

## Case Report

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## Clostridium Cadaveris and Bacteroides Thetaiotaomicron Bacteremia in a Nonagenarian Patient: A Case Report

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## Case Report

We report the case of a 93-year-old man with a 2- to 3-day history of mild cough who presented in the emergency department with sudden-onset dyspnea, low level of consciousness, asthenia, tachypnea, and oxygen desaturation (SaO<sub>2</sub>, 89%).

The patient was an ex-smoker with a past history of hypertension, chronic bronchitis, and benign prostate hyperplasia. He was being assessed at a geriatric outpatient clinic for monoclonal gammopathy. He had become progressively dependent for all basic activities of daily living in the previous 2 months (Barthel Index 20/100, Lawton Scale 0/8) and had had mild to moderate cognitive impairment with slowly progressive memory loss for recent events since the previous year. He was a widower, lived with his niece, and had no home assisted devices. He was treated with aspirin and indapamide.

In the emergency department he presented fever spikes, and blood and urine samples were obtained for culture. Given the initial suspicion of respiratory tract infection with exacerbation of chronic bronchitis, therapy was started with antibiotics (levofloxacin), nebulization with anticholinergics, and oxygen. He was initially hospitalized in the pneumology service, but was transferred 24 hours later to a geriatric unit for continued medical treatment, assessment of monoclonal gammopathy, and evaluation of cognitive and functional impairment.

Laboratory studies revealed a leucocyte count of 12,000, neutrophilia, elevated acute phase reactants, persistent hemoglobin around 8 g/dl, and monoclonal gammopathy (IgG 1 g/dl, IgA 300 mg/dl, and IgM 45 mg/dl). Two units of blood were transfused. A CT scan of the brain revealed multiple small lytic lesions with no sclerotic halo and leukoariosis. Two of the 3 International Myeloma Working Group criteria were met, namely, monoclonal gammopathy and lytic lesions. Given the patient's situation and after discussion with the family, no further invasive tests were performed.

After 5 days of admission, blood cultures (3/3) yielded quinolone-sensitive *Escherichia coli* and *Clostridium cadaveris* (no antibiogram), and ciprofloxacin and metronidazole were initiated. Furthermore, an abdominal and pelvic CT scan was performed to further investigate nonspecific abdominal pain and the positive result in the fecal occult blood test. Thickening of the colon wall and an endoluminal mass (10 cm in diameter) were observed; the initial diagnostic suspicion was colon cancer (Figure 1). Given the risk-benefit ratio and the patient's progressive physical and cognitive deterioration, colonoscopy was not performed.

On day 12 of admission, and after a new fever spike, blood culture (3/3) yielded *Bacteroides thetaiotaomicron*. Ceftriaxone was initiated, and the patient remained afebrile without abdominal pain and with acceptable food intake, but with minimal improvement in functional status (Barthel Index 30/100).

Finally, given the findings of probable colon cancer, possible multiple myeloma, cognitive and functional impairment, advanced

frailty, poor prognosis in the short to medium term, and difficult medical management at home, the patient was transferred to a hospice 23 days after hospitalization. He died 53 days after admission to our department.

## Discussion

*Clostridia spp.* are gram-positive sporulated obligate anaerobic microorganisms that may be motile or non-motile [1]. Risk factors commonly associated with clostridial bacteremia include chronic alcoholism, sepsis after abdominal surgery, intestinal necrosis, urinary tract infection, cardio-respiratory diseases, underlying malignancy, diabetes mellitus, and decubitus ulcers [2].

*C. cadaveris* (formerly *C. capitovale*), is a motile Gram-positive strictly anaerobic rod which is non-toxin-producing and nonpathogenic in animals and humans, although it colonizes the gastrointestinal tract [2,3] It was first described in 1899 by Klein, who found the species in putrefying bodies and noted that *C. cadaveris* was the most prominent species of bacteria during the decay of cadavers [3].

To date, 10 cases of infection by this bacteria have been reported in the English-language literature; 5 cases of bacteremia (decubitus ulcer infection, perforated diverticulitis, pericarditis, and 2 cases with



Figure 1: Abdominal-pelvic computerized tomography image showing an endoluminal mass measuring approximately 10 cm in diameter (arrow).

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a history of malignancy in pediatric patients), 1 case of spontaneous bacterial peritonitis, 1 case of pleural empyema caused by aspiration of aerosol from dead animal material, 1 case of meningitis, and 2 cases of post-surgery infection (1 intraperitoneal abscess and 1 case of septic arthritis) [1-8]. In most cases, it seems that infection originated in the gastrointestinal tract and was associated with immunosuppression (e.g., severe liver disease, metastatic cancer, alcohol abuse, and chronic corticosteroid therapy). The mortality rate can reach up to 50% [5].

The antibiotic of choice is metronidazole, which is active against virtually all strains of *Clostridium spp.* and is considered first-line therapy, although aminoglycosides and penicillin beta-lactamase inhibitors have also been used [5,8].

We report the oldest patient with *C. cadaveris* bacteraemia to date. The patient was potentially immunosuppressed (monoclonal gammopathy with suspected multiple myeloma) and had respiratory infection. We considered the positive blood culture a possible first sign of intestinal neoplasm. Hence, bacterial translocation from this site through a tumor could have been a plausible source of bacteraemia.

*Bacteroides spp.* are gram-negative, non-sporulated, anaerobic rods that account for 30% of the bacteria in the gastrointestinal tract. They are also part of the normal flora of the oral cavity, vagina, and respiratory tract and are one of the most important groups of anaerobic commensals [9].

*B. thetaiotaomicron* represents 6% of all the bacteria and 12% of all *Bacteroides spp.* in the human intestine. It modulates the expression of a large number of genes involved in host physiology in 3 ways: by strengthening the mucosal barrier, by modulating the immune system, and by metabolizing nutrients. However, reports of infection have led to it being considered an opportunistic pathogen. The most common infections are soft tissue and bone infections and intra-abdominal conditions such as abscesses, surgical infections, intestinal perforation, intestinal obstruction, and colorectal cancer [10,11]. The patient we report on is also the oldest to date to have bacteremia caused by *B. thetaiotaomicron*, and even though this infection was not the direct cause of death, the presence of the pathogen in the bloodstream pointed to an underlying malignancy.

*C. cadaveris* and *B. thetaiotaomicron* have traditionally been identified using an automated analytical profile index, although nowadays molecular techniques or mass spectrometry-based approaches are quite common (MALDI-TOF) [12].

As with *C. cadaveris*, the treatment of choice is metronidazole, although susceptibility to clindamycin, amoxicillin-clavulanate, carbapenems, and moxifloxacin has also been reported [9-11].

In conclusion, we present the case of a nonagenarian patient with *C. cadaveris* and *B. thetaiotaomicron* bacteremia. The infection was gastrointestinal in origin, with probable colon cancer and a possible underlying multiple myeloma. These two unusual microorganisms usually colonize the gastrointestinal tract; however, they can cause systemic infection in patients with immunosuppression, cancer, and gastrointestinal diseases or injuries.

Although the exact cause of death is not known, clinical and laboratory findings point to an active neoplastic process that could have led to progressive physical and cognitive deterioration and, eventually, death. A histopathology study would have been of great help in establishing a definitive diagnosis. However, given the patient's comorbid conditions and clinical course, as well as his advanced state

of frailty, the utility of an invasive procedure would have been minimal.

Microorganisms such as *C. cadaveris* and *B. thetaiotaomicron* are increasingly identified as unusual pathogens in our growing population of immune compromised elderly patients. The relevance of the geriatric assessment as an important tool that can help us to better define a therapeutic approach and differentiate between symptoms related to geriatric syndromes and those secondary to cancer.

## Contributorship Statement

Francisco Javier Ortiz Alonso and Nuria Montero Fernández help on the planning and conduct of the manuscript. NéstorFabricio PereyraVenegas and José Antonio Serra-Rexach are responsible of editing and reporting the case.

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## Conflicts of Interest Statement

The authors declare no conflict of interests.

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