CASE REPORT

A neonate born with *Mycobacterium cosmeticum* bacteraemia

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SUMMARY

Mycobacterium cosmeticum is a rapidly growing mycobacterium that was recently identified. However, its role in human infection has not been well described. We present a case of an extremely premature neonate born with bacteraemia due to *M. cosmeticum* that resolved without sequelae. The infection likely occurred during a prolonged intrauterine transfusion procedure.

BACKGROUND

The report demonstrates a premature neonate with *Mycobacterium cosmeticum* bacteraemia, most likely acquired in utero. The patient had negative blood culture results even prior to receiving antimycobacterial therapy. This case is unique in that there have been no other reports of *M. cosmeticum* bacteraemia in neonates. This report will be of significance to those interested in rapidly growing mycobacteria, particularly in the neonatal population.

CASE PRESENTATION

A female infant with a birth weight 1040 g was born in January, 2009, via emergency caesarean section at 27 weeks' gestation to a 26-year-old gravida 3, para 3 mother who received adequate prenatal care. The pregnancy was complicated by maternal isoimmunisation with anti-E, small c and anti-M antibodies. Owing to extreme fetal anaemia, intrauterine blood transfusions (IBT) with maternal blood that was leucoreduced, irradiated and washed, were conducted at 24 weeks and 25 weeks gestation. The maternal blood used for the second IBT was obtained from a previously donated frozen unit in 2005. A third IBT was attempted at 26 weeks gestation, but failed due to fetal intolerance after a prolonged procedure. Subsequent to delivery, the infant was found to have severe anaemia with a haemoglobin level of 6.5 g/dL, thus warranting a double volume exchange transfusion with maternal washed packed red blood cells. She also received daily high-dose intravenous immunoglobulin for 3 days after birth for the management of severe haemolytic disease.

Blood cultures were obtained 5 h apart on the first day of life (DOL), with the first culture obtained via the umbilical arterial catheter prior to transfusion, and the second culture obtained peripherally after transfusion. The infant was empirically started on intravenous ampicillin and gentamicin as per neonatal intensive care unit protocol for possible neonatal sepsis with extreme prematurity and respiratory distress requiring

continuous positive airway pressure ventilation. Her initial white cell count was normal at 17 900 cells/mm³ with significant bandemia of 32%. The pretransfusion and post-transfusion aerobic blood cultures showed growth at 94 h and 107 h, respectively, of Gram-positive bacilli that were weakly acid-fast. The bacteria were later identified as *M. cosmeticum* with sensitivity to amikacin (minimum inhibitory concentration (MIC) <1 µg/mL), cefoxitin (MIC=4 µg/mL), ciprofloxacin (MIC=0.5 µg/mL), clarithromycin (MIC <0.12 µg/mL), imipenem (MIC <0.5 µg/mL), linezolid (MIC=1 µg/mL) and trimethoprim/sulfamethoxazole (MIC=2/38 µg/mL), by the Nocardia/Mycobacteria Research Laboratory at the University of Texas Health Science Center, Tyler, Texas, with confirmation by 16S rRNA sequencing completed at the Mayo Reference Laboratory in Rochester, Minnesota.

The patient had no temperature instability throughout this period, but experienced worsening respiratory acidosis with apnoea and oxygen desaturations, thus requiring intubation and respiratory support with a ventilator on DOL 3. The blood cultures were initially considered to be a contamination, but the paediatric infectious disease consultation was obtained on DOL 8 due to worsening leucocytosis of 35 400 cells/mm³ and an inability to wean the patient from mechanical ventilation. Blood cultures from the umbilical venous catheter and peripheral vein, along with a respiratory culture, were collected on DOL 8 after completion of 7 days of ampicillin and gentamicin. The umbilical central lines were removed on DOL 8. Intravenous amikacin and azithromycin were started on DOL 9. Two additional blood cultures, and urine and cerebrospinal fluid cultures, were also obtained, on DOL 11. The antibiotics were stopped after 7 days when all of the cultures collected on DOL 8 and 11 were found to be negative for mycobacteria or other bacteria and the infant had made significant clinical improvement.

INVESTIGATIONS

In order to rule out potential sources of bacteraemia, an investigation was conducted by the UTMB Department of Healthcare Epidemiology. Cultures were obtained from coolers used to transport blood products for intrauterine transfusion, and saline solution used during transfusion. However, no samples of the saved frozen unit of washed maternal blood that was used for intrauterine transfusion were available for cultures. Maternal blood and urine cultures were also obtained the day prior to delivery and 5 days

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Table 1 Previously published clinical cases of *Mycobacterium cosmeticum*

Year reported	Medical history	Clinical significance	Source of infection
2004	Mesotherapy	Definite	Cutaneous ²
2007	Chronic obstructive pulmonary disease, urosepsis	Definite. Patient improved after removal of catheter	Bacteraemia ³
2007	Non-Hodgkin's lymphoma	Unclear. Culture was collected as routine test and patient remained asymptomatic	Bacteraemia ³
2007	AIDS	Unclear. Patient had additional <i>Mycobacterium</i> species isolated from sputum. He deceased after respiratory arrest	Respiratory ³
2007	Malignancy	Doubtful	Autopsy blood ⁴
2007	Malignancy	Doubtful	Respiratory ⁴
2009	History of mesotherapy	Definite	Cutaneous ⁵
2011	Colitis	Definite. Patient without recurrence after prolonged antimicrobial therapy	Colon ⁶

postpartum. All of the cultures were negative. Environmental cultures were also obtained from hospital tap water, ice from patient floor ice machines and tap water from the residences on Galveston Island in Texas. Several environmental cultures were positive for *Mycobacterium abscessus* and *Mycobacterium porcinum*, but none of the cultures were positive for *M. cosmeticum*.¹ This latter community-based investigation was part of a larger environmental study after Hurricane Ike in September 2008.

OUTCOME AND FOLLOW-UP

While our patient survived, she developed multiple morbidities including left cerebral hemisphere atrophy leading to right-sided hemiplegia, cerebellar hypoplasia and global developmental delay.

DISCUSSION

M. cosmeticum is rarely reported as a cause of human infection, with only eight other clinical cases reported in the literature (table 1).^{2–6} It has never been documented in neonates prior to this case report. Isolation of this bacterium in infant blood culture was unlikely due to contamination during collection and processing of the culture samples, as two blood cultures from two different body sites, drawn 5 h apart, were positive. In addition, the clinical microbiology laboratory had no other positive *M. cosmeticum* culture for several months before and after these cultures, thus eliminating contamination in the laboratory. The mother had no signs or laboratory evidence of infection. However, it can be assumed that infection of the infant occurred in utero since the blood cultures obtained on the first day of life were positive. The likely source of this pathogen was contamination during multiple IBT's in the weeks prior to delivery. The pathogen could have been present in the stored, washed, frozen maternal blood used for IBT, or could have been introduced from the environment during the technically difficult IBT procedures.

This case also coincided with a sharp increase in *M. porcinum* isolates causing disease at the University of Texas Medical Branch in Galveston, Texas, USA, which was attributed to water contamination during Hurricane Ike.¹ Although *M. cosmeticum* was not isolated from environmental cultures at the time, direct surface cultures from the equipment used during IBT were not collected and cannot be excluded as a source of infection.

The clinical outcome in our reported neonate was clearance of bacteraemia prior to receiving additional antimycobacterial therapy with amikacin and azithromycin. With negative cerebrospinal fluid cultures, it is unlikely that *M. cosmeticum*

bacteraemia contributed to the neurological sequelae. While *M. cosmeticum* infection has not been reported in neonates, few cases of other rapidly growing *Mycobacterium* (RGM) bacteraemia in neonates have been reported, all of which describe late-onset sepsis in extremely premature and very low birth weight neonates with good clinical outcomes.^{7 8}

Antimicrobial susceptibility of RGM varies between species, with *M. abscessus* being the most resistant. In a review of RGM bacteraemia,⁹ it was found that the use of at least two active antimicrobials for a minimum of 4 weeks, including the removal of any intravascular catheter, leads to resolution of infection in more than 90% of cases. Antimicrobial susceptibilities of *M. cosmeticum* is only documented in two other reports.^{1 3} Including our case, *M. cosmeticum* showed uniform susceptibilities to amikacin, ciprofloxacin, cefoxitin, clarithromycin, imipenem and trimethoprim/sulfamethoxazole. Our patient was unique in that *M. cosmeticum* was not detected in blood cultures collected after 1 week of parenteral ampicillin and gentamicin. It is uncertain if gentamicin therapy was responsible for the clearance of bacteraemia. While there are no published studies of in vitro gentamicin susceptibility testing or therapeutic clinical use for *M. cosmeticum*, previous studies show variable gentamicin susceptibility for *M. avium* complex.¹⁰ Overall, the case reports to date suggest that *M. cosmeticum* is a low-virulence pathogen without long-term persistence.

Learning points

- The removal of central lines or catheters is essential in the treatment of bacteraemia.
- Rapidly growing mycobacteria can be a cause of neonatal sepsis.
- The spectrum of disease caused by rapidly growing mycobacteria is non-specific, but generally causes mild symptoms.

Contributors JP and LA were responsible for the care of the patient and the editing of this document. WLAK was responsible for writing up the original transcript, and the literature search relating to some of the details of the case report and the discussion section. JP is the guarantor of this case report.

Competing interests None declared.

Patient consent Obtained.

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