

Splenic abscess by *Cutibacterium propionicum* in poorly controlled type 2 diabetes

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DESCRIPTION

A 45-year-old farmer presented with intermittent high-grade fever associated with anorexia, dull-aching abdominal pain over left upper quadrant and a documented weight loss of around 20 kg over the preceding 1 year. He had been advised antitubercular therapy 6 months prior to his presentation with us, which he had discontinued after 2 months. Type 2 diabetes had been diagnosed 5 years prior to his presentation and he had been on oral anti-diabetic agents since diagnosis. However, his glycaemic control had been unsatisfactory due to non-compliance. He was addicted to alcohol and tobacco smoking. He denied abdominal trauma or intravenous drug abuse. The patient had pallor and tachycardia (pulse rate: 120/min) with a supine blood pressure of 118/68 mm Hg. Spleen was soft, tender and palpable 2 cm below the left costal margin.

Complete blood count revealed polymorphonuclear leucocytosis (total count: $14.8 \times 10^9/L$). Multiloculated splenic abscess (figure 1) was subsequently detected on CT scan of the abdomen. Microscopy of the aspirated pus showed plenty of polymorphonuclear cells with long, slender, branching, gram-positive, non-acid fast bacilli (figure 2A,B). Overnight aerobic incubation of the pus in blood agar grew tiny greyish-white colonies with alpha haemolysis; however, the organism grew better and gave larger colonies when cultured anaerobically for 24 hours. Gram stain from the colonies also documented filamentous bacilli ($0.5\text{--}0.8 \mu\text{m} \times 1\text{--}5 \mu\text{m}$) of similar morphology, with various degrees of branching. The bacterium was negative for both catalase and oxidase, but fermented glucose, sucrose and maltose; hence, it was identified as *Cutibacterium propionicum*, a facultative anaerobe. The same organism was also isolated from blood culture, suggesting haematogenous spread of infection. The patient was treated successfully with betalactam–betalactamase combination for 6 months with complete radiological resolution.



Figure 1 Multiloculated splenic abscess ($9.1 \times 4.3 \times 3.7$ cm) on contrast enhanced CT scan of the abdomen: (A) unenhanced, (B) early venous phase (1 min), (C) delayed venous phase (15 min).

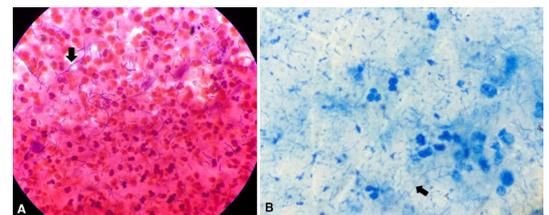


Figure 2 Gram staining of the aspirated pus shows gram-positive branching non-sporing filaments (black arrow) on a background of polymorphonuclear cells (A). The organism was non-acid fast on Ziehl-Neelsen staining (black arrow) (B).

Cutibacterium (formerly known as *Propionibacterium*) species are pleomorphic, non-spore-forming, gram-positive bacteria with four clinically relevant species: *C. acnes*, *C. avidum*, *C. granulosum* and *C. propionicum*.¹ *Cutibacterium* can tolerate wide fluctuations in oxygen tension and pH. Growth may occur in presence of 100% oxygen saturation and pH 4.5–8.0, but optimal growth is seen at oxygen tension at or approaching 0% and at pH between 5.5 and 6.0. Colonies are very small, smooth and white to grey in colour. *C. avidum* and *C. acnes* are skin commensals and have been associated with splenic abscess, when cutaneous integrity is breached following insulin injections.^{2,3} *C. propionicum*, the most pathogenic species among *Cutibacterium*, is

Learning points

- ▶ Splenic abscess due to unusual pathogens is not uncommon in immunocompromised patients. Once gram-positive branching rods are encountered in direct smear or from culture of splenic aspirate, acid-fast staining, biochemical tests and growth characteristics are helpful to narrow down differential diagnoses.
- ▶ *Cutibacterium propionicum* is a gram-positive, non-acid fast, branching bacilli that are facultative anaerobe, form colonies on solid media within 24 hours of aerobic incubation. However, it grows better in anaerobic condition and gives negative result to catalase and oxidase reactions.
- ▶ *C. acnes* phylotype III and *Actinomyces israelii* are the closest differentials of *C. propionicum*. Unlike *C. propionicum*, *C. acnes* phylotype III is catalase positive, and *A. israelii* has a typical delayed growth pattern.



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Table 1 Differential diagnoses of gram-positive branching rods

Organism	Growth based on O ₂ requirement	Catalase test	Appearance on Ziehl-Neelsen test (Kinyoun method)
<i>Nocardia</i> sp	Aerobic	Positive	Acid fast
<i>Rhodococcus</i> sp	Aerobic	Positive	Acid fast
<i>Gordonia</i> sp	Aerobic	Positive	Acid fast
<i>Tsukamurella</i> sp	Aerobic	Positive	Acid fast
<i>Streptomyces</i> sp	Aerobic	Positive	Non-acid fast
<i>Actinomadura</i> sp	Aerobic	Positive	Non-acid fast
<i>Dermatophilus</i> sp	Aerobic	Positive	Non-acid fast
<i>Nocardiosis</i> sp	Aerobic	Positive	Non-acid fast
<i>Thermophilic actinomycetes</i>	Aerobic	Positive	Non-acid fast
<i>Actinomyces</i> sp	Obligate anaerobe	Positive	Non-acid fast
<i>Cutibacterium propionicum</i>	Facultative anaerobe	Negative	Non-acid fast
<i>C. acnes</i> phylotype III	Facultative anaerobe	Positive	Non-acid fast
<i>A. israelii</i>	Facultative anaerobe	Negative	Non-acid fast

known to cause a variety of infections; however, splenic abscess has never been reported. Since the organism resides in human gastrointestinal tract, translocation through gut wall followed by septicaemia probably culminated in seeding of the pathogens in spleen and abscess formation. Altered innate immunity (local and systemic) in diabetes was likely the predisposing factor.

The possible differential diagnoses (DD) have been summarised in table 1. The closest DD, *Actinomyces israelii*, starts to grow only after 7–10 days of incubation, while *C. propionicum* forms colonies within 18–24 hours, and the colony morphologies are also different.⁴

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