

Chromobacterium violaceum infection in a dog

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Summary

The aim of this paper was to present the first case of otitis externa caused by *Chromobacterium violaceum* in a dog in Poland. The studies involved a cross-breed dog aged 10 years with symptoms of chronic inflammation of the external auditory meatus. Inflammatory lesions of the external auditory meatus occurred directly after the dog swam in open water. Swabs were collected from the dog's ears for microbiological and parasitological tests. No parasites capable of causing inflammation of the external auditory meatus were found. From a culture of the inflammatory secretion from the ears on blood agar, a clean culture of violet bacteria was isolated and recognized as *Chromobacterium violaceum* on the basis of an Api 20 test. Targeted therapy with antibiotics based on the systemic and local use of fluoroquinolones led to a complete resolution of the symptoms within two weeks. On the basis on the results of the clinical and microbiological tests conducted, as well as the effect of treatment, it was concluded that the etiological factor for the inflammation of the external auditory meatus in the dog were *Chromobacterium violaceum* microbes.

Keywords: *Chromobacterium violaceum*, dog, otitis externa

Chromobacterium violaceum microbes are Gram-negative, relatively anaerobic bacteria that do not produce spores. They are a part of the natural flora of water and earth in tropical and subtropical regions. The microbes produce an antibiotic, violacein, which gives them a violet colour. They grow well on blood agar, producing characteristic smooth, slightly convex colonies of a dark violet colour with a metallic sheen. In an oxygen-free environment they become colourless. *Chromobacterium violaceum* was isolated for the first time in 1882 (6).

These bacteria rarely infect people. They usually cause skin infections, sometimes sepsis (2-4), but in extreme cases the infection ends in death (11, 15). In animals, infections caused by *Chromobacterium violaceum* were seen in swine (10), cattle (1) and primates (12). The available literature describes only three cases of infection with these microbes in dogs (5, 8), but none of them occurred in Poland, although the microbes have been found in this country (including in *Ixodes ricinus* ticks (16)).

The aim of this paper was to present the first case of otitis externa caused by *Chromobacterium violaceum* in a dog in Poland.

Case description

The studies involved a 10-year-old cross-breed dog of 32 kg. The animal was admitted to the Clinic of Infectious

Diseases, Department of Veterinary Medicine in Lublin, with symptoms of chronic inflammation of the external auditory meatus. Before the admission, the dog had been treated at other veterinary surgeries for 5 months. During an interview it was established that *otitis externa* had developed after the dog had swum in a lake. Since then, treatment with antibiotics used locally in the auditory channel had provided only a short-lasting improvement in the patient's condition, but the disease relapsed soon after discontinuing the treatment.

Clinical examination. Apart from apathy and the inflammation of the external auditory meatus of both ears, no irregularities were found during clinical examination. Body temperature, heart rate and breathing rate, as well as the values of haematological and biochemical parameters of the blood serum, remained within physiological norms. An examination with an otoscope showed redness and oedema of the external auditory meatus wall in both ears and the presence of a brown, greasy secretion. The dog was observed to constantly beat and rub its ears against various objects or the floor. Swabs were collected from the dog's ears for microbiological and parasitological tests.

Parasitological test. From the material collected from the ears, direct smears were prepared on slides, which were then flooded with KOH solution, heated over a burner, and evaluated under a light microscope. No parasites capable of causing inflammation of the external auditory meatus (*Sarcoptes scabiei*, *Demodex*) were observed.

Microbiological test. Using direct microscopic preparations on slides, made from the inflammatory secretion (collected with swabs) and stained with the Gram method, Gram-negative bacilli were detected, but no *Malassezia* organisms were found. At the same time, cultures of the tested material were grown on the following media: blood agar, McConkey agar, and Sabouraud agar. After a 48-hour incubation of the cultures, a growth of transparent, beta-hemolytic colonies of a light violet colour and approx. 0.5 mm in diameter with a slightly dense centre was observed on blood agar, while colourless colonies were found on McConkey agar. The microbes isolated showed the greatest sensitivity to marbofloxacin and enrofloxacin, less sensitivity to tetracycline and amoxicillin, and resistance to lincomycin, gentamicin, penicillin, and streptomycin.

The bacteria were identified with the API 20 E system (bioMérieux), which helped categorize the microbes as *Chromobacterium violaceum* (identification code 2244000). In none of the smears was the presence of fungi observed.

To confirm the pathogenicity of the microorganisms isolated, mice were infected intraperitoneally with a bacterial suspension of a density corresponding to the McFarland tube no. 1 (1,200,000 cfu). Twenty-four hours after the infection, the mice were apathetic and did not take food. Forty-eight hours after the infection, their condition worsened and they stopped taking water. The animals were euthanized, and clean cultures of *Chromobacterium violaceum* were isolated from their organs.

Treatment of the dog was based on the results of an antibiogram. Enrofloxacin (Enroxil Krka) was used systemically at a dose of 5 mg/kg once a day, while marbofloxacin with clotrimazole and dexamethasone acetate in Aurizon (Vetoquinol Biowet) were administered locally once a day, deep into the auditory channel. The therapy was continued for 14 days. The animal recovered by the end of treatment, regaining its temperament and appetite, while the symptoms of ear itching and the brown secretion from the ear abated. In ear smears collected in the 2nd and 6th week after the end of treatment, no *Chromobacterium violaceum* was observed.

Discussion

On the basis of the results of clinical and microbiological tests and treatment, it was concluded that the etiological factor for the inflammation of the external auditory meatus in the dog were *Chromobacterium violaceum* microbes. This article presents the first documented case of the infection of a dog with these pathogens in Poland. In the available literature there are only three cases of *Chromobacterium violaceum* infections in dogs: one in Australia (8) and two in Florida (5). Those were severe infections, accompanied by sepsis and damage to internal organs.

Chromobacterium violaceum lives in water environments and earth, showing a distinct preference for the former (7). In the case described, the occurrence of inflammation in the external auditory meatus directly after the dog swam in a lake, suggests that the source of infection was water. It should be underlined, however, that not all strains of *Chromobacterium*

violaceum are pathogenic. The pathogenicity of these microbes depends on their ability to produce endotoxin, and on increased activity towards the saprophytic strains of superoxide dismutase and catalase, conditioning the resistance of the bacteria to phagocytosis (13).

Treatment of infections caused by *Chromobacterium violaceum* is very difficult because of the resistance of these microbes to many antibiotics (6, 7). It seems that the most effective method of fighting such infections is the application of fluoroquinolones (5, 9, 14), which in this case (enrofloxacin + marbofloxacin) contributed to the dog's recovery.

It should be noted that the changing climatic conditions in Poland lead to the occurrence of pathogens that were until recently characteristic of tropical and subtropical areas. This applies not only to bacterial and viral infections but also to parasitic invasions. In cases of relapsing, chronic inflammations of ears, especially in dogs with tendencies to swim in open water, infection with *Chromobacterium violaceum* should be considered.

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