

Emerging Pathogen: *Leuconostoc* Bacteremia

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ABSTRACT

Leuconostoc, member of the Family *Streptococcaceae*, is an uncommon cause of infections in humans. Previously thought to be contaminants in cultures, they are now being recognised as emerging pathogens. We describe a case of *Leuconostoc* bacteremia in a 76-year-old man with a history of diabetes mellitus, hepatic cirrhosis and alpha thalassemia trait. He presented with signs and symptoms of congestive cardiac failure and pneumonia. Blood culture grew *Leuconostoc pseudomesenteroides*. He responded to treatment with anti cardiac failure drugs and high dose penicillin. Though an uncommon cause of bacteremia, *Leuconostoc* sepsis should be considered in immunocompromised patients and in those with underlying chronic diseases.

Keywords: bacteremia, *Leuconostoc*, vancomycin

INTRODUCTION

Leuconostoc organisms are facultative anaerobic catalase-negative gram-positive coccobacilli that are widespread in the natural environment. They are used in industrial microbiology, being important in sugar, wine and milk industries. They are not considered to be part of the normal flora although they have occasionally been isolated in the vagina and gastric fluid^{1,2}. They are intrinsically resistant to vancomycin and very rarely cause disease in humans. However they have recently been recognised as emerging pathogens. The *Leuconostoc* strains associated with human infections have been identified as *Leuconostoc mesenteroides*, *pseudomesenteroides*, *lactis* and *citreum*. The first cases of *Leuconostoc* infection in humans were reported in 1985 before which they were considered non-pathogenic and of no clinical significance³. Since then more cases of *Leuconostoc* infection namely meningitis, pneumonia, peritonitis and bacteremia have been described especially in severely ill and immunocompromised patients⁴.

CASE REPORT

A 76-year-old Malay gentleman was admitted with 1 week history of progressive shortness of breath and ankle swelling. He had orthopnoea but not paroxysmal nocturnal dyspnoea or chest pain. He denied having fever, cough, expectoration, diarrhoea or urinary symptoms. He had a past history of type 2 diabetes mellitus for 10 years, hypertension for 8 years, vitamin B12 deficiency anaemia thought to be due to malabsorption from metformin (parietal cell and intrinsic factor antibody negative), alpha-thalassemia minor with baseline Hb of 8–9 g/dl, hepatitis B carrier with cirrhosis of liver and renal calculi. His medications included losartan, glipizide, metformin, folic acid and vitamin B complex. He was a non-smoker and did not consume any illicit drugs.

On examination he was lethargic, ill-looking and breathless at rest with pallor and bilateral pitting pedal oedema. Pulse rate was 92 beats per minute, blood pressure 164/68 mm of Hg, temp 38.3°C, SpO₂ 95% on room air with respiratory rate of 20 breaths per minute.

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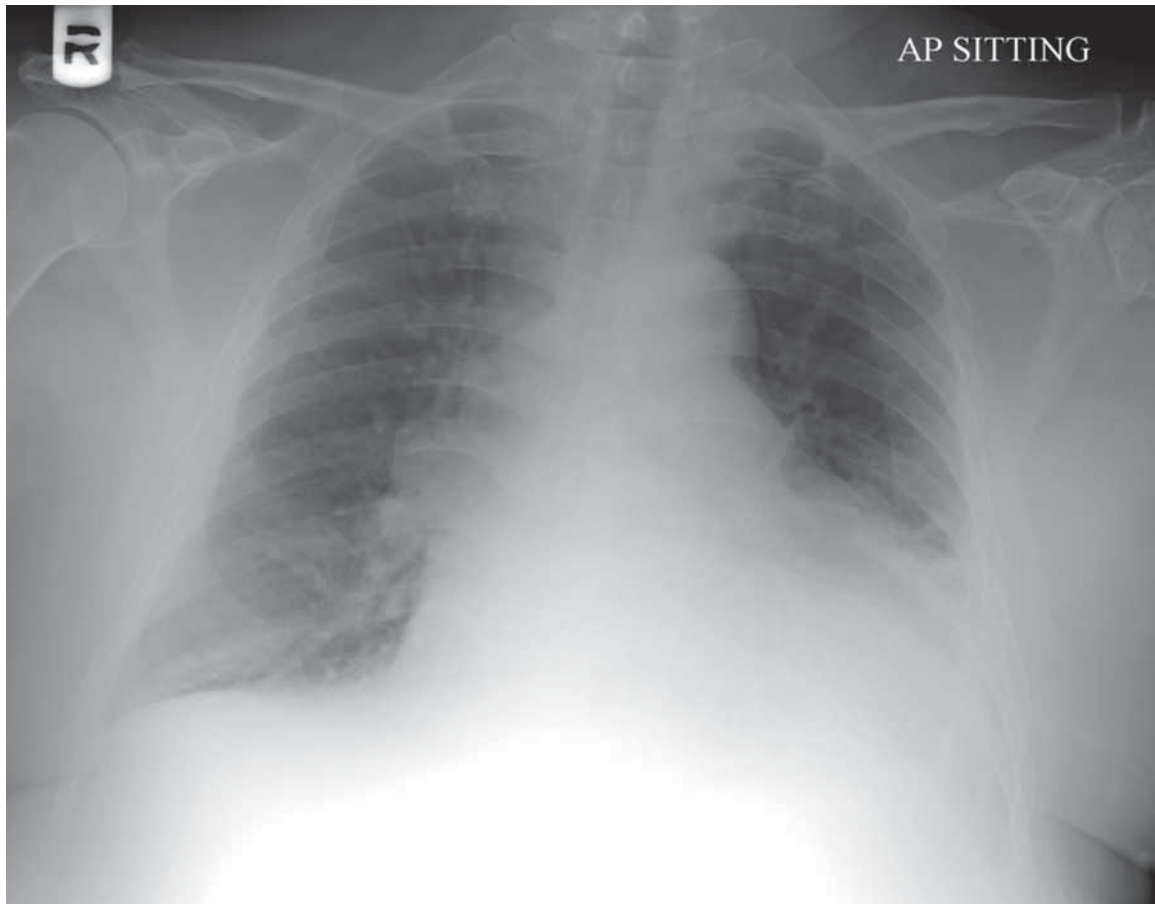


Fig. 1. Chest radiograph: increased alveolar shadowing both lower zones with a left pleural effusion.

There was no icterus or clubbing. He had a raised jugular venous pressure with normal heart sounds and no murmurs and no stigmata of infective endocarditis. Respiratory system examination showed bibasal crackles. Abdomen was soft, non tender and had no palpable masses. Central nervous system examination was unremarkable with no focal neurological deficit.

Initial laboratory investigations showed haemoglobin 8.6 g/dl (14–18), white cell count $5.35 \times 10^9/L$ (4–10), platelets 120×10^9 (140–440), CRP 62.2 mg/L (0.2–8.8), urea 9.4 mmol/L (2.8–7.7), creatinine 149 $\mu\text{mol/L}$ (63–110), sodium 144 mmol/L (135–145), potassium 4.4 mmol/L (3.3–4.9), chloride 108 mmol/L (96–108), bicarbonate 29.6 mmol/L (19–31), random glucose 8.4 mmol/L (3.9–11), HbA_{1c} 5.9%. Prothrombin time, partial thromboplastin time, liver function tests, thyroid profile, calcium, magnesium, folate and vit B12 levels were all

normal. Creatinine kinase and creatinine kinase-MB were normal. Troponin T was initially $<0.01 \mu\text{g/L}$ (<0.03) but rose slightly to 0.04. Serum iron 3 $\mu\text{mol/L}$ (11–29), total iron binding capacity 35 $\mu\text{mol/L}$ (44–73), transferrin saturation 8.6% (22–58); ferritin 652 $\mu\text{g/L}$ (47–452), D dimer 746 $\mu\text{g/L}$ (50–324), soluble fibrinogen monomers negative, NT-pro BNP 5279 pg/ml (<100). Chest radiograph showed increased alveolar shadowing both lower zones and a left pleural effusion (Fig. 1). ECG showed poor R wave progression without acute ischaemic changes. Ultrasound of abdomen showed liver cirrhosis, fatty infiltration and splenomegaly with suggestion of portal hypertension. Computerised tomogram of thorax showed ground glass opacification and interlobular septal thickening compatible with pulmonary oedema and consolidation in the superior segment of the lingula but no evidence of pulmonary embolism.

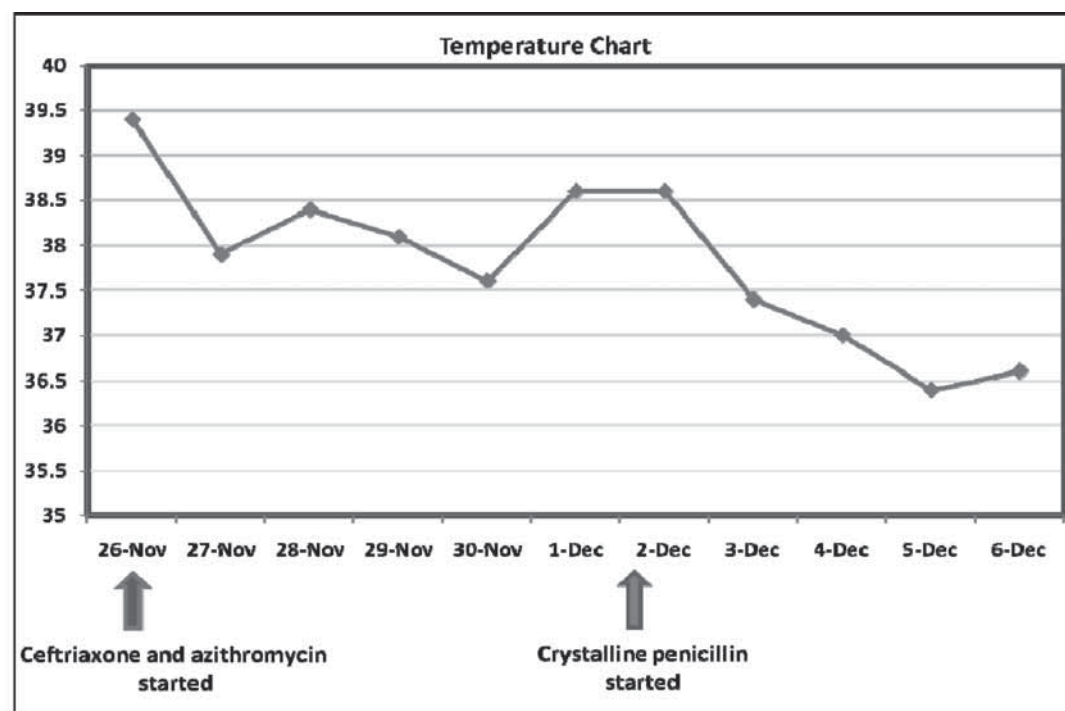


Fig. 2. Temperature chart showing Tmax.

Initial diagnosis was congestive cardiac failure precipitated by sepsis from community acquired pneumonia. He was given intravenous diuretics and empirically started on ceftriaxone and azithromycin. However, he remained breathless and arterial blood gases showed a pH of 7.265 (7.350–7.450), pO_2 of 66.2 mmHg (75–100), pCO_2 of 71.7 mm Hg (35–45) and bicarbonate of 27 mmol/l. He required mechanical ventilation in view of the worsening type II respiratory failure. His clinical condition improved and he was successfully weaned off the ventilator after 24 hours. He continued to improve clinically but remained pyrexia.

His sputum culture did not isolate any organisms. Urine culture showed no bacterial growth. Blood culture from one bottle done on admission was reported to be growing gram-positive rods which were later identified as *Leuconostoc pseudomesenteroides* sensitive to penicillin with a MIC of 0.50 $\mu\text{g/ml}$ and resistant to vancomycin. 2D echocardiography showed no vegetations, normal valves, left ventricular ejection fraction 64%, no regional wall motion abnormality, moderate concentric left ventricular hypertrophy and moderate pulmonary hypertension. Antibiotics were changed to intravenous crystalline penicillin 4

Mega Units 4 hourly for 2 weeks with good result and resolution of the fever (Fig. 2). His blood pressure remained subsequently normal, renal function and CRP also returned to normal. Platelet counts and total white counts remained stable.

Repeat blood cultures done 3 days and 1 week after starting antibiotics showed no bacterial growth. He was reviewed after discharge and was well.

DISCUSSION

Leuconostoc bacteremia though very rare is being increasingly reported especially in at-risk patients. Most of the reported cases are in children with short gut syndrome, in immunocompromised patients and in those with underlying chronic diseases. In a review reported by Bernaldo de Quiros *et al*, *Leuconostoc* bacteremia accounted for only 2 of 709 significant cases of bacteremia. However they point out that confusion with *Streptococcus viridans* or *Enterococcus* when routine sensitivity tests are not performed may be the cause of the underestimation⁵.

Enteral and parenteral nutrition and exposure to vancomycin are recognised risk factors that may

predispose to *Leuconostoc* bacteremia^{6,7}. Insertion of central catheters is another well-known predisposing factor for *Leuconostoc* infection probably resulting from a break in the skin integrity as it is believed that skin may be the portal of entry⁸.

Our patient had no known risk factors but had underlying diabetes and liver cirrhosis which may have contributed to this uncommon infection.

Patients usually present with gastrointestinal symptoms namely abdominal pain, diarrhoea and vomiting⁸. Fever and leucocytosis are consistent features^{7,8}.

Our patient was pyrexial on examination but had no gastrointestinal symptoms and his total white cell count was normal. Absence of leucocytosis may be explained by hypersplenism as he also had mild thrombocytopenia which had been noted in the past. Diagnosis is confirmed by positive blood culture though identification of *Leuconostoc* organisms can be difficult and confusing since it can be misidentified as *Streptococcus viridans* or *Enterococcus* in the laboratory because they share similar biochemical properties. The main clues to differentiate *Leuconostoc* from other Streptococci are vancomycin resistance, gas production during glucose fermentation and failure to hydrolyse arginine to ammonia⁹.

Treatment consists of removal of infected catheters, drainage of abscesses and appropriate antibiotic. Penicillin is the antibiotic of choice. It should be given at higher doses than those used for other streptococcal infections as *Leuconostoc* species are penicillin tolerant with high MICs to penicillin¹⁰. Other antibiotics that have been found useful are clindamycin and gentamycin¹¹. In some cases cure has been achieved only by removal of infected catheters without antibiotic therapy^{5,8}.

CONCLUSION

Leuconostoc bacteremia is an uncommon cause of sepsis but is an emerging pathogen, especially with the recent increase in the use of vancomycin. It should be included in the differential diagnosis when patients present with fever, gastrointestinal symptoms and leucocytosis. It must also be considered in high risk patients who have any form of sepsis, for example pneumonia. Since high dose penicillin is successful in its management, early diagnosis is important to minimise morbidity and mortality. An increased awareness of this emerging pathogen amongst clinicians and laboratory personnel is imperative.

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