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Capnocytophaga cynodegmi Cellulitis, Bacteremia, and Pneumonitis in a Diabetic Man

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***Capnocytophaga cynodegmi* (formerly "DF-2 like organism"), a commensal organism of the canine oral cavity, is a capnophilic, gram-negative, facultative bacillus. *C. cynodegmi* has rarely been encountered in human diseases. We report the first known case of cellulitis, bacteremia, and pneumonitis caused by *C. cynodegmi* in a diabetic man from central India following a dog bite.**

CASE REPORT

A 59-year-old non-insulin-dependent diabetic man was hospitalized with a 24-h history of fever, purulent expectoration, and painful leg swelling. Two days earlier, he had been bitten by a stray dog. Immediately after the bite, the wound was cleaned, tetanus prophylaxis was administered, and an antirabies immunization schedule was initiated. On examination, he was toxic, febrile, tachypneic, and hypotensive, with signs of lower left lobe pneumonitis. Cellulitis over the ankle and the lower third of the left leg, pus discharge from the puncture wound, and regional lymphadenopathy were noticed. His hemoglobin was 122 g/liter, and his total white-cell count was 12.2×10^9/liter (80% polymorphs, 10% bands). A chest radiograph revealed left perihilar pneumonitis. Ankle and leg radiographs showed soft tissue swelling with no bone involvement. Blood glucose (random sample) was 21 mmol/liter (378 mg/dl). Echocardiography and renal and hepatic function test results were normal. Incision and drainage of the wound yielded 30 ml of pus. Penicillin, ciprofloxacin, gentamicin, metronidazole, saline, and crystalline insulin were administered intravenously. Over the next 5 days, the patient exhibited fluctuations of temperature (38.5 to 40°C) and remained ill. Three days after the initial collection and incubation, the blood, bronchoalveolar lavage fluid, sputum, and pus specimens obtained for culture yielded a capnophilic, gram-negative, facultative anaerobic bacillus that was positive for oxidase and catalase. Species identification of *Capnocytophaga cynodegmi* was based on the criteria of Brenner et al. (2). Punctate colonies of less than 1 mm in diameter were noted after 72 h on chocolate agar in 5% CO_2. The colonies appeared convex and smooth, exhibited confluent growth, and increased in size to 3 mm 120 h after initial incubation. The bacteria were gram negative, and they appeared as thin, 2- to 4-mm-long fusiform bacilli with slightly curved ends. The isolate was microaerophilic and exhibited luxuriant growth on heart infusion agar supplemented with 5% sheep blood and incubated at 35 to 72°C in the presence of 5% CO_2 (candle extinction jar). The organism was identified as *C. cynodegmi* and was differentiated from *Capnocytophaga canimorsus* by its ability to ferment sucrose, raffinose, xylose, and inulin and by its growth at 72°C. The isolate had gliding mobility, showed beta-hemolysis on blood agar with 5% rabbit blood, was positive for catalase, oxidase, arginine dihydrolase, *O*-nitrophenyl-β-D-galactopyranoside, and esculin, and produced acid from cellobiose, dextrin, fructose, D-glucose, glycogen, lactose, maltose, D-mannose, melibiose, D-galactose, starch, and raffinose. The isolate did not grow on MacConkey agar or triple sugar iron agar, was negative for indole, urease, lysine and ornithine decarboxylase, Simmon's citrate, nitrate, and gelatin, and did not produce gas from D-glucose or acid from D-mannitol or D-xylose. The antimicrobial susceptibility of our isolate was determined by the Kirby-Bauer disk diffusion method in chocolate agar supplemented with 5% sheep blood following incubation for 96 h at 37°C. The organism was susceptible to penicillin G, amoxicillin, chloramphenicol, norfloxacin, ciprofloxacin, ofloxacin, gentamicin, amikacin, kanamycin, netromycin, cephalexin, cefazolin, cefuroxime, cefotaxime, cefoperazone, ceftazidime, ceftriaxone, clindamycin, erythromycin, and vancomycin (5-μg disk; zone diameters, >16 mm) and resistant to tetracycline, doxycycline, colistin, and trimethoprim-sulfamethoxazole (zone diameters, <10 mm) and did not exhibit intermediate susceptibility (zone diameters, 10 to 16 mm) to any of the antibiotics tested. *Pseudomonas aeruginosa* and *Staphylococcus aureus* that were susceptible to the administered antibiotics were coisolated from the pus culture. Defervescence occurred on the seventh hospital day. Subsequent blood and pus cultures and chest radiographs remained noncontributory. Therapy was continued for 12 days. Three months later at follow-up, the patient was well on oral antidiabetic therapy.

Capnocytophaga spp. (Centers for Disease Control dysgonic fermenter 1 and 2 [DF-1 and DF-2]) are fastidious, capnophilic, facultatively anaerobic, gram-negative, filamentous rods with tapered ends and gliding mobility (2, 8, 10). The ecologic niche of the DF-2 group is the canine oral cavity (2, 8, 10). Over 150 DF-2 strains were reclassified on the basis of genetic relatedness and phenotypic characteristics as DF-2 (*C. canimorsus*) and DF-2-like (*C. cynodegmi*) organisms (2). *C. cani-*

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morsus can cause a wide spectrum of diseases, ranging from mild to fulminant (2, 3, 6, 8, 10, 11), and is frequently recovered from human blood, localized wounds following dog bites, other clinical specimens of immunocompromised patients, and occasionally in immunocompetent hosts (2, 3, 6, 8–11). Until now, only one report appeared in the English literature from the United States of a *C. cynodegmi* human wound infection (five strains) and post-corneal transplant endophthalmitis (one strain), with no evidence of systemic infection or immunocompromisation after dog bites or cat scratches (2). *C. cynodegmi* has not been previously recovered from a diabetic patient or in India (3, 13).

Most of the human isolates of *C. canimorsus* and *C. cynodegmi* from infected dog bite wounds occur as a part of aerobic and anaerobic polymicrobial flora (2, 3, 5, 7, 8, 10–12, 14), which may overshadow their clinical significance. In our patient, *P. aeruginosa* and *S. aureus* were isolated concurrently with *C. cynodegmi* from tissue fluid but were considered nonsystemic pathogens, as they were not grown in serial blood cultures.

Both *C. canimorsus* and *C. cynodegmi* attach to, are phagocytosed by, and multiply intracellularly in mouse macrophage cells (4). While *C. canimorsus* produces an exotoxin with cytotoxic effects within 48 h, *C. cynodegmi* has no such effects (4).

C. canimorsus is susceptible to penicillin, quinolones, clindamycin, and cephalosporins, as demonstrated by disk diffusion, agar dilution, and antimicrobial gradient strip-testing methods (1–3, 5–8, 11, 12). A significant number of *C. canimorsus* isolates demonstrate beta-lactamase activity (1, 5, 6, 8, 10, 11); variable trimethoprim-sulfamethoxazole, aminoglycoside, and metronidazole sensitivity (1, 5); and uniform resistance to aztreonam (1). Our data suggest that the drug susceptibility pattern of *C. cynodegmi* is similar to that of *C. canimorsus* (1–3, 5–8, 10, 12, 14), and penicillin can be considered the drug of choice for treatment of *C. cynodegmi*.

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