Case Report

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A rare case of *Actinomyces israelii* bacteraemia

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Introduction: *Actinomyces israelii* usually causes chronic suppurative and granulomatous infections. *Actinomyces* bacteraemia is very rare but has been reported for *A. viscosus*, *A. odontolyticus* and *A. naeslundii* due to periodontal disease. We present a rare case of *A. israelii* bacteraemia.

Case presentation: A 55-year-old male with history of metastatic pancreatic cancer on chemotherapy through a portacath was admitted with sepsis with fever/tachycardia and worsening abdominal pain. Four sets of blood cultures grew *A. israelii* bacteria. The patient died from cardiopulmonary arrest within a week of being started on broad-spectrum antibiotics. Negative blood cultures were never obtained, and the source of the bacteraemia could not be ascertained.

Conclusion: *A. israelii* bacteraemia described in this case is very rare. Determining the source of the bacteraemia would have been important in deciding the modality and length of treatment plan. However, the lack of such evidence in our case leaves these questions unanswered.

Keywords: *Actinomyces*; anaerobes; antimicrobials; oral bacteria.

Introduction

Of the 14 *Actinomyces* species, six can cause disease in humans: *Actinomyces israelii* (most common), *A. naeslundii*, *A. odontolyticus*, *A. viscosus*, *A. meyeri* and *A. gerencseriae* (Schaal & Lee, 1992). They are thin, branching (filamentous), Gram-positive bacilli and are non-spore-forming/non-acid-fast/anaerobic/microaerophilic organisms. The most common clinical forms of actinomycosis are cervicofacial (i.e. lumpy jaw), thoracic and abdominal (Schaal, 1998) and pelvic actinomycosis in women. Because these microorganisms are not virulent, they require a break in the integrity of the mucous membranes and the presence of devitalized tissue to invade deeper body structures and cause human illness. Furthermore, actinomycosis is generally a polymicrobial infection, with isolates comprising as many as 5–10 bacterial species, such as *Peptostreptococcus*, *Prevotella*, *Fusobacterium*, *Bacteroides*, *Staphylococcus* and *Streptococcus* species, as well as *Enterobacteriaceae*, depending on the location of the actinomycotic lesions (Holm, 1950, 1951; Weese & Smith, 1975). Once infection is established, the host mounts an intense inflammatory response (i.e. suppurative, granulomatous), and fibrosis and draining sinus tracts may then follow.

Case report

A 55-year-old Egyptian male with a past medical history of pancreatic cancer with metastasis to the liver and celiac plexus, status post-chemotherapy through a portacath (placed several months ago), presented with complaints of

fever with shaking chills and gradually worsening abdominal pain and nausea/vomiting for about a week. He also complained of a dry cough but there was no diarrhoea, dysuria, recent travel or sick contact. He had no history of any recent dental manipulation. He appeared chronically debilitated and was tachycardic and febrile. There was no icterus or erythema/discharge surrounding the portacath site. His dental hygiene was poor, but there was no obvious abscess. His abdomen was diffusely tender with no signs of abdominal wall discoloration or any masses.

Investigations

His labs revealed a white blood cell count of 12 000 cells ml⁻¹ with 85 % neutrophils, haemoglobin of 9.9 g dl⁻¹, platelets of 151 000 cells microliter⁻¹, creatinine of 1.1 mg dl⁻¹, total bilirubin of 2.7 mg dl⁻¹, alanine aminotransferase of 57 IU l⁻¹; aspartate aminotransferase of 69 IU l⁻¹, alkaline phosphatase of 445 IU l⁻¹ and albumin of 2.4 g dl⁻¹. A computed tomography scan of his abdomen showed an ill-defined pancreatic body mass with worsening of liver metastasis, moderate ascites with possible peritoneal carcinomatosis and progressive osseous metastatic disease and multifocal small pulmonary nodules.

Diagnosis

The diagnosis of sepsis/systemic inflammatory response syndrome was made. The differential diagnoses were

probable complicated intra-abdominal infection or probable catheter-related bloodstream infection. Other differentials could have been pneumonia or pancreatitis.

Treatment

He was empirically started on broad-spectrum antibiotics (vancomycin and piperacillin/tazobactam). His blood cultures grew slender Gram-positive bacilli within 48 h, which were later identified as *A. israelii*. Repeat cultures grew the same organism.

Outcome and follow-up

A total of four sets of blood cultures, two from the portacath and two from peripheral veins, were positive for *A. israelii*. Piperacillin/tazobactam was continued. The patient's general condition deteriorated despite treatment and he ended up on a ventilator. Portacath removal or tip culture could not be done due to the same reason. Paracentesis or biopsy of the visceral lesions was not done. The patient died of cardiorespiratory failure within a week of admission while still on piperacillin/tazobactam. Negative blood cultures could not be obtained due to the rapidity of the course of events. It could not be ascertained whether the patient died from overwhelming sepsis from bacteraemia or due to the poor condition from his metastatic cancer.

Discussion

Bacteraemia from *Actinomyces* is rare. Dental procedures may result in transient bacteraemia (Okell & Elliott, 1935). In a prior study, the incidence of *Actinomyces* bacteraemia (*A. viscosus*, *A. naeslundii* or *A. odontolyticus*) was 30 %, and half of the patients had periodontitis (Bhatawadekar & Bhardwaj, 2002). *Actinomyces* causing bacteraemia following dental procedures has been reported to range from 8.54 % (Rogosa *et al.*, 1960) to 14.73 % (Sweet *et al.*, 1978). In a similar study by Crawford *et al.* (1974), *Actinomyces* bacteraemia was caused by *A. odontolyticus* in 20 % and by *A. viscosus* in 40 % of their patients. Transient bacteraemia may lead to a shower of *Actinomyces* entering the circulation, which may settle at different sites and form a nidus on which a chronic actinomycotic infection develops.

A. israelii bacteraemia has not been reported previously. Hence, this case depicts a novel and rare presentation. The case also highlights various diagnostic dilemmas. In anaerobic cultures enriched with brain–heart infusion medium, colonies may appear in 3–7 days, but the isolation and definitive identification of actinomycetes may require 2–3 weeks. However, blood cultures turned positive within 48 h in our patient. Four sets of blood cultures were positive for *A. israelii* and negative blood cultures could not be obtained.

Determination of the source of *Actinomyces* bacteraemia usually poses a diagnostic challenge. Histology may reveal mixed suppurative and granulomatous inflammatory reactions, connective tissue proliferation and the presence of sulfur granules. It is unclear whether the origin of bacteraemia in our patient was dental or peritoneal/gastrointestinal in origin. The lack of tissue culture or visceral biopsy specimen makes it difficult to ascertain the source in our case.

Were the blood cultures just a contaminant? Having four sets of positive blood cultures suggests that this is unlikely. It is unclear, however, whether the source of bacteraemia was from the portacath, as it was never removed and repeat negative cultures were never obtained.

Despite being on piperacillin/tazobactam for a week, to which the *A. israelii* was sensitive, the patient died. As described above, it was not possible to determine the cause of death as *Actinomyces* bacteraemia in our patient due to his metastatic disease and overall poor condition. The fact that the patient had metastatic pancreatic cancer was a major confounder. However, the question of whether treatment of the bacteraemia with antibiotics alone would have been sufficient to save the patient, had the patient not had metastatic cancer, remains unanswered.

There are descriptions in the literature of prolonged treatment (6 months to 1 year) of actinomycosis with antibiotics such as penicillin (Smith *et al.*, 2005). Bacteraemia due to other *Actinomyces* species has been treated with penicillin or cephalosporins for 2 weeks duration. However, the required duration of treatment for *A. israelii* bacteraemia is unknown. It is likely that the source of the bacteraemia would have to be treated concomitantly, such as treatment of periodontal or peritoneal/gastrointestinal disease.

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