

## NEW MICROBES IN HUMANS

# *Butyricimonas virosa* bacteraemia and bowel disease: case report and review

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## Abstract

Only two cases of human infection with the anaerobic Gram-negative bacillus *Butyricimonas virosa* have been previously reported. We describe the case of a 69-year-old man with *B. virosa* and diverticulitis, further supporting an association of bacteraemia with this pathogen to bowel disease. We also summarize the characteristics of the previously described cases.

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## Introduction

A 69-year-old Ecuadorian man with no known medical history initially presented to the emergency department at the Einstein Division of Montefiore Medical Center with complaints of several days of headache and chills. At the time of evaluation, the patient was afebrile (temperature 36.7°C), with a white blood cell count of 9.9 g/L (normal range, 4.8–10.8 g/L). Blood

and urine specimens were collected for culture, and the patient was discharged home.

Five days after presentation to the emergency department, Gram-negative bacilli were isolated from the anaerobic blood culture bottle. The patient was telephoned and advised to return to the hospital for further evaluation.

At admission to the general medicine ward, the patient was afebrile (temperature 36.7°C) with a white blood cell count within the normal range, at 5.9 g/L. His previous headaches and chills had spontaneously resolved, and he was now asymptomatic. He denied vomiting, abdominal pain, diarrhoea or constipation. His physical examination revealed normal heart sounds, clear lungs and a soft, nondistended and nontender abdomen. He underwent computerized axial tomography of the abdomen and pelvis without contrast. This revealed diverticulosis of the distal descending and proximal sigmoid colon with minimal stranding and no fluid collection, consistent with mild diverticulitis. The patient initially received one dose of ceftriaxone for Gram-negative bacteraemia of unclear origin, but therapy was changed to oral ciprofloxacin and metronidazole in light of the radiologic findings, before final identification of *B. virosa*. Although antibiotics do not hasten recovery or prevent relapses in uncomplicated diverticulitis, this patient's documented bacteraemia, by definition, classified his condition as complicated diverticulitis, for which antibiotics are advised [1].

The Gram-negative bacilli isolated in the anaerobic bottle were identified as *Butyricimonas virosa* by matrix-assisted laser desorption/ionization time-of-flight mass spectrometry (MALDI-TOF MS) (Microflex MALDI Biotyper instrument, Bruker Daltonics, Leipzig, Germany) by Real Time Classification 3.1 software). The isolate score (2.098) and consistency category (A) were indicative of a reliable species level identification. Antibiotic susceptibilities were determined by Etest and demonstrated resistance to penicillin G (minimum inhibitory concentration (MIC) >32) and ceftriaxone (MIC >32.0). However, the organism was susceptible to piperacillin/tazobactam (MIC 0.125) and metronidazole (MIC 1.0).

The patient's hospital course was brief and uneventful. He was discharged to complete a 14-day course of oral antibiotics as an outpatient. Colonoscopy was performed soon after discharge, with the examination revealing several hyperplastic polyps and a sessile serrated adenoma, all of which were resected. However, there was no evidence of malignant colonic neoplasm upon pathology evaluation.

## Discussion

Although generally uncommon, anaerobic organisms do contribute to bloodstream infections, accounting for 0.5 to 12%

**TABLE 1. Characteristics of three patients with *Butyrivimonas virosa* bacteraemia**

Age	Gender	Reason for initial presentation	Clinical presentation	Diagnostic Methods	Susceptibilities	Outcome
72	M	Aortic aneurysm surgery in patient with previously diagnosed adenocarcinoma of colon [3]	Fever 24 days after surgery. Anaerobic blood cultures with Gram-negative bacilli.	16S rRNA gene sequencing	Susceptible: amp, ams, amc, tzp, ipm, mem, cli, mtz	Septic shock and later death due to infection with another organism
81	M	Whipple procedure for adenocarcinoma of duodenum [4]	Fever 18 days after Whipple procedure. Anaerobic blood cultures with Gram-negative bacilli.	MALDI-TOF MS	Resistant: kan, van, cst	Recovered without antibiotic therapy
69	M	Headache and chills	Headache and chills. Acute complicated diverticulitis. Anaerobic blood culture bottles with Gram-negative bacilli.	MALDI-TOF MS	Resistant: pen, ctx. Susceptible: tzp, mtz	Recovered before initiation of oral antibiotic therapy

amc, amoxicillin/clavulanate; amp, ampicillin; ams, ampicillin/sulbactam; cli, clindamycin; cst, colistin; ctx, ceftriaxone; ipm, imipenem; kan, kanamycin; MALDI-TOF MS, matrix-assisted laser desorption/ionization time-of-flight mass spectrometry; mem, meropenem; mtz, metronidazole; pen, penicillin; tzp, piperacillin/tazobactam; van, vancomycin.

of all positive blood cultures [2]. The most commonly isolated organisms are of the *Bacteroides fragilis* group, *Clostridium* spp., and *Peptostreptococcus* spp. [2]. Anaerobic bacteraemia has been most frequently associated with an abdominal source of infection, which accounts for about 50 to 70% of cases [2].

There are two other reported cases of human infection with *B. virosa*. The first case was described by Toprak et al. [3] in a 72-year-old man with previously diagnosed adenocarcinoma of the colon who was found to have fever 24 days after aortic aneurysm surgery; blood cultures revealed Gram-negative bacilli in the anaerobic bottle, and the organism was identified as *B. virosa* by 16S rRNA sequencing. The second case was described by Mehta et al. [4] in an 81-year-old male veteran who developed fever 18 days after a Whipple procedure for adenocarcinoma of the duodenum [4]. Gram-negative bacilli were isolated from the anaerobic blood culture bottle after 5 days of incubation and confirmed to be *B. virosa* by MALDI-TOF MS.

Our patient's bacteraemia was most likely due to acute diverticulitis, or inflammation of diverticula, which is often accompanied by gross or microscopic perforation [5]. This is the presumed source of the *B. virosa* bacteraemia, as *Butyrivimonas* spp. have previously been isolated from the human gastrointestinal tract and faeces [6,7]. Given our patient's diagnosis of diverticulitis, he later underwent colonoscopy with biopsy that did not reveal evidence of malignant colonic neoplasm, although polyps and an adenoma were present.

The only two previously reported cases of human infection with *B. virosa* were described in patients with documented malignancies of the gastrointestinal tract (Table 1). Those patients were also both male and in the sixth to eighth decade of life. Fever was noted several weeks after the initial hospitalization. This is in contrast to our patient, who reported subjective fever but did not record his temperature at the time of his symptoms, so it is not known if he was truly febrile. Two of the three patients recovered from the infection.

Before final identification of the *B. virosa* isolate, our patient was treated with ciprofloxacin and metronidazole in order to provide empiric coverage for typical gastrointestinal flora. Susceptibility testing of the isolate revealed penicillin and ceftriaxone resistance, but susceptibility to metronidazole. Toprak et al. [3] did not provide data on antimicrobial resistance, but they reported that their isolate was susceptible to penicillin derivatives, clindamycin and metronidazole (Table 1).

In conclusion, this is only the third reported case of human infection caused by *B. virosa*, but the first case of *B. virosa* bacteraemia due to diverticulitis and the first not associated with a known gastrointestinal malignancy. Rapidly advancing technology such as MALDI-TOF MS is now available to many clinical laboratories and has provided for expedited and accurate identification of bacteria and other organisms [8]. These advances have led to the recognition of pathogens such as *B. virosa* that were previously considered rare or were not known to cause human disease [9]. The use of rapid-identification systems such as MALDI-TOF MS continues to provide a broader understanding of the clinical burden and spectrum of disease caused by rarely isolated bacteria such as *B. virosa* and may lead to improved patient care in the future.

### Conflict of Interest

None declared.

### References

- [1] Wilkins T, Embry K, George R. Diagnosis and management of acute diverticulitis. *Am Fam Physician* 2013;87:612–20.
- [2] Lassmann B, Gustafson DR, Wood CM, Rosenblatt JE. Reemergence of anaerobic bacteremia. *Clin Infect Dis* 2007;44:895–900.

- [3] Toprak NU, Bozan T, Birkan Y, Isbir S, Soyletir G. *Butyricimonas virosa*: the first clinical case of bacteraemia. *New Microbes New Infect* 2015;4: 7–8.
- [4] Mehta SR, Estrada J, Basallo C, Farala A, Fierer J. *Butyricimonas virosa* bacteraemia identified by MALDI-TOF. *New Microbes New Infect* 2015;8:127.
- [5] Jacobs DO. Diverticulitis. *N Engl J Med* 2007;357:2057–66.
- [6] Sakamoto M, Tanaka Y, Benno Y, Ohkuma M. *Butyricimonas faecihominis* sp. nov. and *Butyricimonas paravirosa* sp. nov., isolated from human faeces, and emended description of the genus *Butyricimonas*. *Int J Syst Evol Microbiol* 2014;64(Pt 9):2992–7.
- [7] Wang F, Yu T, Huang G, Cai D, Liang X, Su H, et al. Gut microbiota community and its assembly associated with age and diet in Chinese centenarians. *J Microbiol Biotechnol* 2015;25:1195–204.
- [8] Carbonnelle E, Mesquita C, Bille E, Day N, Dauphin B, Beretti J, et al. MALDI-TOF mass spectrometry tools for bacterial identification in clinical microbiology laboratory. *Clin Biochem* 2011;44:104–9.
- [9] Seng P, Abat C, Rolain JM, Colson P, Lagier JC, Gouriet F, et al. Identification of rare pathogenic bacteria in a clinical microbiology laboratory: impact of matrix-assisted laser desorption ionization–time of flight mass spectrometry. *J Clin Microbiol* 2013;51:2182–94.