
CASE REPORT

***Mycobacterium mucogenicum* causing central line-related sepsis in a home parenteral nutrition patient**

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ABSTRACT

Long-term home parenteral nutrition is associated with increased risk of line infection and subsequent sepsis. Line infections involving rapidly growing mycobacteria are almost exclusively found in immunocompromised patients. The authors report a case of opportunistic line-sepsis caused by *Mycobacterium mucogenicum* in a home parenteral nutritional patient with overt immunocompromise. Following a prolonged clinical course and molecular sequencing this infection was eventually diagnosed. The importance of awareness of rapidly growing mycobacteria as a causative agent of line infection in both immunocompromised and immunocompetent patients, the need for immediate removal of the line in such diagnosed infections, and the use of molecular techniques to identify atypical pathogens are emphasised. *J Microbiol Infect Dis* 2017; 7(2): 93-97

Keywords: Parenteral, Nutrition, Central Line, Mycobacterium, Sepsis, Infection

INTRODUCTION

Home parenteral nutrition is an important tool in the management of long-term intestinal failure. These patients need long-term intravenous access making them susceptible to line infections. Line sepsis is a significant cause of morbidity, missed feeds and can lead to serious life-threatening conditions such as infective endocarditis. Careful training and scrupulous attention by the patient to their own line care is essential. There are many pathogens that can cause these infections, which can come from any part of the environment that the patient encounters, and so unexpected infections can occur.

Rapidly growing mycobacteria (RGM) are common environmental organisms and are occasionally identified in soft tissue infections [1-3], indwelling urinary catheter-related sepsis [4], and associated with trauma [4,5]. Where intravenous line sepsis has been reported involving RGM, this has almost exclusively been in immunocompromised patients.

Here we report a case of line sepsis with a prolonged clinical course that was caused by the

rapidly growing *Mycobacterium mucogenicum* in a home parenteral nutrition patient.

CASE REPORT

A 24-year-old female dental nurse with an eight year history of pseudo-obstruction presented to the emergency department with a 1-month history of malaise, nausea, headache, generalised aches and pains and intermittent hot flushes. Given her gastrointestinal dysmotility she had been administering parenteral nutrition via a right internal jugular vein catheter three times a week since 2001. Previous repeated attempts to cease parenteral nutrition had resulted in significant weight loss and therefore oral intake alone could not achieve adequate nutrition. However, she had not lost any weight over the period of her current illness. The patient reported worsening symptoms in the week prior to admission, specifically experiencing fevers following use of the line, although she had never recorded a temperature herself at home. She had only ever had one central line for administering parenteral nutrition and experienced no problems with it over the seven years it had been in situ.

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Her only other past medical history was of a cholecystectomy in 2004. She had not been in hospital recently nor taken antibiotics. She took Oxycontin 40 mg bd, Mebeverine 270 mg bd, Omeprazole 20 mg bd and Warfarin 1 mg od. There was no significant social or family history and a review of systems revealed nil else of note.

On examination, a temperature of 37.0 °C was recorded with a blood pressure of 112/74 mmHg and tachycardia of 125 bpm. Her body mass index was 24 kg/m². The Hickman line site was neither erythematous nor indurated. General physical examination was unremarkable including normal heart sounds with no additional sounds.

Her blood tests revealed the following significant findings: normal white cell count; platelet count 10⁷ x 10⁹ cells/L; alkaline phosphatase 297 U/l; alanine aminotransferase 62 IU/l; gamma-glutamyltransferase 225 U/l and C-reactive protein 18mg/dl. Multiple sets of peripheral and central blood cultures were taken. Chest x-ray was unremarkable, as was urinalysis. The patient was managed expectantly with peripheral IV fluids (with resolution of the tachycardia) and closely observed. Total parenteral nutrition was withheld as the history was suggestive of possible line infection.

Other sources of infection were sought with a transthoracic echocardiogram revealing no evidence of vegetation and normal cardiac function. An ultrasound scan of the abdomen (prompted by the abnormal liver function tests) demonstrated a normal liver and biliary system with a blood screen testing for causes of chronic liver disease returning negative. Thus, oral intake (including nutritional supplementation) only was encouraged.

By day 4, no further temperature had been recorded and so normal saline was infused via the line. That night the patient developed a temperature of 38.2 °C, felt profoundly unwell and had rigors. The following day, intravenous vancomycin was commenced through the line with locking of the line after infusion. Both peripheral blood and internal jugular line cultures performed on admission flagged up positive on day 7 of the admission, and gram positive rods were seen on microscopy. No change in antibiotics was deemed necessary as the patient

appeared to clinically improve and remained afebrile with the vancomycin therapy. After 4 days of vancomycin, CRP had returned to 5 mg/dl and following 7 days' treatment antibiotics were stopped.

The organism was submitted for molecular sequencing (16S rRNA polymerase chain reaction (PCR)), the results of which were most consistent with *Mycobacterium mucogenicum*.

Despite the course of vancomycin therapy, 48 hours following antibiotic cessation the patient had a further temperature and rigor with use of the Hickman line, which together with the molecular microbiology results, prompted line removal. Line removal was associated with no further temperature spikes, maintenance of a normal CRP and a return of liver function tests to within normal limits. The patient received no further antimicrobial therapy and 6 weeks following line removal, a second line was sited through the contralateral internal jugular vein. The subsequent six months' parenteral feeding was uneventful.

DISCUSSION

Mycobacterium mucogenicum is a Rapidly Growing Mycobacterium (RGM) and is frequently isolated as a contaminant from water supplies [1,2,6] and in particular hospital water systems [1], probably due to the species' resistance to common disinfectants and their tolerance to a wide range of pH and temperatures [1]. First reported as a human pathogen in patients with peritoneal-dialysis associated peritonitis [7], RGM have been identified as the cause of soft tissue and bone infections, particularly following trauma [8, 9]. The biofilm that is frequently associated with indwelling plastic (such as vascular access and other catheters) is an ideal habitat for *M. mucogenicum* [1,10] as it is for most RGM.

Where RGM have been isolated from patients with catheter-associated infections, a history of immersion while bathing [11] or flushing the catheter with tap water [5] have been recorded. Moreover, almost all cases of RGM-associated line infection have been in immunocompromised patients; bone marrow transplant recipients or oncology patients receiving chemotherapy. Our patient had managed the same line for 7 years, and had demonstrated meticulous care of her

line both at home and in her workplace and awareness of the importance of avoiding drinking water contamination of this device. However, it has been shown that dental unit water supplies can possess increased colonisation by nontuberculous mycobacteria (NTM) than drinking water supplies [12], raising the possibility that the patient's work as a dental nurse was related to her infection with the offending organism, although there are no current reports suggesting that health-care workers with indwelling catheters have increased rates of infection with NTM. In fact the only case reported thus far of *Mycobacterium mucogenicum* infection in an immunocompetent patient presenting with line sepsis, involved a patient with Munchausen syndrome [7]. There have however been reports of outbreaks of *Mycobacterium mucogenicum* infections in hospitals in which both the water supply and showerheads have found to be colonised with the organism [11].

Here we report a case of catheter-related RGM infection in a patient with non-malignant and non-immunosuppressive disease, and to our knowledge, this is the first report of catheter-related *M. mucogenicum* infection associated with long-term parenteral nutrition without deliberate inoculation.

The most convenient tool for the rapid identification of mycobacteria remains the presence of acid-fast bacilli by Ziehl-Nielsen staining on microscopy. However, PCR-based sequencing of the 16S ribosomal RNA is increasingly becoming the gold standard for the identification of individual mycobacterial species [11]. *M. mucogenicum* is generally susceptible to amikacin, cefoxitin, clarithromycin, imipenem, fluoroquinolones, and minocycline [13] and individual sensitivities should, of course, direct the eventual choice of agent. Mycobacteria are generally resistant to vancomycin, which is commonly used as a first line agent for line infections. However in this case, the patient's condition did improve during vancomycin therapy. This may have been related to partial activity of vancomycin against *M. mucogenicum*, decreased use of the line, or even activity of vancomycin against a secondary causative agent.

In our patient who was already receiving vancomycin when the results of *M. mucogenicum* culture returned, we considered the possibility that the RGM may have been an environmental contaminant rather than an aetiological agent. We noted the absence of inflammation and induration at the line exit site (frequently observed and reported with RGM tunnel infections but not luminal infections [9]). However, when use of the line, following a full course of intravenous vancomycin, together with the absence of other organisms in any of the cultures, resulted in pyrexia, we were more confident that RGM was the causative agent. This is also echoed as *M. mucogenicum* was isolated from more than one blood culture specimen.

In a recent retrospective case series, Hawkins and colleagues reviewed six cases of RGM-associated line infections¹⁴. All except one patient were immunocompromised; the other receiving parenteral nutrition for gut dysmotility. In this patient *M. septicum* was isolated. They and others recommend removal of the infected line and IV combination antibiotic therapy for at least the initial treatment period [14], to prevent acquired resistance of *M. mucogenicum* to antibiotic agents, and to continue for at least 2 weeks, with re-siting of the line, if required, after 4 weeks. The exact duration of therapy required for *M. mucogenicum* has not been established, but prolonged therapy appears necessary to eradicate infection [5] in the immunosuppressed population.

We did not treat our patient with further antibiotics, and chose to observe for an evidence of ongoing infection of which there was none. A Hickman line was reinserted at a period of 6 weeks after removal of the initial line.

In a patient with an indwelling nutrition line presenting with a fever, infection with rapidly growing mycobacterium as a differential diagnosis should be considered. This consideration should be further heightened if the patient demonstrates an increased exposure to medical or dental environments, and in particular their water supplies, as in this case. The absence of exit site infection or of overt immunocompromise should not distract from this possibility and RGM isolates should not be dismissed as laboratory contaminants [15]. In

immunocompromised patients, a diagnosis of RGM-associated line sepsis should prompt immediate removal of the line together with combination antimicrobial therapy as determined by an antibiogram. In immunocompetent patients, as our case demonstrates, this adjunctive therapy may not be necessary. This case further demonstrates the utility of 16S sequencing in the identification of unusual organisms. Use of molecular techniques is likely to result in atypical causes of line sepsis being identified with increasing frequency, and this accurate identification will obviously direct patient management.

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Authors Contributions

-AS helped to draft and revise the manuscript.

-WA conceived of the study and helped to draft and revise the manuscript.

-SW critically revised the manuscript for intellectual content.

-ES critically revised the manuscript for intellectual content.

-MG critically revised the manuscript for intellectual content and gave final approval for the version to be published.

-All authors read and approved the final manuscript.

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