C. glycolicum as the Sole Cause of Bacteremia in a Patient with Acute Cholecystitis

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Abstract. Here we describe a case of Clostridia glycolicum (C. glycolicum) bacteremia in a bedridden elderly man with chronic illnesses. The bacterium was identified by the Remel RapID ANA II System. We believe that this is the fifth published report of human illness caused by this bacterium. In the four previously reported cases, C. glycolicum was found in cultures with other bacteria. This is the first reported case in which C. glycolicum was the sole causative agent of disease.

Case Report

The patient was a 67-year-old man with coronary arterial disease (stent in November 2005), chronic heart failure with severely reduced ejection fraction, atrial fibrillation, venous thrombosis, prostate cancer (radiation therapy in February 1996), and a psychiatric history. He was legally blind and had been bedridden for 2 years due to his illnesses. His medications included lisinopril, omeprazole, simvastatin, aspirin, digoxin, furosemide, metoprolol succinate, and warfarin. He was admitted to the hospital with a temperature of 100.3°F and complaining of abdominal pain for 4 days. Complete blood count showed white blood cell count 13.9 x 10^9/L, with the following differential: granulocytes, 88.9% (12.4 x 10^9/L); lymphocytes: 6.1% (0.85 x 10^9/L); and monocytes: 3.8% (0.53 x 10^9/L). Abdominal computed axial tomographic (CT) scan showed gallbladder wall thickening with pericholecystic fluid and ascites. The patient was diagnosed with acalculous cholecystitis, and three sets of blood samples were sent for culture. After one day’s incubation in the BACTALERT system (Biomerieux, Durham, NC, USA), all three anaerobic blood cultures were positive for gram-positive, rod-shaped bacteria. After subculture on blood agar plates, the specimen was submitted to Remel RapID ANA II System (Remel, Lenexa, KS) and identified as C. glycolicum (spore location: subterminal spores; nitrate: negative; CO2 growth: negative; glucose: positive; gelatin: negative; milk digestion: negative; lipase: negative; lecithinase: negative; motility: positive). The patient received piperacillin/tazobactam intravenously for one week with significant improvement of symptoms. The white blood cell count decreased to 7.5 x 10^9/L, with a differential of: granulocytes 78.2% (5.9 x 10^9/L), lymphocytes 12.2% (0.915 x 10^9/L), and monocytes 7.5% (0.56 x 10^9/L). Consequently, the patient was discharged to a nursing home. Two months later, the patient expired from congestive heart failure.

Discussion

C. glycolicum was first identified from mud by Gaston and Stadtman in 1962 [1]. It is an anaerobic, gram-positive, spore-forming, motile, slender
rod ranging from 2 to 15 μm in length. Multiple strains of this organism, which share largely similar biological features, have been recovered [1-4]. The original strain isolated by Gaston and Stadtman is strictly anaerobic, but an aerotolerant strain, RD-1, has also been recovered [4]. Subsequently, this bacterium was recovered from a variety of soils, oil mill wastewaters, sea-grass roots, as well as from human, bovine, and lizard feces [2-6]. In addition, it has been found to inhabit the gastrointestinal tract of humans [7]. Animal infection by this organism has occasionally been reported in addax and ornate Nile monitor [8, 9]. Rare human infection has also been described (see below) [10,11]. The biochemical phenotype of *C. glycolicum* has also been well characterized and has been adopted in many bacterium identification systems [12, 13], including the Remel RapID ANA II system used in this study. Due to their convenience and accuracy, molecular techniques, such as 16S rRNA gene sequencing and DNA-DNA hybridization, are now increasingly being used to identify this organism in place of traditional identification methods [7, 14]. Currently, there appears to be little information regarding cytotoxins produced by this organism. One in vitro screen test, using morphological changes of embryonic lung fibroblasts as the indicator, failed to identify any cytotoxins from *C. glycolicum* [15]. Susceptibility testing reveals that *C. glycolicum* is sensitive to amoxicillin-clavulanate, clindamycin, metronidazole, and vancomycin [16]. No drug resistance to this organism has thus far been reported.

The first case of human infection was published in 2007 [7]. In this case, the patient was diagnosed with Hodgkin’s Lymphoma and was an immunosuppressed bone marrow transplant recipient. Two out of three sets of blood cultures from this patient also grew *Enterococcus spp* in addition to *C. glycolicum*. Subsequently, another case involving *C. glycolicum* was reported in a brain abscess in a 62-year-old immunocompetent man with otitis media and mastoiditis who used clay to treat the otitis [10]. In this case, cultures of the abscess showed mixed flora and included, in addition to *C. glycolicum*, two types of *E. coli*, *Streptococcus spp*, two types of anaerobic Gram negative rods that the authors were not able to speciate, and *Brevibacterium spp*. However, blood cultures grew only *C. glycolicum*. Jiang *et al.* have recently described two cases of wound infection in young immunocompetent patients [11]. In both cases *C. glycolicum* was one of several species grown from the wound. In the first case, culture of a scalp wound containing a foreign body grew two species of *Bacillus* and a *Clostridium* species in addition to *C. glycolicum*. In the second case, the flora of a wrist wound sustained in a motor vehicle accident contained both *Veillonella spp* and *C. glycolicum*. It therefore appears that our case is unique in that *C. glycolicum* was the sole organism grown in the patient’s cultures.

The fact that only four cases of human infection by *C. glycolicum* have been reported since the first isolate of this bacterium in 1962 suggests that this organism is opportunistic and has low virulence. In all four of the previously reported cases, this organism was found to occur together with other organisms. (The possible exception to this is the brain abscess case described above, in which blood cultures were positive only for *C. glycolicum* even though multiple organisms were cultured from the abscess.) This observation suggests either that this organism does not itself cause disease or that it requires other bacterial species to produce clinical illness.

However, in the current reported case, the fact that *C. glycolicum* was the sole organism isolated from the patient’s blood culture suggests that it can cause disease by itself. The patient, who was elderly and bed-ridden as a result of multiple diseases, may have been predisposed to acquiring opportunistic infection due to his immunocompromised state, as occurred in the patient with Hodgkin’s Lymphoma. Since *C. glycolicum* is known to inhabit the gastrointestinal tract [7], and since the patient was found to have acalculous cholecystitis, the source of infection may have been the gallbladder.

In summary, here we report the fifth case of human infection by *C. glycolicum*, which is a normal flora in the human colon and an elusive human pathogen. Presently, this is the only case described in which *C. glycolicum* was the sole pathogen causing severe disease. Given its disease-causing potential/little-understood mechanism/etc., the clinical significance of *C. glycolicum* merits further investigation.
References