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CASE REPORT

Postoperative endophthalmitis and *Stenotrophomonas maltophilia*: A case series highlighting the risks of reused surgical equipment

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Abstract

Postoperative endophthalmitis is a serious complication with significant visual consequences. While common pathogens are usually involved, rare organisms such as *Stenotrophomonas maltophilia* can also cause this condition. Identifying and treating the source of infection is critical for improving outcomes. We report three cases of acute postoperative endophthalmitis occurring within the same week. All patients underwent pars plana vitrectomy (PPV) with vitreous sampling, followed by empiric treatment with systemic and topical moxifloxacin and systemic trimethoprim-sulfamethoxazole, adjusted according to culture sensitivities. Two patients responded well to PPV and medical therapy but a diabetic patient required intravitreal injections and intraocular lens explantation. The probable source of infection was reused phacoemulsification device cassette. This case series highlights the need for strict infection control practices and disposable devices to prevent postoperative infections caused by atypical pathogens such as *S. maltophilia*.

Keywords: Disposable surgical devices, Postoperative endophthalmitis, *Stenotrophomonas maltophilia*.

Although rare, acute postoperative endophthalmitis is a serious condition that significantly affects visual function.[1] *Stenotrophomonas maltophilia* is an aerobic, motile, nonfermented, Gram-negative bacillus. It is also a microorganism that can live in amoebae isolated from soil and water. Recently, it has attracted interest as a nosocomial pathogen due to its ability to colonize plastic, glass, and Teflon.[2,3]

We presented three patients referred to our clinic with a diagnosis of endophthalmitis following cataract surgery and we also discussed factors associated with potential infections and several applications in the operating room.

Case Report

Case 1 — A 56-year-old female patient was referred to our medical center with a pre-diagnosis of endophthalmitis

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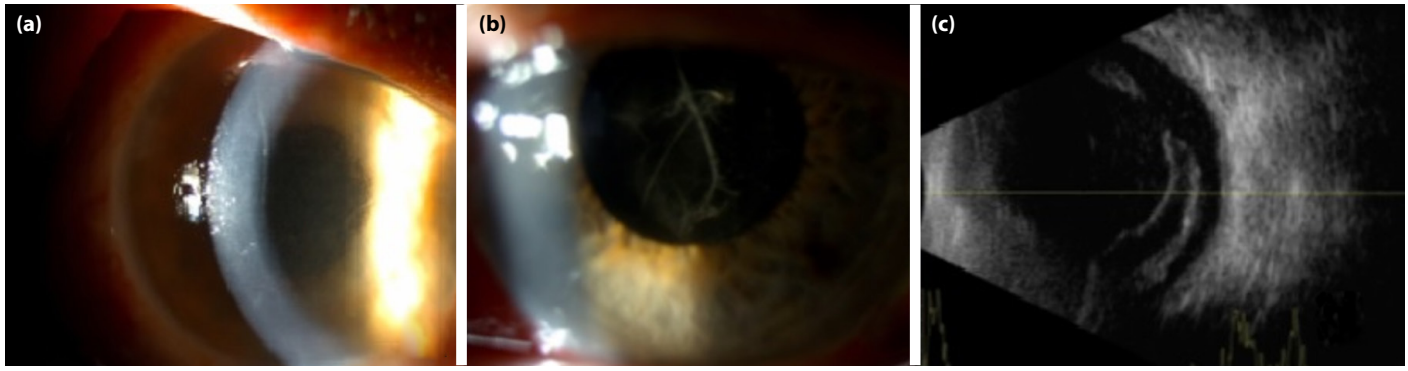

Fig. 1. **(a)** Case 1 was admitted with corneal edema and Descemet's membrane folds; **(b)** +4 cellular reaction and fibrin formations in the anterior chamber; **(c)** condensed view in the vitreous on ocular ultrasound.

from a clinic where she had undergone left eye cataract surgery 3 weeks previously. On admission, her best-corrected visual acuity (BCVA) was 20/25 in her right eye, but her left eye was at a level where hand movements could be detected only. IOP was measured with an air tonometer of 24 mmHg in the left eye. The patient had no known medical conditions. On examination of the anterior segments, while the right eye appeared normal, the left eye had corneal edema, ciliary hyperemia (Fig. 1a), +4 cell reaction, and fibrin formation in the anterior chamber (Fig. 1b). Ocular ultrasonography showed a hyperechogenic image consistent with condensed vitreous (Fig. 1c). Based on these findings, a diagnosis of acute postoperative endophthalmitis was made, and a pars plana vitrectomy (PPV) with vitreous sampling was performed on the same day. Postoperatively, vancomycin, ceftazidime, and amphotericin B were administered intravitreally and moxifloxacin was administered into the anterior chamber. For daily treatment following surgery, moxifloxacin topically and intravenously was initiated with topical vancomycin and ceftazidime. Growth of *S. maltophilia* was observed in the vitreous sample taken on the third day of treatment and the antibiogram showed resistance to all antibiotics except levofloxacin and trimethoprim-sulfamethoxazole (TMP/SMX). Therefore, TMP/SMX therapy and systemic and topical moxifloxacin therapy were started, and all other treatments were stopped. The patient's BCVA increased to 20/50 in the 1st week postoperatively. At the end of the 1st month, the BCVA of the patient's left eye was 20/25, intraocular pressure was within normal limits, the cornea was transparent, the anterior chamber was formed and there were no inflammatory cells (Fig. 2a). The optic disc and macula appeared natural (Fig. 2b).

Case 2 — A 78-year-old female patient with a 5-year history of diabetes was referred to our center with a pre-diagnosis of endophthalmitis from a clinic where she had undergone

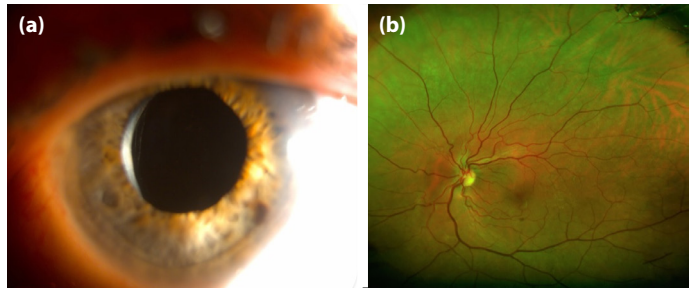

Fig. 2. **(a)** Transparent cornea, transparent intraocular lens, and natural anterior segment structures during the 1st month of treatment for case 1; **(b)** recumbent retina and natural appearance in fundus photograph during the 1st month of treatment for case 1.

left eye cataract surgery approximately 18 days previously. On admission, BCVA in the right eye was 20/25, while the left eye was at the level where hand movement could be detected. Intraocular pressure was normal. Anterior segment examination revealed an epithelial defect, corneal edema, ciliary hyperemia, +4 cell reaction, fibrin formation in the anterior chamber, and hypopyon in the left eye (Fig. 3a). Ocular ultrasonography showed hyperechogenic reflection consistent with vitreous condensation (Fig. 3b).

PPV was performed after vitreous sampling with the diagnosis of acute postoperative endophthalmitis. The same treatment protocol of the first patient was administered postoperatively. *S. maltophilia* was found at the end of culture on the 4th day after vitrectomy and it

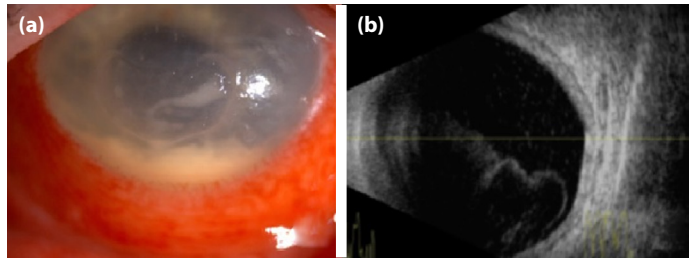

Fig. 3. **(a)** Ciliary hyperemia, corneal edema, corneal epithelial defect, intense cellular reaction, and hypopyon in the anterior chamber; **(b)** condensed view in the vitreous on ocular ultrasound.

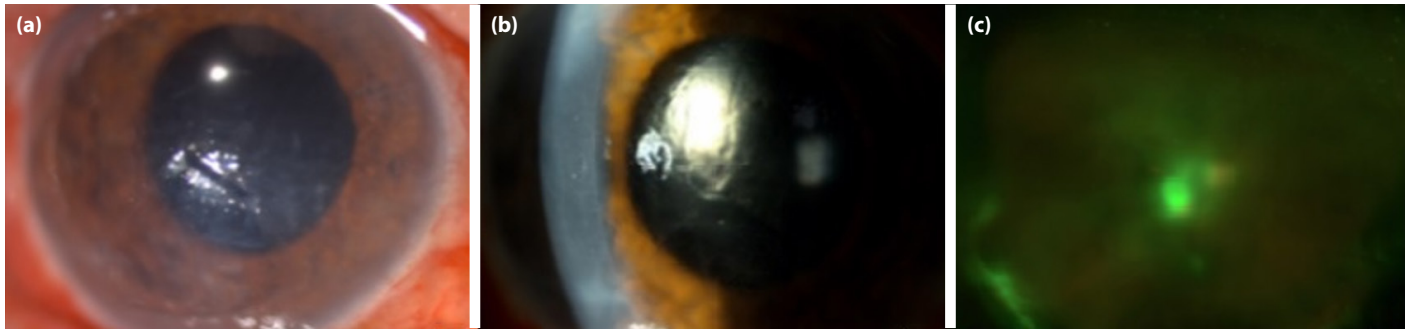

Fig. 4. **(a)** Corneal edema and ciliary hyperemia; **(b)** intense cellular reaction in the anterior chamber; **(c)** posterior segment structures that could not be identified in the fundus photograph.

was resistant to all tested antibiotics except levofloxacin and TMP/SMX. Oral TMP/SMX treatment was started in addition to systemic and topical moxifloxacin. With a BCVA of 20/200 in the 1st postoperative week, the patient was discharged with the abovementioned treatment. However, by the 3rd week after PPV, visual acuity had decreased from 1 meter to finger counting, the cornea was edematous, there was a +3 cell reaction in the anterior chamber and there were lens opacities. Intraocular lens (IOL) explantation with PPV and silicone oil injection was performed due to recurrent endophthalmitis. The same microorganism and antibiogram results were found in the culture of the removed IOL material. The patient was, therefore, treated with oral TMP/SMX and systemic and topical moxifloxacin. At the 1st-month, BCVA was maintained at the level of counting fingers at a distance of three meters and intraocular pressure was within normal limits. Anterior segment examination showed aphakia, cornea was transparent. The retina was siliconized on fundus examination. No recurrent endophthalmitis was found on subsequent examinations.

Case 3 — An 80-year-old female patient had undergone cataract surgery on her right eye approximately 16 days before being referred to our center. On examination, BCVA was 20/400 in the right eye and 20/40 in the left eye. Intraocular pressure was within normal limits. Anterior segment examination revealed corneal edema, ciliary hyperemia (Fig. 4a), +4 cell reaction, and fibrin formation in the anterior chamber (Fig. 4b). Fundus examination of the right eye was opaque, but the retina was attached (Fig. 4c). The patient had no known comorbidities.

A diagnosis of acute postoperative endophthalmitis was made in this case, which was referred from the same center as the cases described above. A vitreous sample was taken on the day of admission, and PPV was performed. In the culture results, *S. maltophilia* was also isolated in this patient, and treatment was regulated according to the antibiogram

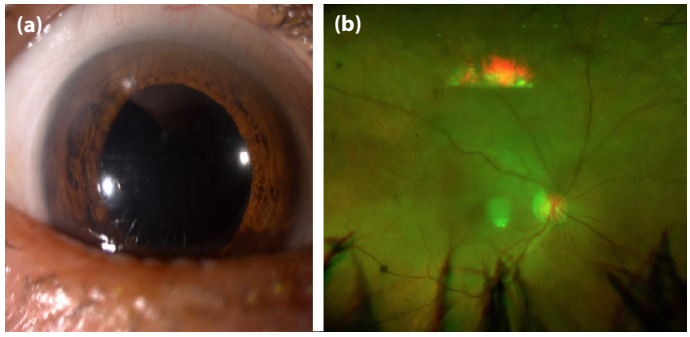

Fig. 5. **(a)** After 1 month of treatment in case 3, the cornea is transparent, the anterior chamber is formed and the intraocular lens is transparent; **(b)** the retina is reattached and the posterior segment is natural.

results. BCVA was 20/100 in the 1st postoperative week, the patient was discharged on the same treatment. At the 1st-month, BCVA of the right eye was 20/32, anterior segment examination showed no pathological findings (Fig. 5a), and the retina appeared natural (Fig. 5b).

On contacting the surgeon who performed the cataract surgeries of all three cases, it was noted that the surgeries were performed within the same week and phacoemulsification cassettes used in these surgeries were sterilized and reused. It was also noted that there were no complications in cases where the surgery was performed within the same week but the cassettes were used for the 1st time.

Discussion

In addition to causing diseases such as conjunctivitis, keratitis, preseptal cellulitis, dacryocystitis, and endophthalmitis, *S. maltophilia* is important because it is a common microorganism that grows in cultures made from phacoemulsification and vitrectomy device fluids.[4] *S. maltophilia* was first described by Kaiser et al.[5] in 1997, who defined it as a factor in postoperative endophthalmitis in a healthy patient with no additional disease.

Existing literature has reported that empirical treatment of postoperative endophthalmitis has a limited effect on *S. maltophilia* and treatment may be more effective when antibiogram results are taken into account.[3,4] Therefore, in cases where the effects of empirical treatment are limited in daily practice, atypical microorganisms causing nosocomial endophthalmitis, such as *S. maltophilia*, should be considered while awaiting culture results. In the present cases, as the patients were referred from the same center, the results of the first case allowed us to pre-diagnose and plan treatment for the possible causative microorganisms before cultures.

Acute postoperative endophthalmitis is the most common clinical course on the third to fifth postoperative day. Some studies have found that *S. maltophilia* has a relatively slow course, and the time at which findings appear may be related to the microbial load at exposure. [4,6] Our cases were diagnosed on the 16th, 18th, and 21st days after surgery when they were referred to our center. Therefore, in cases with a relatively slow course, this nosocomial pathogen may need to be considered with other atypical pathogens.

Many studies have reported that diabetes mellitus is a poor prognostic factor for *S. maltophilia* endophthalmitis. [3,7] Unlike other cases, in the present study, recurrent endophthalmitis developed in the 3rd week after PPV in our diabetic patient. In this case, endophthalmitis was controlled by PPV, silicone injection, and IOL explantation after recurrent endophthalmitis. Ji et al.[3] reported that in resistant or recurrent *S. maltophilia* endophthalmitis, IOL extraction may be effective. Therefore, lens extraction should be considered in patients who do not respond to PPV or who develop recurrence.

After cataract surgery, it is a standard surgical protocol to apply certain concentrations of antibiotics to the anterior chamber to prevent endophthalmitis. The most commonly used antibiotics include moxifloxacin, cefuroxime, and vancomycin. Recent studies have reported that administration of moxifloxacin to the anterior chamber is more advantageous in terms of antibacterial spectrum and efficacy for prevention of postoperative endophthalmitis. [8,9] We found that cefuroxime was administered to the anterior chamber of our patients at the end of their cataract surgery. After observing the antibiogram results of *S. maltophilia* produced in the cultures, it was found that many cephalosporin groups, including cefuroxime, were resistant to antibiotics but sensitive to levofloxacin. Moxifloxacin, a member of a new generation of quinolones, was therefore also used for treatment. These results may support the use of moxifloxacin for postoperative endophthalmitis prophylaxis, especially against gram-negative bacteria that cause nosocomial infections.

Existing literature has reported that nosocomial infections can occur due to contamination of aspiration fluids, plastic, and silicone surfaces.[2-4] Williams et al.[4] concluded that *S. maltophilia* endophthalmitis was caused by improper sterilization of disposable surgical equipment in a patient referred to their center from a rural hospital. In the present study, no materials that could potentially lead to nosocomial infection were identified at the center where the patients underwent cataract surgery. However, as the same phacoemulsification cassette was sterilized and re-used for all patients studied, and other patients did not develop complications during operations performed with other cassettes during the same period, the sterilized and re-used cassette may have been the source of nosocomial infection.

Recently, there has been a lot of discussion in the ophthalmological community about sustainability. Phacoemulsification surgery is a surgery that generates a lot of waste and is performed in large numbers around the world. In a study conducted at Aravind Hospital, it was reported that phacoemulsification cassettes and tube sets were reused without sterilization on approximately 20 patients on the same day. The cassette and tubing are discarded at the end of the surgical day and the phacoemulsification handpiece is then terminally cleaned and autoclaved. As a result of the study, no bacterial or fungal growth was found in the samples taken from these cassettes and tube sets. It was also observed that this practice did not increase endophthalmitis rates.[10] However, in countries such as the USA, this practice is generally not preferred because it is considered "off-label" and not approved by the manufacturers. This shows that application protocols are shaped by regional differences and regulations. In our patients, the same cassette was cleaned and used within the same week. Here, the boundaries between reuse and appropriate sterilization should be clearly defined, and more studies should be conducted on this subject. This is a critical issue, both medico-legal and in terms of the patient experiencing functional organ loss.

In conclusion, to reduce the risk of postoperative endophthalmitis due to atypical microorganisms, it is important to note that disposable surgical devices, especially device cassettes, should not be reused.

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