

# Spontaneous bacterial peritonitis caused by *Streptococcus bovis*: case report and review of the literature

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## ABSTRACT

Spontaneous bacterial peritonitis (SBP) is a frequent and severe complication that occurs in patient with cirrhosis and ascites. It occurs in 10% to 30% of patients admitted to hospital. The organisms that cause SBP are predominantly enteric. *Escherichia coli* is the most frequent recovered pathogen, and Gram-positive bacteria, mainly *Staphylococcus* spp., are being considered an emerging causative agent of SBP. *Streptococcus bovis* that may be found as part of the commensal bowel flora in about 10% of healthy adults constitute an uncommon cause of peritonitis that was first reported in 1994. We describe the first case of SBP at the University Hospital of Santa Maria (HUSM) caused by *S. bovis*, resistant to the antibiotics erythromycin and clindamycin (inducible clindamycin resistance detected by disk diffusion test using the D-zone test).

**Keywords:** peritonitis, *Streptococcus bovis*, cirrhosis, ascites.

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Bacterial infections are a frequent and severe complication of liver cirrhosis. The spontaneous bacterial peritonitis (SBP) is a common complication of cirrhotic patients with ascites. All cirrhotic patients with ascites can develop SBP.<sup>1</sup> The prevalence of SBP in cirrhotic patients with ascites admitted to a hospital ranges between 10% and 30%.<sup>2,3</sup> A vast majority of such infections are due to gastrointestinal Gram-negative bacteria, mainly *Enterobacteriaceae*. However, these data refer mainly to community-acquired infections. The etiologies of nosocomial infections have undergone changes, and Gram-positive bacteria have emerged as the most common cause of infection among hospitalized patients.<sup>4</sup> *Staphylococcus aureus* is actually recognized as an important pathogen in cirrhotic patients.<sup>5</sup> Different species of *Streptococcus* have been isolated from ascitic fluid. Although, *Streptococcus bovis* is a rare cause of SPB and has only been reported in a few cases<sup>6</sup> first related in 1994,<sup>7</sup> we report a case of spontaneous bacterial peritonitis due to this microorganism and review the previous reports.

## CASE REPORT

A 75-year-old man with cirrhosis due to alcohol abuse, diagnosed 3 years before admission, was admitted with fever, fine tremor, abdominal

pain, abdominal distention, and diarrhea. On presentation, his temperature was 37.8° C. Laboratory tests revealed an Hb of 8.8 g/dL; hematocrit 29%, white blood cell (WBC) count of 6,400/mm<sup>3</sup> with 18% neutrophils; AST 44 UI/L, ALT 17 UI/L, alkaline phosphatase 54 UI/L, gamma-glutamyl transferase (GGT) 11 UI/L, total bilirubin 2.65 mg/dL, direct bilirubin 1.30 mg/dL, C-reactive protein 13.27 mg/dL, urea 106.6 mg/dL, creatinine 2.6 mg/dL. Ceftriaxone therapy was started empirically for treatment of intra-abdominal infection. The patient died one day after hospitalization. *Streptococcus bovis* was subsequently isolated of ascitic fluid.

## PAST MEDICAL HISTORY

The patient was being monitored at HUSM since 2005 when he presented mild chronic gastritis, grade 2, no atrophic, with search of *Helicobacter pylori* positive; antibodies anti-HBc non-reagent. In 2007, he was admitted to this hospital, with diffuse abdominal pain, and abdominal distention; through upper endoscopy was diagnosed esophageal varices and portal hypertension. The patient was submitted to paracentesis; the culture of ascitic fluid was negative. Empirical antibiotic therapy was initiated

**Table 1. Summary of clinical information for reported cases of spontaneous bacterial peritonitis due to *S. bovis* infection**

Case reports (number of patients)	Age (yr) (sex)	Clinical presentation	Outcome
Lossos I <i>et al.</i> , 1994 (1)	25 (M)	Fever, fatigue, jaundice	Recovery
Ackerman <i>et al.</i> , 1995 (1)	69 (M)	Fever, GI bleeding	Recovery
Gloria <i>et al.</i> , 1996 (2)	52 (M), 58 (M)	Fever (2), jaundice, change in mental status, abdominal pain	Death
Macedo <i>et al.</i> , 1997 (1)	57 (M)	Fever, abdominal pain	Recovery
Shad and Schindler, 1999 (1)	70 (F)	Change in mental status	Recovery
Genuth, 2000 (1)	64 (M)	Abdominal pain, abdominal distention	Recovery
Eledrisi <i>et al.</i> , 2000 (1)	46 (M)	Abdominal pain, GI bleeding	Recovery
Vilaichone <i>et al.</i> 2001 (7)	54 (F), 58 (F), 58 (M), 62 (F), 65 (F), 69 (F), 63 (F)	Fever (7), GI bleeding (2), abdominal pain (2), abdominal distention (4), change in mental status (3), jaundice	Recovery
Hörner <i>et al.</i> , 2009 (1)	75 (M)	Fever, abdominal pain, abdominal distention, diarrhea	Death

immediately with ceftriaxone. The suspected diagnosis was hepatocellular carcinoma.

Table 1 presents a summary of the sixteen patients with spontaneous bacterial peritonitis due to *S. bovis*, reported in the literature, and important clinical information.

## DISCUSSION

To our knowledge, there are only fifteen cases of spontaneous peritonitis due to *S. bovis*, reported in English and Portuguese literature: we describe the sixteenth case.<sup>6-13</sup> Most patients with spontaneous bacterial peritonitis presents fever, abdominal pain, abdominal distention, and jaundice. Spontaneous bacterial peritonitis due to *S. bovis* infections usually occurs in elderly patients with equal frequency in male and female (8:7).<sup>6</sup>

*S. bovis* is a rare cause of spontaneous bacterial peritonitis in patients with cirrhosis.<sup>13</sup> *S. bovis* is a group D nonenterococcal streptococcus, frequently found as part of the comensal bowel flora in humans and animals.<sup>14-16</sup> The association between invasive *S. bovis* infections and endocarditis or intestinal pathologies is well established. *S. bovis* bacteremia has long been known to be associated with colon cancer.<sup>6,15</sup> However, different *Streptococcus bovis* biotypes, now renamed as *Streptococcus equinus*, *Streptococcus gallolyticus* [*Streptococcus bovis* I], *Streptococcus pasteurianus* [*Streptococcus bovis* II/2], and *Streptococcus infantarius* [*Streptococcus bovis* II/1] are associated with different diseases.<sup>14,17</sup> *Streptococcus bovis* I, which ferment the mannitol, is found to have a stronger association with bacteremia and infective endocarditis in patients with intestinal pathologies than

biotype II/1. On the other hand, *Streptococcus bovis* biotype II is associated with chronic liver diseases. Thus, it is important for the clinical microbiology laboratory to identify the biotype of *S. bovis* isolated from sterile body sites.<sup>17</sup> The biochemical identification (MicroScan – DADE – Siemens) of *S. bovis* isolated from the patient's case report indicated that it refers to biotype *S. bovis* II/2 (*Streptococcus pasteurianus*). *S. bovis* type 2 is the most common type of *S. bovis* that causes spontaneous bacterial peritonitis and was found in others reported cases.<sup>6,7,13</sup>

Clinical isolates of *Streptococcus bovis* are usually sensitive to penicillin. Intravenous penicillin is the antimicrobial agent of first choice.<sup>6,16</sup> Reports on the susceptibility of *S. bovis* are scarce.<sup>18</sup> Macrolides and related drugs have been suggested as alternative for treatment of streptococcal infections when the patient is allergic to penicillin. However, high rates of resistance to erythromycin have been identified in *S. bovis* isolates from blood cultures in Taiwan.<sup>16</sup> Two major mechanisms account for erythromycin resistance in many Gram-positive bacteria: target site modification and active efflux.<sup>19</sup> Target site modification, generally known as macrolide-lincosamide-streptogramin B (MLS) resistance, is mediated by Erm methylases, which methylate 23S rRNA and induce ribosome modification. Expression of MLS resistance in streptococci can be either constitutive (cMLS) or inducible (iMLS).

Antimicrobial susceptibility testing of the isolate was carried out by automation (Micro-Scan – DADE – Siemens): the antibiotics penicillin, ampicillin, clindamycin, and levofloxacin were sensitive. By disk diffusion method, performed

with agar Mueller-Hinton containing 5% sheep blood, in accordance with the guidelines established by the Clinical and Laboratory Standards Institute,<sup>20</sup> the strain was resistant to erythromycin.

Flattening of the zone of inhibition adjacent to the erythromycin disk referred to as a D-zone was visible, indicating an inducible type of macrolides-lincosamides-streptogramins (iMLS) resistance. Resistance to both erythromycin and clindamycin indicated MLS<sub>B</sub> cross-resistance.

In the present study, *Streptococcus bovis* showed the iMLS phenotype, visualized as D-zone: D-test positive, that is, resistance to antibiotics erythromycin and clindamycin evidenced by the method of induction.

Therefore, the aim of this study was to report our experience with the isolation of *Streptococcus bovis* in ascitic fluid of a patient with liver cirrhosis due to alcohol abuse.

Intravenous penicillin is still the antimicrobial agent of first choice for *S. bovis* spontaneous bacterial peritonitis. However, cefotaxime also can be effectively used in these kinds of infections.<sup>11</sup> The overall mortality was 25% (4/16 patients).

The isolation of *S. bovis* indicates to the clinician a poor prognosis for his patient who should have a more detailed monitoring. Thus, a detailed investigation of the entire large intestine is necessary in patients in whom *S. bovis* was isolated, even in the absence of intestinal symptoms.

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