

Anaerobiospirillum succiniciproducens bacteraemia

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ABSTRACT We describe a case of *A. succiniciproducens* bacteraemia in a thirty-four-year-old man with decompensated chronic liver disease associated with a fatal outcome. *A. succiniciproducens* infections are rare. The organism has distinctive spiral morphology on Gram staining and unlike most other spiral bacteria, it is able to grow in blood cultures and on blood agar. It is a strict anaerobe but demonstrates metronidazole resistance. An appreciation of this resistance is necessary for an appropriate initial choice of antibiotic therapy. Often there is a poor response even to appropriate antibiotic therapy and there is a high associated mortality. *A. succiniciproducens* infections are considered to be zoonotic.

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KEYWORDS Anaerobiospirillum, gram negative, metronidazole, spiral, zoonosis

LIST OF ABBREVIATIONS *Anaerobiospirillum succiniciproducens* (*A. succiniciproducens*), cysteine lactose electrolyte deficient (CLED)

DECLARATION OF INTERESTS No conflict of interests declared

CASE HISTORY

A thirty-four-year-old man with alcoholic liver disease was admitted with a ten day history of diarrhoea, jaundice, vomiting and abdominal pain. There was no history of overseas travel or contact with animals. His past medical history was of injecting drug use, benzodiazepine dependence, chronic hepatitis C virus infection and macrocytic anaemia secondary to folate deficiency. Testing for Human Immunodeficiency Virus was refused.

On admission he was febrile and had signs of decompensated chronic liver disease with jaundice, asterixis, ascites, and mild encephalopathy. An ascitic tap with a total white cell count of 2,220 per cubic millimetre suggested spontaneous bacterial peritonitis. He was treated initially with intravenous ceftriaxone and metronidazole and then intravenous piperacillin-tazobactam as his condition deteriorated. An anaerobic blood culture taken while on metronidazole grew a Gram negative spiral organism. Despite treatment, he developed a coagulopathy, gastrointestinal bleeding, pseudo-obstruction, and pneumonia. He died nineteen days after admission.

MICROBIOLOGY

The spiral organism morphologically resembled a *Campylobacter* but was oxidase negative. It was a strict anaerobe but metronidazole resistant and grew readily in a BacT/ALERT@SN anaerobic blood culture bottle and on 5% horse blood agar but not CLED agar or Preston *Campylobacter* medium. Modified Stoke's disc sensitivity testing showed it to be sensitive to penicillin, amoxycillin-clavulanate, ciprofloxacin, gentamicin and piperacillin-



FIGURE 1 Colonies of *A. succiniciproducens* on 5% horse blood agar incubated anaerobically for 48 hours, showing non-haemolytic colonies of 0.5–1 mm diameter.

tazobactam but erythromycin resistant. It was identified by 16S rRNA gene sequence analysis as *A. succiniciproducens*.

DISCUSSION

Spiral Gram negative organisms are rarely grown in blood cultures. Medically important spiral organisms include members of the *Spirochaetaceae* (such as *Treponema* and *Borrelia* species), and *Leptospira*, *Campylobacter* and *Helicobacter* species. Of these, *Treponema pallidum* cannot be cultivated in artificial media; *Leptospira* species can grow in selective semi-solid media but would not be expected to grow readily on blood agar; few species of *Borrelia* grow *in vitro* and those that do, require selective media as do species of *Helicobacter* and *Campylobacter*.

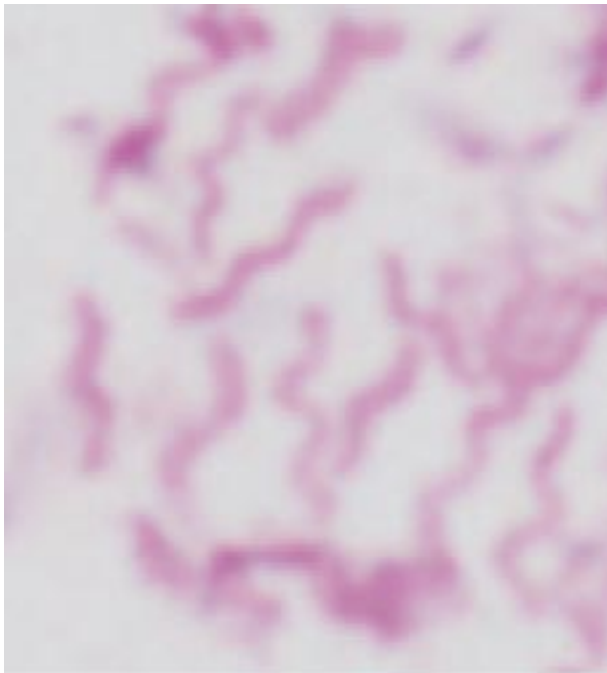


FIGURE 2 Gram stain appearance of *A. succiniciproducens* demonstrating spiral morphology of Gram negative rods (Length 2–3 μm \times 10,000 magnification).

A. succiniciproducens bacteraemia is rare but is associated with decompensated liver disease,^{1, 2, 3, 4} diarrhoeal illness,^{1, 2, 3, 5} malignancy² and diabetes.² It is not thought to be part of the normal bowel flora but may be a zoonotic infection acquired from the bowel flora of cats or dogs.⁶ Initial Gram stain appearances can be confused with those of a *Campylobacter* but oxidase testing will distinguish them biochemically.⁷ There is generally a poor response to antibiotic therapy and when recovery occurs, there can be musculoskeletal sequelae.^{4, 7}

The finding of a spiral organism growing from blood cultures should alert clinicians and microbiologists to the likelihood that they are dealing with an *A. succiniciproducens* infection (particularly in a susceptible patient) and that conventional treatment for anaerobic infections with metronidazole is inappropriate due to its inherent resistance.^{5, 7, 8, 9} Much remains to be discovered regarding the optimal antibiotic treatment of this infection and its post-infectious sequelae.

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