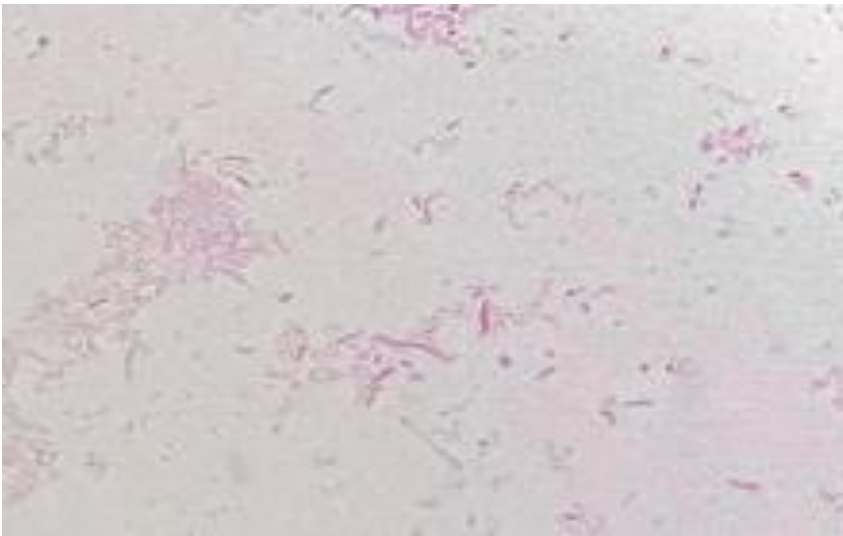


A middle-aged adult with a history of alcohol and tobacco use disorder, underlying COPD, progressive weight loss with cachexia presented with a one-month history of worsening bilateral eye pain, photophobia, excessive tearing, and decreased vision. The patient lives with domestic partner and three domestic cats. There was no reported history of ocular trauma.

At the time of presentation, the patient was near blindness with markedly decreased visual acuity in both eyes. There was severe blepharitis with meibomian gland dysfunction bilaterally. Slit-lamp examination demonstrated inferior limbal corneal opacity and stromal thinning (right greater than left), bilateral layering hypopyon, and posterior synechiae of the iris. The overall presentation was concerning for bilateral hypopyon anterior uveitis with corneal thinning. Given the atypical bilateral involvement, both infectious and autoimmune etiologies were considered.

Corneal cultures were obtained prior to antimicrobial escalation. Empiric topical moxifloxacin was initiated along with erythromycin ophthalmic ointment. Doxycycline and valacyclovir were also started while awaiting microbiologic data and serologic workup. Gram stain from the corneal scraping demonstrated numerous polymorphonuclear leukocytes and small Gram-negative rods. Culture on 5% sheep's blood agar and chocolate agars demonstrated heavy growth of a gray, nonhemolytic organism within 24 hours. Importantly, no growth was recovered on MacConkey agar. The predominant recovered organism was oxidase-, catalase-, and indole positive.



Question 1

Based on microbiologic findings and biochemical reactivity, which organism is the most likely primary pathogen?

- A. *Haemophilus influenzae*
- B. *Neisseria gonorrhoeae*
- C. *Pasteurella multocida*
- D. *Pseudomonas aeruginosa*
- E. *Escherichia coli*

Question 2

Which epidemiologic detail in this case most strongly supports the likely source of infection?

- A. Chronic tobacco use
- B. Underlying COPD
- C. Chronic alcohol use disorder

- D. Living with three domestic cats
- E. Bilateral eye involvement

Answer and Explanations:

Question 1

Correct Answer: C

The microbiologic findings in this case are suggestive of *Pasteurella multocida* being the predominant organism. Pasteurellae are small, non-motile, facultatively anaerobic Gram-negative coccobacilli. They grow readily on 5% Sheep's blood agar and chocolate agar, typically producing smooth, gray, nonhemolytic colonies within 18–24 hours. Importantly, these organisms, like other fastidious species grow poorly on MacConkey agar. *P. multocida* exhibits typical "COIN" biochemical reactivity: Catalase-, Oxidase-, and Indole-positivity, as well as positivity for Nitrate reduction, which was not tested in this case. These phenotypic features distinguish it from other fastidious Gram-negative organisms such as *Haemophilus influenzae* (which exhibits variable indole activity and will not grow on Sheep's blood agar) and *Neisseria gonorrhoeae* (which traditionally are diplococci with negative indole and nitrate reduction reactions). Both *Escherichia coli* and *Pseudomonas aeruginosa* are non-fastidious and would readily grow on MacConkey agar, with *E. coli* usually exhibiting lactose fermentation.

P. multocida is a commensal organism in the respiratory and gastrointestinal tracts of many domestic and wild animals. Cats and dogs have the highest carriage rates, approximately 70–90% and 20–50%, respectively. Human infections most commonly follows bites or scratches, and typically presents with acute onset of cellulitis, sometimes with purulent drainage. Ocular *P. multocida* infection is rare and can be caused by scratches to the eye or contamination of the area with animal saliva. Reported ocular manifestations span a wide clinical spectrum, including conjunctivitis, corneal ulceration, anterior uveitis, corneal abscess, endophthalmitis, and, in severe cases, panophthalmitis.

Question 2

Correct Answer: D

The most significant epidemiologic clue is close contact with cats. *Pasteurella multocida* is the most common pathogen isolated from cat bite wounds (approximately 75%) and is frequently transmitted through bites, scratches, or licks to nonintact skin. Non-bite transmission is increasingly recognized, especially in patients with chronic medical conditions. In this case, chronic alcohol use, malnutrition, and probable chronic lung disease likely predisposed the patient to infection. Close and continuous exposure to three cats represents the most important risk factor.

Importantly, infection without a clear animal bite history can occur as evidenced in this case. This most commonly occurs in patients with severe comorbidities, immunocompromised states, bacteremia, or those requiring intensive care management. Such cases are often associated with significant mortality. In the present vignette, the patient's chronic alcohol use disorder, cachexia, and probable chronic lung disease likely impaired host immunological responses, facilitating infection in the setting of close and continuous feline exposure. Thus, both the microbiologic profile and the epidemiologic context strongly support *Pasteurella multocida* as the primary pathogen.

Discussion

Pasteurella multocida is an uncommon but aggressive ocular pathogen. While it most frequently causes rapidly progressive cellulitis after animal bites, ocular involvement represents a rare and potentially sight-threatening manifestation. Reported ocular infections include conjunctivitis, keratitis, corneal ulceration, anterior uveitis,

endophthalmitis, and panophthalmitis. Among these, panophthalmitis is one of the most severe complications and is associated with poor visual outcomes in many reported cases.

P. multocida induced panophthalmitis has rarely been described in the literature. The organism is not a common cause of panophthalmitis following open globe injury, particularly when there is no direct history of animal bites or scratches. Case reports have documented both systemic and localized ocular infections with or without obvious animal exposure. Some patients experienced devastating visual loss despite aggressive therapy, while others achieved favorable outcomes when early diagnosis and prompt surgical management (e.g., early vitrectomy) were performed. A reported pediatric case of *P. multocida* endophthalmitis following cat scratch injury demonstrated full visual recovery to 20/20 after timely surgical and antimicrobial intervention.

Systemically, *P. multocida* can cause respiratory tract infections, meningitis, peritonitis, endocarditis, sepsis, and bone and joint infections. Severe infections without animal bites are increasingly recognized, especially in patients with significant comorbidities or immunocompromised states. Such cases often carry substantial mortality risk. Mortality rates in invasive infections such as bacteremia and meningitis may approach 25–30%.

Culture-based detection remains the diagnostic gold standard for exogenous ocular infections. *P. multocida* is typically susceptible to beta-lactam penicillins, second- and third-generation cephalosporins, carbapenems, fluoroquinolones, and tetracyclines. Penicillin remains the treatment of choice for monomicrobial infection, although most bites are often polymicrobial mixtures requiring the addition of beta-lactamase inhibitors to provide coverage for anaerobic oral flora which may be present (including amoxicillin/clavulanate or ampicillin/sulbactam). Early recognition, appropriate antibiotic selection, and urgent ophthalmologic management (including intravitreal therapy or surgical intervention when indicated) are the gold standards of treatment.

Although many ocular cases are linked to direct animal exposure, infection may also occur via indirect exposure, environmental contamination, or in the absence of a recognized bite. Therefore, clinicians must maintain suspicion for *P. multocida* in patients presenting with rapidly progressive ocular inflammation, particularly when there is any history of cat or dog contact. In summary, *Pasteurella multocida* is a rare but aggressive cause of ocular infection. Literature consistently highlights its potential for rapidly advancing and vision-threatening disease. It should be considered in the differential diagnosis of severe ocular infection, particularly in patients with significant animal exposure or animal-induced ocular trauma. In this case, the patient's hypopyon was managed with an IV course of ampicillin/sulbactam while he underwent workup for additional systemic illness.

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