

First Case of *Victivallis vadensis* Bacteremia

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Abstract

Introduction: *Victivallis vadensis*, a strictly anaerobic, non-motile, non-spore-forming, gram negative coccus, was first isolated in 2003 from the feces of a healthy Dutch male, and it is considered a component of the human gastrointestinal microbiome.

Presentation of Case: We present the case of an 18-year-old male with fever, chills, and abdominal pain, who developed ruptured appendicitis and was found to have *V. vadensis* bacteremia on blood culture.

Discussion: Prior papers have described difficulties in culturing *V. vadensis*. However, this isolate grew in 4 days on an anaerobically incubated blood agar plate. *V. vadensis* was the sole organism recovered from blood culture in this case, but it has never been reported to cause disease in humans. Blood cultures were collected shortly after administration of IV antibiotics, and growth of other organisms may have been inhibited by the administered antibiotics. It is unclear if the presence of *V. vadensis* bacteremia caused any of the patient's symptoms or was simply the result of transient bacteremia related to ruptured appendicitis.

Conclusion: This is the first reported case of *V. vadensis* bacteremia, however, the significance of this isolate as it relates to clinical disease is unclear.

Keywords: *Victivallis vadensis*; Bacteremia; Appendicitis; Microbiota; Gram-Negative; Anaerobic

Introduction

Victivallis vadensis is a strictly anaerobic, non-motile, non-spore-forming, gram negative coccus. It was described in 2003, when isolated from a fecal sample from a healthy Dutch man as a part of a human microbiome study in Wageningen, Netherlands [1] and based on 16S rRNA sequencing, it was identified as a novel species. Subsequently, *V. vadensis* was identified by 16s rRNA sequencing as a minor component of landfill leachate in France [2] and in a study in China assessing microbial fuel cells used in the generation of electricity and treatment of wastewater [3]. Other reports of *V. vadensis* in the literature include a genome sequencing study of a *V. vadensis* strain isolated from human feces [4] and identification of a novel β -galactosidase produced by *V. vadensis* [5]. To our knowledge there are no prior reports of *V. vadensis* bacteremia in humans. We present the first case of *V. vadensis* bacteremia, which occurred in a patient with ruptured appendicitis.

Presentation of Case

We present the case of an 18-year-old male with past medical history significant for autism, developmental delay, hearing loss and speech delay who presented to the Emergency Department (ED) with a 2 days history of fevers (T max 38.3°C) with associated chills as well as non-specific abdominal pain, initially difficult to localize, later with localization to right lower quadrant.

The patient was initially treated at home with acetaminophen, but there was minimal relief of symptoms. A limited review of systems was obtained in the ED. It was remarkable for decreased oral intake and nausea, but no emesis or diarrhea was reported.

Upon initial evaluation in the ED, the patient was found to be tachycardic, but normotensive with adequate perfusion and normal oxygen saturation. His mental status was unchanged, but the patient was distressed and diaphoretic from abdominal pain. Abdominal exam revealed right lower quadrant tenderness with guarding. Heart, lung, skin and genital examinations were normal.

Initial lab work revealed no leukocytosis, but significant bandemia of 25% was seen as well as normal hemoglobin and platelet count. The patient had normal electrolytes and a mild metabolic acidosis. Transaminases and pancreatic enzymes were normal. A single blood culture set (2 bottles: 1 aerobic, 1 anaerobic) was collected.

Imaging studies included an ultrasound of the appendix and abdominal radiograph. The ultrasound did not fully visualize the appendix, but a small amount of free fluid was noted in the right lower quadrant. Abdominal radiograph revealed a nonspecific gaseous distension of a single loop of large bowel. Air and stool were seen distally. No free air and no dilation of small bowel were seen.

Clinical course while in ED was complicated by the development of fever (38.5°C) and clinical worsening with diaphoresis and diffuse abdominal guarding suggesting an acute abdomen. Further imaging was obtained. Abdominal CT with contrast was consistent with appendicitis with micro-perforation and purulent ascites. Several loops of air-distended small and large bowel were present, representing ileus, likely reactive to diffuse peritonitis. No intra-abdominal abscesses were seen.

A diagnosis of acute appendicitis with likely perforation was made; the patient was started on empiric antibiotics with metronidazole and ceftriaxone and taken to the OR for emergent laparoscopic appendectomy. Post-operative course was uncomplicated.

Evaluation of the specimen in surgical pathology confirmed the diagnosis of acute appendicitis with perforation. There was grossly visible transmural perforation and fibrinous exudate.

According to the hospital information system, the blood culture was collected in the ED approximately 37 minutes after the start of administration of IV antibiotics (metronidazole and ceftriaxone). The anaerobic bottle (BacTec Plus Anaerobic/F) flagged "positive" 3 days and 9 hours after collection, and a Gram stain showed small gram negative cocci. The specimen was plated to blood, chocolate and MacConkey agar plates for aerobic incubation and a CDC blood agar plate for anaerobic incubation (Figure 1a, 1b, 2a and 2b). Small round gray colonies were seen on the anaerobically incubated blood agar plate on the 4th day following plating. No growth was seen on aerobic media. Identification was attempted by Matrix Assisted Laser Desorption Ionization Time of Flight Mass Spectrometry (MALDI-TOF MS; Vitek MS v2.2, bioMérieux), but was unsuccessful (No ID). Sanger sequencing (first 500 bp of the 16S gene) was performed and the isolate was identified as *Victivallis vadensis* strain Cello (446/447 bp match, 99.78% match, 0/447 bp gap, 0% gap). There was good separation from the next closest match *Lentisphaera araneosa* (384/458 bp match, 83.84% match, 15/458 bp gap, 3.28% gap).

Subsequent blood cultures collected on hospital days 5 (x1), day 7 (x2) were negative.

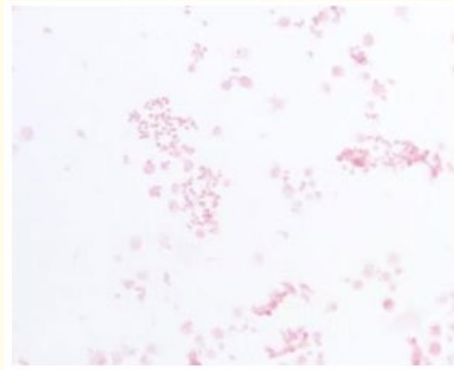


Figure 1a: Gram stain of *Victivallis vadensis* from positive blood culture bottle.

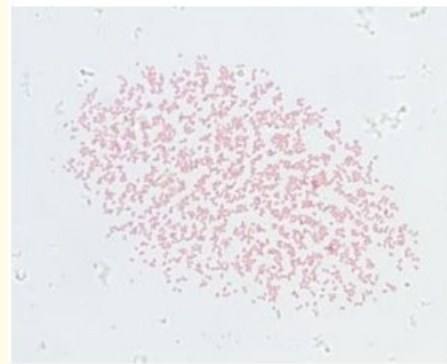


Figure 1b: Gram stain of *Victivallis vadensis* from anaerobically incubated Blood agar plate.

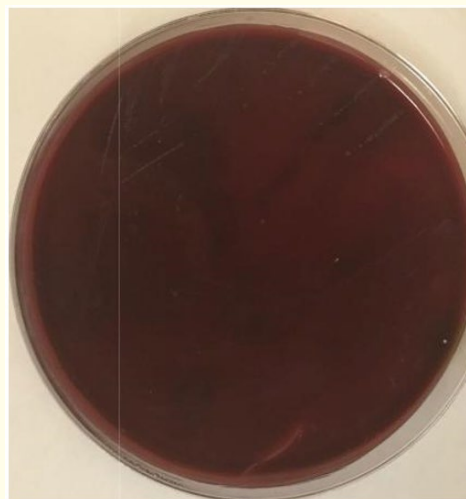


Figure 2a: Growth of *Victivallis vadensis* on blood agar plate after 4 days incubation.

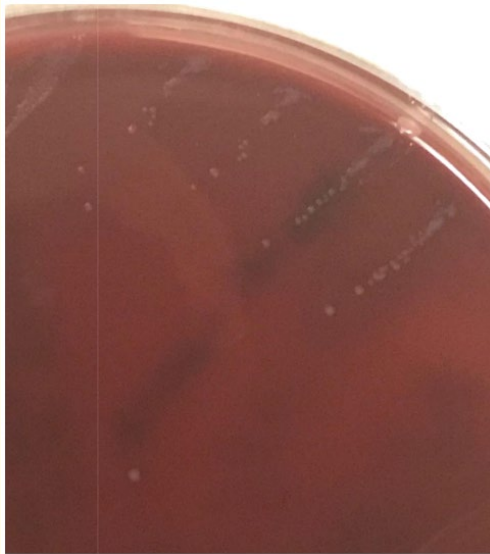


Figure 2b: Small round grey colonies of *Victivallis vadensis* on anaerobically incubated blood agar plate.

Post-operative course was complicated by ileus, and the patient remained hospitalized 2 weeks. Following completion of antibiotic therapy he was discharged home in good condition. However, he did return to the ED 3 days later with diarrhea and was diagnosed with *C. difficile* colitis. Blood cultures on readmission were negative. The patient was treated for *C. difficile* and was doing well at 2 week follow up appointment.

Discussion and Conclusion

Victivallis vadensis is considered a part of the human gastrointestinal microbiome. It has been identified in human stool by 16S rRNA sequencing and isolated from human feces in culture.

In this case we isolated *V. vadensis* from blood in a patient with ruptured appendicitis. The Gram stain findings (Small gram negative cocci) and some growth conditions (Strictly anaerobic) are consistent with *V. vadensis*. Sequencing results for the isolate were consistent with *V. vadensis* with good separation from the next closest match *L. araneosa*, which is related but separate from *V. vadensis*. Both organisms are in the phylum *Lentisphaerae* which contains only two orders, *Victivallales* and *Lentisphaerales*. *V. vadensis* is a member of the *Victivallales* order while *L. araneosa* belongs to the *Lentisphaerales* order, which consists of Gram negative aerobic and anaerobic marine bacterium.

In the initial study identifying *V. vadensis* as a novel species the authors report the inability of this organism to grow on normal media [1] and failure of the organism to grow on solid media (2% agar, plates and roll tubes) despite multiple attempts. In their study no colonies grew on Biolog Universal Anaerobic (BUA) agar plates though growth on soft agar was reported in Wilkens-Chalgren broth and modified KA media (no haemin, bacteriological peptone/Oxoid instead of tryptic peptone from meat). In the only other study describing culturing of *V. vadensis*, specially made media was used" [5]. Why we were successful in growing *V. vadensis* in blood culture bottles and on CDC blood agar plates is unclear, though the prior reports do not mention attempts to grow this organism in blood culture bottles or traditional anaerobic blood agar plates.

The clinical implications of isolation of *V. vadensis* in this case are unclear. Only one set of blood culture bottles (aerobic and anaerobic) were collected at the time of admission, and *V. vadensis* was the sole organism isolated in these blood cultures. A second set of blood culture bottles were not collected. Collection of 2 sets of blood culture bottles is often used to assess for contamination with skin microbiota.

V. vadensis is not considered skin microbiota and would be an unusual contaminant given the rarity of reports of isolation of this organism.

Bacteremia is a potential complication of appendicitis. While *V. vadensis* was the sole organism isolated by blood culture in this case, it has never been reported to cause disease. Blood cultures were drawn approximately 30 minutes after the initiating of administration of IV antibiotics (metronidazole, ceftriaxone). As a culture was not collected prior to the administration of antibiotics, it is cannot be determined if other infectious organisms were initially present in the patient's blood. However, the administration of antibiotics may have inhibited the growth of other potentially clinically relevant organisms if they were present. It is also therefore, unclear if the presence of *V. vadensis* bacteremia caused any of the patient's symptomatology or was simply the result of transient bacteremia related to ruptured appendicitis. There are no Clinical and Laboratory Standards Institute (CLSI) established criteria for antibiotic resistance for *V. vadensis* and thus the isolate was not tested for resistance to metronidazole or clindamycin. Additionally, the literature does not indicate any patterns of susceptibility for *V. vadensis* or that susceptibility testing has been undertaken. It thus cannot be determined if the isolate in this case was resistant to the antibiotics administered to the patient.

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Declarations of Interest

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