



## *Pasteurella multocida*-induced endophthalmitis after a cat scratch

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### ABSTRACT

**Purpose:** To report the case of a Japanese girl with a perforating ocular injury caused by a cat scratch, resulting in *Pasteurella multocida*-induced endophthalmitis.

**Observations:** A 10-year-old girl presented with a red eye, eye pain, and blurred vision in her right eye immediately after receiving a cat scratch. We performed lensectomy and vitrectomy for endophthalmitis 4 hours after her arrival. After culturing a sample of the vitreous humor, *Pasteurella multocida* was identified, and the antibiotic was changed to ampicillin. The best-corrected visual acuity of her right eye improved to 20/20 6 months after surgery.

**Conclusions and importance:** We present a rare case of *Pasteurella multocida*-induced endophthalmitis after a cat scratch. Our findings suggest the great importance of identifying the responsible bacterium and using matched antibiotics as soon as possible in such cases to prevent vision loss.

### 1. Introduction

*Pasteurella multocida* (PM) is a small, Gram-negative coccobacillus found as resident microflora in many mammals and birds, including in the oral cavities of 70%–90% of cats.<sup>1</sup> In humans, infections are most commonly caused by dog and cat bites or scratches, resulting in skin and soft tissue infections. Infections of other sites with PM have rarely been reported and include bone and joint infections, respiratory tract infections and central nervous infections.<sup>2–4</sup> During the last 35 years, PM-induced endophthalmitis has only been reported in five cases in the literature.<sup>5–9</sup> The previously reported ocular PM infections include conjunctivitis,<sup>10</sup> corneal ulcers<sup>11,12</sup> and endophthalmitis.<sup>5–9</sup> This is the first evidence that rapid surgical and antibiotic therapy can save a patient's vision.

#### 1.1. Case presentation

A 10-year-old girl presented with a red eye, eye pain, and blurred vision in her right eye immediately after receiving a cat scratch to the eye (Fig. 1a). She was referred to our hospital 18 hours after the injury. The best-corrected visual acuity (BCVA) of her right and left eyes were 20/40 and 20/20, respectively. The intraocular pressure (IOP) of the right eye was 9 mmHg, compared with 18 mmHg in the left. Slit lamp examination and fluorescein staining revealed a conjunctival laceration

on the nasal inferior side of the right eye, but no leakage (Fig. 1b). Additionally, cells (2+) were seen in the anterior chamber (Fig. 1c), but fundus examination revealed no abnormalities.

During serial ophthalmic examinations, hypotony and worsening of the anterior chamber inflammation with hypopyon were evident within 2 hours. We diagnosed endophthalmitis caused by a perforating ocular injury after a cat scratch. We then performed lensectomy and vitrectomy under general anesthesia 4 hours after her arrival (22 hours after the injury). During surgery, we found a puncture wound at the nasal inferior sclera 2 mm from the limbus (Fig. 2a), a fibrin mass in the anterior chamber and vitreous body, retinal hemorrhage in the arcade area, and tortuosity and sheathing of retinal vessels (Fig. 2b) despite no obvious abnormalities before surgery. We used vancomycin (10 mg/500 ml and 10 mg/ml) and ceftazidime (20 mg/500 ml and 20 mg/ml) as antibiotics in intraocular ophthalmic irrigation and intravitreal injection, respectively, and imipenem/cilastatin (25 mg/kg) intravenously after surgery. As antibiotics in eye drops, we used moxifloxacin and cefmenoxime 6 times/day.

Four days after surgery, PM was identified from direct smear of a vitreous humor sample and the cultured vitreous humor sample using matrix-assisted laser desorption/ionization-time of flight mass spectrometry (Fig. 3). PM was sensitive to all antibiotics, especially ampicillin, so we changed the systemic antibiotics to ampicillin (100 mg/kg). Intravenous ampicillin was continued for 2 weeks, and then was changed

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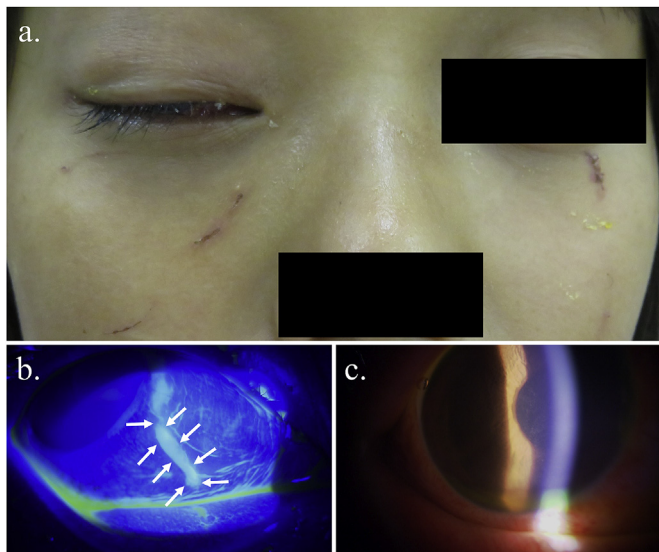
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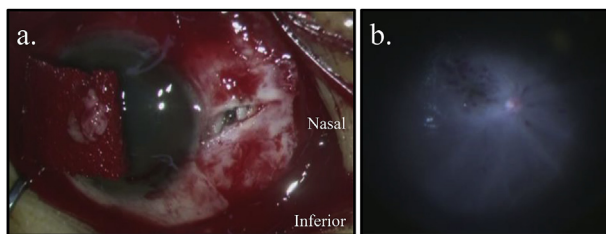
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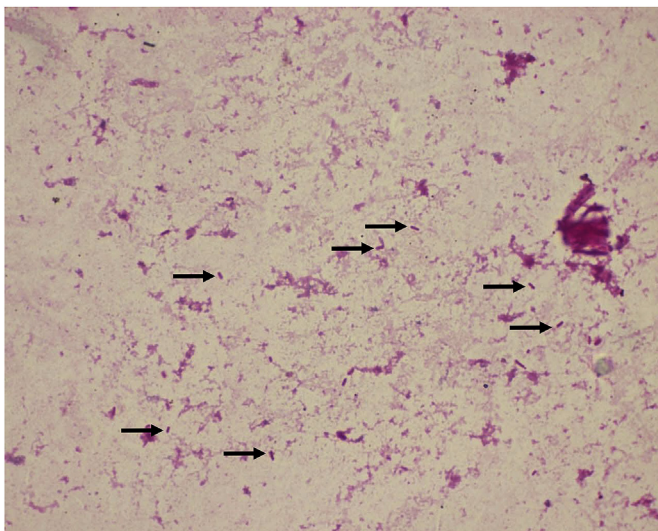
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**Fig. 1.** Ophthalmological findings during the patient's first visit. a. The patient's face was scratched by her pet cat. b. Arrows showing a nasal-inferior conjunctival laceration in fluorescein staining c. Inflammation in the anterior chamber.



**Fig. 2.** Observations during surgery. a. Puncture wound at the nasal inferior sclera. b. Retinal hemorrhage and tortuosity and sheathing of retinal vessels.



**Fig. 3.** Identification of *Pasteurella multocida* as a small, Gram-negative coccobacillus in direct smear of vitreous sample (1000 × ).

to oral amoxicillin (25 mg/kg), which was continued for 2 weeks. Ocular inflammation improved, and the BCVA of her right eye improved to 20/40 2 weeks after surgery; however, tortuosity and sheathing of the retinal vessels remained (Fig. 4a). Eight weeks later, the BCVA had improved to 20/25, and tortuosity and sheathing of the

retinal vessels had disappeared. Finally, 6 months after surgery, the BCVA had increased to 20/20 and there were no abnormalities in the fundus (Fig. 4b).

## 2. Discussion

In the present case, retinal inflammation was observed during surgery despite no obvious abnormalities being apparent before surgery, suggesting that endophthalmitis advanced rapidly. Importantly, our diagnosis of endophthalmitis and the decision to perform surgery as soon as possible was beneficial in saving the patient's vision. Prior to surgery, we thought that the causative bacterium of endophthalmitis was a highly virulent species such as *Escherichia coli*. However, culture of the vitreous sample revealed PM.

PM is a common bacterium in pets, including cats and dogs. Of only five reported cases of PM endophthalmitis in the literature, three were associated with direct trauma involving a cat (scratch: two cases and bite: one case), and two were indirect but involved patients with pet cats.

In the three previous cases involving trauma<sup>6,8,9</sup> and the present case, PM is likely to have derived directly from the pet animal. In such cases, a scratch or a bite from the pet causes eye trauma, which is then infected by PM leading to endophthalmitis depending on the depth of the wound. In the two reported cases without trauma,<sup>5,7</sup> PM still derived from the pet animal but instead infected the conjunctiva flora. Both of these previous cases had received cataract surgery then developed post-operative endophthalmitis. Additionally, a case of *Pasteurella canis* isolation following penetrating eye injury revealed that intravitreal injection of the systemic antibiotics ceftazidime and amikacin resulted in recovery from endophthalmitis.<sup>13</sup>

There are many opportunities to touch pet animals even if patients are not pet owners. However, we must emphasize the importance of preventing direct trauma from animals, as well as taking care of infection controls for resident bacteria from pet animals to prevent future endophthalmitis after intraocular surgery.

## 3. Conclusions and importance

We experienced a rare case of a rapidly progressive endophthalmitis caused by PM after a cat scratch. We stress the importance of identifying the bacterium responsible and using matched antibiotics as soon as possible to prevent vision loss.

### Patient consent

Written consent to publish this case report has been obtained from the patient's guardian.

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### Authorship

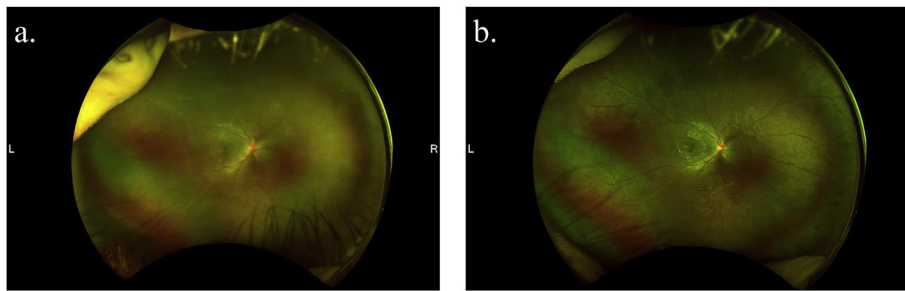
All authors attest that they meet the current ICMJE criteria for Authorship.

### Declaration of competing interest

The following authors have no financial disclosures: YM, HI, AS, KY, YT, FG.

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**Fig. 4.** Retinal image after surgery. a. The retinal hemorrhage disappeared but tortuosity and sheathing of the retinal vessels remained after 2 weeks. b. No remarkable abnormalities on the retina are apparent at 6 months.

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