

# Can a sneeze after phacoemulsification cause endophthalmitis? A case report

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**Dear Editor,**

We reported the first case of acute exogenous postoperative endophthalmitis caused by a normal human microbiota in the nasopharynx, *Streptococcus anginosus*. The patient had a successful cataract surgery, but he felt uncomfortable in the surgery eye 4d post-surgery. Besides, he had a heavy sneeze about 6h before the blurred vision. Vitreous sample of the affected eye turned out to be *Streptococcus anginosus*, a normal inhabitant in the nasopharynx. It might invade into conjunctival sac through inferior nasal meatus to canaliculi lacrimalis with the sudden ocular pressure change. During two months follow-up, the patient had poor visual outcome due to macula edema and subsequent retina thinning despite emergent medical and surgical therapy. To avoid such postoperative complication, patients after cataract surgery should avoid holding the nose when they are sneezing.

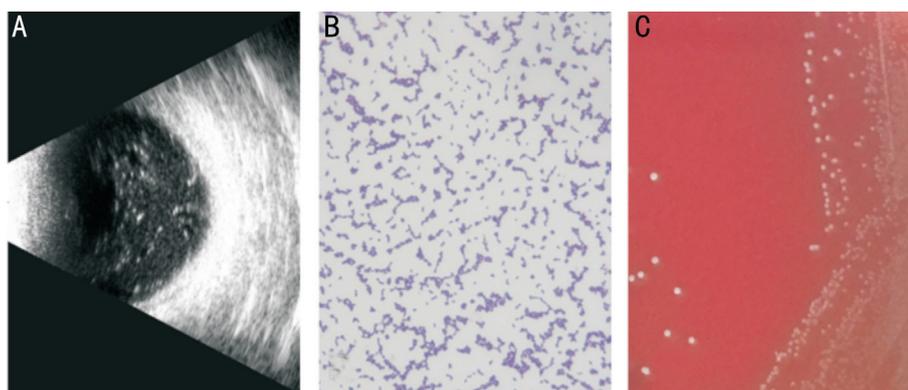
Endophthalmitis is a severe sight-threatening ocular infection caused by a variety of microbes. It can be classified as exogenous or endogenous based on the cause of infection. Endogenous endophthalmitis occurs when infectious organisms responsible for infection spread to the eye haematogenously; and exogenous endophthalmitis occurs when infecting microbes enter the eye directly<sup>[1]</sup>. Toxic anterior segment syndrome (TASS) is an acute sterile endophthalmitis similar to the infectious exogenous endophthalmitis, but it usually happens 24h within the cataract surgery without bacterial

infection. After cataract surgery, infectious endophthalmitis is generally classified as exogenous endophthalmitis, which often leads to poor visual acuity (VA). The reported incidence rates range from 0.03% to 0.7%<sup>[2]</sup>. Post-cataract endophthalmitis might be caused by contamination of surgical instruments or improper care after the operation, such as rubbing the eyes or exposing the eyes to bathing water. This is the first case report of acute post-cataract endophthalmitis caused by *Streptococcus anginosus*, possibly due to a heavy sneeze. We obtained the written informed consent from the patient, and this case was in accordance with the tenets of the Declaration of Helsinki.

A 69-year-old man presented with reduced vision and slight pain in his left eye 4d after cataract surgery. And he had a heavy sneeze 6h before the blurred vision. Medical history showed that he had grade III lens opacity in the left eye. The standard phacoemulsification cataract surgery was done by an experienced surgeon in March 2019 and there was no infection during the operation. The surgery was done through a 12 o'clock clear corneal incision of 2.2 mm and 3 o'clock auxiliary incision of 1.0 mm under topical anaesthesia. His VA of the left eye was Snellen 40/50 one day post-surgery. And he was administered with tobradex eyedrops *q.i.d.* The patient had successful right cataract surgery 6mo ago with the same post-operative medication. He had no predisposing factors to endophthalmitis and no special medication.

His VA was fingers counting (FC)/30 cm in the affected eye at presentation. Slit-lamp examination revealed conjunctival congestion, corneal epithelial and stromal edema, dust keratic precipitates (KP++), and Tyndall (+++) in the anterior chamber, obscuring the view of white sheath of blood vessels in the posterior segment. Ultrasound B-scan revealed plenty of moderately reflective mobile dot echoes with diffuse retina thickening (Figure 1A). A diagnosis of acute postoperative endophthalmitis was made based on clinical presentation and ultrasound findings.

The left eye underwent three-port pars plana vitrectomy immediately. Vitreous sample was aspirated firstly and sent for microbiological analysis. Then the intraocular lens was extracted and opacities of vitreous were aspirated, followed by silicone oil injection. Finally, before incision closure, norvancomycin (0.1 mg/0.1 mL), ceftazidime (2.25 mg/0.1 mL),



**Figure 1** The diagnosis of endophthalmitis and the culture of bacteria. Ultrasound B-scans (A) of left eye showed plenty of moderately reflective mobile dot echoes with diffuse retina thickening. Blood plate (B) Gram-stain demonstrating strains of Gram-positive cocci in chain arrangement (C) massive gray-white minute colonies for needlepoint size with a/b hemolysin in condition of 5% CO<sub>2</sub>, 35°C.

and dexamethasone (400 µg/0.08 mL) were injected intravitreally. Meanwhile, ceftazidime, dexamethasone, and vancomycin were used intravenously. Intravitreal injection of norvancomycin, ceftazidime and dexamethasone were repeated once a day three times successively until anterior chamber exudates resolving. Four days post-surgery, the blood plate of vitreous samples turned out to be cocci growth (+++; Figure 1C). Gram staining (Figure 1B) showed Gram-positive and identified as *Streptococcus anginosus* with the mass spectrometry matrix-assisted laser desorption ionization (MALDI) Biotyper system (Microflex LT). Then therapeutic schedule was shifted to penicillin and gentamicin intravenously.

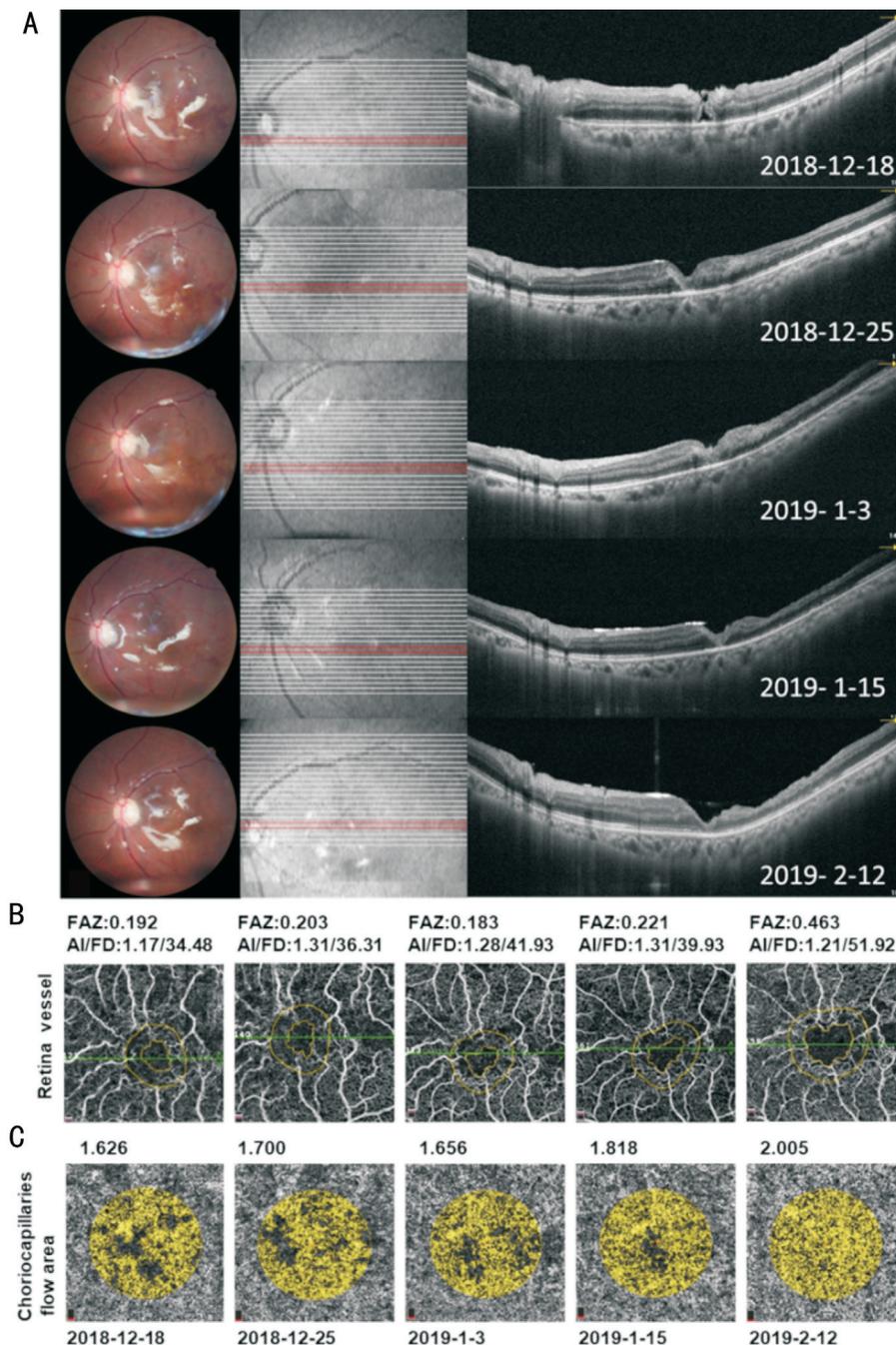
During two months' follow-up, his best correct visual acuity (BCVA) was raised to Snellen 20/200. In fundus photograph, intra-retinal hemorrhage was decreased but retina arteries were narrowing compared with the first time examination post-operatively. SD-OCT demonstrated that retina edema was recovering, but nerve fiber layer of periphery retina was getting thinner (Figure 2A). OCTA showed that vessel density of retina (Figure 2B) and choriocapillaris (Figure 2C) was increasing, but fovea avascular zone in maculae had no improvement compared with the first time examination post-operative.

Postoperative endophthalmitis is a rare but disastrous complication of cataract surgery. Less than 50% of patients achieve a final VA of  $\geq 20/40$ <sup>[3-4]</sup>. Treatment outcomes after endophthalmitis are highly dependent on the causative agents. In post-cataract endophthalmitis, Gram-positive infections are the most prevalent; among them, coagulase-negative *Staphylococcus* accounts for the most infections, followed by *Streptococcus* and *Staphylococcus aureus*<sup>[2-4]</sup>. Early pars plana vitrectomy and proper systemic administration are usually required as initial treatments to rescue VA. *Streptococcus* is the second most common genus of germs identified in post-cataract endophthalmitis and usually results in poor visual outcomes<sup>[5]</sup>. In Pijl *et al*'s<sup>[3]</sup> study of 250 post-cataract

endophthalmitis cases, all  $\beta$ -haemolytic *Streptococcus* cases ( $n=9$ ) manifested within 3d after surgery, and 8 out of the 9 cases (88.9%) resulted in a final VA  $\leq$  light-perception (LP). The study did not clarify the specific bacterial types, so it is unclear whether *Streptococcus anginosus* infection was present.

Gram-positive *Streptococcus anginosus* is a member of the *Streptococcus milleri* group, which belongs to the  $\beta$ -haemolytic *Streptococcus* group. It is a commensal and normal inhabitant of the mucosal membranes and frequently found in the mouth, nasopharynx, throat, and sinuses<sup>[6]</sup>. As a member of the normal microbiota in humans, *Streptococcus anginosus* is not often properly identified. Therefore, we performed a matrix-assisted laser desorption ionization-time of flight mass spectrometry (MALDI-TOF MS) analysis<sup>[7]</sup>. With the development of bacterial typing in recent years, an increasing number of reports have emphasized that *Streptococcus anginosus* is an important bacterial pathogen in tissues such as the appendix, perianal region, and intra-abdominal region. The bacterial capsule,  $\beta$ -haemolysin, and hydrogen sulphide (H<sub>2</sub>S) are toxic and constitute prototypic virulence factors<sup>[6]</sup>.

The patient's VA was good in the first three days after surgery. He had routine topical eye drops of tobradex *q.i.d.* and with no symptoms of infection. He denied rubbing the eyes after surgery. He had no infection in the right eye post-cataract surgery. Occasionally, we noticed that he sneezed heavily while holding both sides of his nose in our ophthalmology emergency. Asking carefully, the patient had such heavy sneeze 6h before he experienced a decreased vision. Anatomically, nasal cavity is in connection with the lacrimal duct system through inferior nasal meatus. Also, previous reports showed that fungal infection of the nose might infiltrate into lacrimal sac with a rare percentage<sup>[8-9]</sup>. Such a heavy sneeze may cause the sudden rise of the pressure in the nasal cavity. The nasal cavity secretions might be squeezed into the conjunctival sac through the inferior nasal meatus to the canaliculi lacrimales. *Streptococcus anginosus* is a normal inhabitant in nasal cavity



**Figure 2** Two months' follow-up of the affected eye by fundus photograph and OCT Color fundus photograph (A) of left eye showed hemorrhage in macular and periphery, thinning of retina arteries. During the 2 months' follow-up, haemorrhages decreased in macular and periphery. SD-OCT (A) of the same eye showed macula oedema, leakage, hemorrhages and disconnection of nerve fiber layer in fovea maculae. During the 2 months' follow-up, ellipsoid zone in fovea maculae was partially disappeared; nerve fiber layer of periphery retina was thinned, especial temporally. OCTA (B, C) of the same eye showed decrease vessel density of retina. During the 2 months' follow-up, vessel density of retina and choriocapillaris increased but no recovery of FAZ area and AI/FD index. FAZ: Foveal avascular zone; AI/FD: Acircularity index/flow density.

but pathogenic bacteria in ocular tissue. Therefore, except the infection through finger-nose-eye contact, we speculated that the patient might have been infected with *Streptococcus anginosus* when it travelled through the nasal cavity to the conjunctival sac. When the ocular pressure suddenly changed, the bacteria invaded the intraocular tissue through the cataract incision, which resulted in acute-onset endophthalmitis. To our knowledge, there is no other report of postoperative

endophthalmitis caused by *Streptococcus anginosus*, which is quite virulent in the intraocular tissue. Our patient experienced acute onset and severe retina lesions despite immediate surgery and proactive therapy. The vitreous biopsy revealed many bacterial colonies, which might explain the severity of his disease. *Streptococcus anginosus* has been reported in only 2 cases endogenous endophthalmitis that resulted in relatively good visual outcomes<sup>[10-11]</sup>. In those cases, the pathogenic

bacteria were confirmed only in the blood sample, and no bacteria were identified in the vitreous sample. The good VA might be due to a low bacterial concentration in the vitreous body. This case suggests that *Streptococcus anginosus* may cause virulent postoperative endophthalmitis, leading to severe retinal lesions and poor visual outcomes despite emergent medical and surgical therapies. And endophthalmitis after cataract surgery may possibly be caused by the heavy sneeze by holding both sides of nose.

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**Conflicts of Interest:** Qian YW, None; Li QJ, None; Che X, None; Jiang J, None; Wang ZL, None.

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