Full-length title:

Capnocytophaga canimorsus endophthalmitis after cataract surgery linked to salivary dog-to-human transmission

Running title:

Postoperative *C. canimorsus* endophthalmitis

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Summary statement:

An 83-year-old woman presented postoperative endophthalmitis 12 days after uncomplicated cataract surgery. Vitreous cultures remained sterile, but broad-spectrum bacterial polymerase chain reaction identified *Capnocytophaga canimorsus*, a fastidious commensal bacterium of the canine flora. The patient reported having brushed her dog's teeth 2 days after the surgery, exposing herself to salivary droplets.

Abstract

Purpose: To describe a case of acute postoperative bacterial endophthalmitis due to *Capnocytophaga canimorsus* following cataract surgery, with probable contamination dog salivary droplets two days after the procedure.

Methods: An 83-year-old woman who underwent uncomplicated cataract extraction with intraocular lens implantation, presented 12 days later with acute pain, redness and vision loss in her left eye. Visual acuity was hand motion and clinical findings suggested the diagnosis of acute postoperative endophthalmitis. The patient underwent diagnostic vitrectomy, intravitreal ceftazidime/vancomycin injection and received oral moxifloxacine (400 mg/day). Two days later she underwent complete pars-plana vitrectomy due to the absence of clinical improvement. Vitreous samples showed Gram-negative bacterium on direct examination but cultures remained sterile, which prompted the realization of a broad-range bacterial polymerase chain reaction (PCR) analysis.

Results: PCR on the vitreous sample detected *Capnocytophaga canimorsus*, a fastidious Gram-negative bacterium of the oral canine flora. When asked for recent contacts with dogs the patient reported having proceeded to an intensive tooth care session for her dog at postoperative day 2. Intravenous ceftriaxone (2g/day) was added to the treatment. Anterior and posterior segment inflammation slowly resolved and final visual acuity was 20/160.

Conclusion: Although very rare, this complication suggests that patients undergoing ocular surgery should avoid contact with salivary secretions of pets during the early postoperative period. Diagnostic broad-range bacterial PCR is useful to detect unconventional or slow-growing agents in vitreous samples.

Introduction

Capnocytophaga canimorsus is a fastidious Gram-negative bacterium that belongs to the gingival microbiota of canine and feline species. Several cases of ocular infections due to *Capnocytophaga canimorsus* have been reported in the literature, most of which were endogenous endophthalmitis secondary to a dog bite.[1–3] Here we report a case of endophthalmitis that occurred twelve days after uncomplicated cataract surgery, and was caused by *Capnocytophaga canimorsus*, identified with diagnostic pan-bacterial polymerase chain reaction (PCR). There was no report of dog bite, but the patient reported an intense dog's tooth brushing at postoperative day 2, suggesting transmission through exposure to dog salivary droplets.

Case description

An 83-year-old woman was referred to the emergency department of our institution (Jules-Gonin Eye Hospital, Lausanne, Switzerland) due to acute pain and rapid decrease of vision in her left eye, twelve days after a routine cataract extraction. Her medical history was unremarkable, she had no diabetes, no immunosuppression and no chronic disease. Her ocular history was also unremarkable besides recent cataract extraction. Phacoemulsification had been uneventful with intraocular lens implantation through self-sealing, clear-corneal incisions, conventional intracameral cefuroxime injection and postoperative topical treatment by a combination of dexamethasone/chloramphenicol (4 times/day) and nepafenac drops (4 times/day). One week after the procedure, best-corrected visual acuity (BCVA) had returned to 20/20. On the day of referral for acute pain and

redness she received one dose of oral ofloxacine (200 mg) before coming to our hospital.

At baseline examination, BCVA was limited to hand motion. Biomicroscopy revealed 4+ anterior chamber cells and 4+ flare with hypopion and Descemet membrane folds (Figure 1). Fundus visualization was obstructed and B-scan ultrasound showed a marked vitritis. A clinical diagnosis of acute postoperative endophthalmitis was made, and the patient was managed according to a standard protocol consisting in: 1) aqueous humor and vitreous sampling for microbiology analysis, using a 30-Gauge needle and a 23-Gauge vitrector, respectively and 2) intravitreal antibiotics administration consisting in vancomycin (1mg/0.1ml) and ceftazidime (2.25mg/0.1ml) in association with systemic moxifloxacine (400 mg daily, intravenously for 48 hours then orally for 10 days), topical ofloxacine and prednisolone acetate (4 times/day). The Gram stain of the vitreous smears revealed the presence of Gram-negative bacterium. Forty-eight hours later, the evolution was unfavorable with visual acuity decreasing to light perception. A complete pars-plana vitrectomy was performed with new microbiological analysis, and the intravitreal injection of vancomycin (1mg/0.1ml) and ceftazidime (2.25mg/0.1ml) was repeated.

As the two bacteriological cultures remained sterile, the initial vitreous sample was analyzed by broad-range bacterial PCR. This molecular diagnostic method is based on the amplification of the 16S rRNA gene followed by sequencing of the obtained amplicon.[4,5] The resulting sequence was analyzed using the publicly available Basic Local Alignment Search Tool (BLAST, https://blast.ncbi.nlm.nih.gov/Blast.cgi) of the National Center for Biotechnology Information, and revealed 99% identity with *Capnocytophaga canimorsus* 16S rRNA encoding gene (701 of 709 nucleotides). *Capnocytophaga canimorsus* is a fastidious

Gram-negative rod bacterium that belongs to the gingival microbiota of canine and feline species.

When asked specifically for recent contacts with dogs the patient reported owning one and having proceeded to an intensive tooth care session for her dog at postoperative day 2. Salivary sampling from the dog's oral cavity for microbiological analysis was not performed due to the commensal nature of *Capnocytophaga canimorsus*. Based on the results of the pan-bacterial PCR, the systemic antibiotic treatment was adapted by adding intravenous ceftriaxone (2g daily). The intraocular inflammation eventually faded, with a residual visual acuity of 20/160.

Discussion

Capnocytophaga canimorsus was first described by Bobo and Newton in 1976.[6] They isolated the pathogen from blood and cerebrospinal fluid of a man who developed severe meningitis one week after a dog bite. Pathogens from the *Capnocytophaga* genus that colonize humans are typically opportunistic and zoonotic. They may provoke severe systemic infections such as meningitis, endocarditis and septicemia with a mortality rate estimated at 30%.[7]

Most ocular infections caused by *Capnocytophaga* species reported in the literature involve the cornea,[8] but seven cases of *Capnocytophaga canimorsus* endophthalmitis have been reported. Their clinical characteristics, diagnostic methods and management are summarized in Table 1. Most of these infections were endogenous endophthalmitis occurring few days after a dog[1–3] or cat bite.[9] In the present case, the patient did not report any dog bite suggesting a transmission through the exposure to her dog's salivary droplets during tooth brushing. Microbiological investigations of the dog's saliva were not performed due to the high

prevalence of this commensal bacilli in the canine oral flora, estimated between 58-74%,[10,11] resulting in a high probability of a positive analysis. There is only one previous report of a postoperative *Capnocytophaga canimorsus* endophthalmitis, in a patient owning a dog, however the exact source of contamination could not be identified.[12]

Our observation strongly suggests transmission through aerosol, although salivary transmission via hand licking, and subsequent eye rubbing by the patient could have also occurred. Consistently, reported rates of animal-to-human *Capnocytophaga canimorsus* transmission in the absence of bite is higher than expected. In a retrospective study of 65 cases of severe *Capnocytophaga canimorsus* septicemia requiring intensive care*,* Hästbacka et al reported that all patients had been in contact with dogs, but that the mode of transmission was a bite in 38% of cases, a lick of healthy or wounded skin in 25% of cases, a skin wound without bite or licking in 25% of cases, and that no bite, wound or licking was identified in the remaining 12% of cases.[13] Authors concluded that the presence of a dog in a household or any contact with dogs may be a sufficient exposure for developing *Capnocytophaga canimorsus* infection, regardless of the immunocompetent status. Similarly, in an earlier case series of 39 patients with *Capnocytophaga canimorsus* septicemia, Pers et al had reported that the only identified exposure was the owning of a dog in 13% of cases.[14] Both studies suggest the possibility of aerosol transmission in 12-13% of cases.

In the present report, bacterial cultures of ocular samples remained sterile, which may be a consequence of the single dose of oral ofloxacine received by the patient before referral. This case illustrates the benefit of broad-spectrum bacterial PCR in identifying causative bacterial agents in culture-negative endophthalmitis, due to

fastidious bacteria, non-cultivable microorganisms or introduction of an antibiotic treatment prior sampling. It also illustrates the risks associated to the contact with salivary secretions of pets during the postoperative period. *Capnocytophaga canimorsus* transmission may occur in the absence of direct salivary exposure such as dog bite or licking. This item may be added to standard recommendation leaflets provided to patients before the surgical procedure.

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Figure Legend

Figure 1: Biomicroscopy in an 83-year-old woman with *Capnocytophaga canimorsus* endophthalmitis at presentation.

Slit-lamp examination revealed 4+ anterior chamber cells (A) and fibrin deposits on the intraocular lens (B) obstructing fundus visualization.