

Case Report

Fatal case of *Clostridium perfringens* enteritis and bacteraemia in South Africa

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Abstract

Clostridium perfringens is an important anaerobic pathogen causing foodborne and non-foodborne gastrointestinal diseases in humans and animals. This pathogen is also the more common *Clostridium* species associated with bacteraemia. We report on a fatal case of *C. perfringens* infection in an adult with type 2 diabetes.

Key words: *Clostridium perfringens*, necrotising enteritis, bacteraemia, South Africa

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Introduction

Clostridium perfringens is an important anaerobic pathogen causing foodborne and non-foodborne gastrointestinal diseases in humans and animals. Clostridial species are also a common cause of anaerobic bacteraemia, with *C. perfringens* the most commonly isolated species [1,2]. Clostridial bacteraemia is associated with high mortality rates (approaching 50%) despite appropriate medical/surgical management and antimicrobial therapy [3]. Enteritis necroticans, also called pigbel, is an often fatal type of gastrointestinal infection typically caused by *C. perfringens* type C, although case reports and series have described *C. perfringens* type A causing this disease as well [4]. Risk factors for developing enteritis necroticans include diabetes mellitus, protein malnutrition, the sudden intake of protein-rich meals, and high amounts of dietary trypsin inhibitors. The disease is characterised by segmental haemorrhagic necrosis of the jejunum, which rapidly progresses to full-thickness necrosis of small and occasionally large bowel segments [5,6]. Clinical features include severe abdominal pain, vomiting, diarrhoea (often with blood), followed by constipation, intestinal obstruction and hypotension and may be rapidly progressive [5,7].

Case report

On 14 October 2009, in the town of Tzaneen, South Africa, a 61-year-old male presented to hospital with a one-day history of fever with rigors, nausea and weakness followed by profuse watery diarrhoea. The patient deteriorated rapidly during the evening, and on admission to hospital the following morning was noted to be febrile and hypotensive, with a decreased level of consciousness and continuous green watery diarrhoea. Shortly afterwards he developed clinical evidence of disseminated intravascular coagulation and asystole, and died despite intensive resuscitation efforts. No autopsy was performed. He had a history of hypercholesterolaemia and uncontrolled type 2 diabetes; the diabetes had been diagnosed five years previously but he had stopped taking medication after two years as he believed he had been cured. It was reported that he had been experiencing excessive thirst for several months, but had not sought medical attention. Routine blood tests done prior to death, including blood cultures (aerobic and anaerobic culture), did not elucidate the aetiology of the illness. The presence of a bacteraemia was investigated as follows: a sample of the patient's blood was processed to extract genomic DNA using the MagNA Pure Compact Nucleic Acid Isolation Kit I (Roche Diagnostics GmbH, Mannheim, Germany). The

DNA extraction was analyzed using PCR aimed at amplification of bacterial 16S ribosomal RNA (rRNA) DNA. The sequence of PCR primers were as follows: AGAGTTTGATCYTGGYTYAG and ACGGCTACCTTGTTACGACTT. The PCR included 30 cycles of 95°C for 1 minute, 55°C for 2 minutes and 72°C for 2 minutes, and employed AmpliTaq Gold DNA polymerase enzyme (Applied Biosystems, Foster City, USA). The amplified 16S rRNA gene product (~1500 base pairs) was purified from the PCR using the MSB Spin PCRapace Kit (Invitek, Berlin, Germany). The gene was sequenced using the BigDye Terminator v3.1 Cycle Sequencing Kit (Applied Biosystems) and an Applied Biosystems 3130 Genetic Analyzer. The nucleotide sequence of the gene was examined against the DNA database of the National Center for Biotechnology Information (NCBI) using the BLAST algorithm (<http://www.ncbi.nlm.nih.gov/>). PCR amplification of a bacterial 16S rRNA gene and DNA sequence analysis of the gene determined the presence of *C. perfringens* in the bloodstream of the patient. Our sequence analysis revealed a 100% match with *C. perfringens* genes listed in the NCBI database.

Discussion

In the present case study, we report on a fatal case of *C. perfringens* infection in an adult with type 2 diabetes. Clostridial bacteraemia was diagnosed genetically and involved PCR and DNA sequence analysis of the bacterial 16S rRNA gene, which is a well-documented and well-established method [8-10]. Fulminant *C. perfringens* disease with enteritis necroticans in diabetic patients is well described, and perhaps attributable to diabetes-related gastrointestinal dysfunction allowing overgrowth of the organism and facilitating its pathogenesis [5]. *C. perfringens* is ubiquitous, found in soil and the gastrointestinal tracts of many animals including humans, in whom asymptomatic carriage is common in endemic regions. Outbreaks and sporadic cases of enteritis necroticans have been linked to inadequately cooked food-animal products. Affected persons usually have underlying risk factors, including the classic association with protein malnutrition and the more recently recognised association with diabetes. In this case, we hypothesise that the source of our patient's infection was most likely a contaminated food source. He belonged to a ministry that provided food to needy children by collecting and distributing donated foods (including meat) which were usually past their expiry dates. He assisted in handling and preparation of this food for

distribution, and also ate this food occasionally. Fortunately, no other cases of gastrointestinal illness were identified in the community.

In conclusion, our genetic diagnosis of *C. perfringens* bacteraemia was supported by the patient's clinical presentation, which is in keeping with previously published case reports of enteritis necroticans in diabetic patients. Diabetes is emerging as one of the most prevalent non-communicable diseases in South Africa [11], and healthcare workers should be cognisant of the range of unusual infectious diseases that may afflict diabetic patients.

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