical anti-inflammatory

‡Patient refused further intervention in the setting of worsening inflammation
macrolides provide sufficient antibiotic coverage for *Corynebacterium* species. However, their resistance to antibiotics has become a concern recently. Suto et al. reported that 13 of 76 eyes with *Corynebacterium* conjunctival flora preoperatively were resistant to levofloxacin and/or tobramycin. The species in our case had intermediate sensitivity to ciprofloxacin and was sensitive to all other antibiotics including gentamicin and vancomycin. To ensure adequate coverage, intracameral vancomycin is recommended when *Corynebacterium* is isolated. Although resistance is always a concern, broad-coverage intracameral prophylaxis with vancomycin is reasonable in preventing *Corynebacterium* endophthalmitis.

The ideal surgical management of *Corynebacterium* pseudophakic endophthalmitis or delayed-onset endophthalmitis in general is controversial. The recurrence rate is highest when the initial treatment is intracameral antibiotics alone and lowest when PPV is combined with total capsulotomy. The treatment of the reported cases of *Corynebacterium* pseudophakic endophthalmitis is given in Table 2. Our case had persistent and recurrent inflammations despite repeat intracameral, intracapsular, and intravitreal antibiotics. The complete resolution of inflammation was achieved when PPV and total capsulectomy were performed. The case shows that partial capsulectomy and intracameral antibiotics may not be adequate in treating *Corynebacterium* pseudophakic endophthalmitis despite its presumed low virulence.

In conclusion, organisms other than *P. acnes* should be in the differential diagnosis of delayed pseudophakic endophthalmitis. Although generally thought to be less virulent than *P. acnes* or *Staphylococcus epidermis* endophthalmitis, *Corynebacterium* endophthalmitis may require aggressive surgical intervention.

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