Case Report

Isolation of *Gordonia terrae* from a patient with catheter-related bacteraemia

A. J. Grisold,¹ P. Roll,² M. Hoenigl,¹ G. Feierl,¹ R. Vicenzi-Moser³ and E. Marth¹

Correspondence

A. J. Grisold

andrea.grisold@meduni-graz.at

¹Institute of Hygiene, Medical University of Graz, A-8010 Graz, Austria

²Institute for Forensic Medicine, Medical University of Graz, A-8010 Graz, Austria

³Department of Anaesthesiology and Intensive Care Medicine, Medical University of Graz, A-8036 Graz, Austria

Received 10 May 2007

Accepted 9 August 2007

A coryneform bacterium was isolated from a blood culture from a 24-year-old man with familial hypertrophic non-obstructive cardiomyopathy, chronic abuse of anabolic steroids and prior admission to hospital because of clinical signs of sepsis. 16S rRNA gene analysis unambiguously identified *Gordonia terrae*.

Introduction

Gordonia terrae is one of 27 *Gordonia* species described, which are aerobic, slightly acid-fast nocardioform actinomycetes. *Gordonia* species are ubiquitous in the environment and often found in soil and water; however, a few are also sporadically associated with human infections in both immunocompromised and immunocompetent individuals (Arenskötter *et al.*, 2004). *G. terrae* is rarely isolated from clinical specimens and only a few cases of infection have been reported. Clinical manifestations include central venous catheter related bacteraemia, granulomatous skin infection, meningitis and brain abscesses, granulomatous mastitis and a mycetoma of the hand. We describe here a very rare case of central venous catheter related bacteraemia due to *G. terrae*.

Case report

A 24-year-old man was admitted to hospital with a 2 day history of progressive dyspnoea and a 1 day history of nausea and vomiting. He had a past medical history of familial hypertrophic non-obstructive cardiomyopathy and a reported chronic abuse of methandienone, an anabolic steroid which he had used for body building. On examination he presented with a temperature of 37.7 °C, a heart rate of 116 beats min⁻¹ and a GCS score of 15. Blood tests revealed neutrophilic leukocytosis (25.0 × 10⁶ µl⁻¹), elevated C-reactive protein level of 82.8 mg l⁻¹ (normal range <8 mg l⁻¹), signs of disseminated intravascular coagulation, elevated liver enzymes (aspartate aminotransferase 7111 IU l⁻¹, alanine aminotransferase 7173 IU l⁻¹), a moderately elevated potassium blood level (5.8 mmol l⁻¹), elevated cardiac enzymes and signs of acute renal failure (creatinine 6.65 × 10¹ mg l⁻¹). The cardiac ejection fraction was ~15%. Chest X-ray revealed pneumoniaic-type consolidation in the right lower lung and a

density of 1.5 cm in diameter in the right upper lung. Sepsis with acute renal failure and ischaemic hepatitis was diagnosed and the patient was immediately transferred to the intensive care unit. Antibody quick tests for *Legionella*, *Leptospira* and Puumala and antigen quick test for pneumococci gave negative results. He was given fluids and vasopressors, intubated, dialysed and placed on levofloxacin (500 mg per day) and piperacillin/tazobactam (4 g/500 mg twice a day) for community-acquired pneumonia and sepsis. One day after admission, the patient developed septic shock with multiple organ dysfunction. *G. terrae* was isolated from a blood sample obtained through a central venous catheter on day 4 after admission. All other blood cultures turned out to be negative. Cultures from tracheal secretion revealed only moderate growth of *Candida albicans*. Despite aggressive treatment, the patient died of multisystem organ failure on the 4th day after admission.

Microbiological studies

Blood cultures were placed in the Bactec 9050 (Becton Dickinson) and were positive for growth after 4 days of incubation. The isolate grew on blood and chocolate agar, with salmon-to-orange colonies after 48 h of incubation. The Gram stain showed Gram-positive coryneform bacteria, and in the API Coryne (bioMérieux) the isolate gave a profile number of 2110004 and was identified as *Rhodococcus* sp. (91.7% identification; T index 0.95).

16S rRNA gene analysis was carried out using eubacterial universal primers. Subsequently a BLAST search of the obtained partial 16S rRNA gene sequence (1251 bp) was performed using the taxonomy browser of the National Center for Biotechnology Information (<http://www.ncbi.nlm.nih.gov>) and retrieved from GenBank. Similarity of

100% was achieved for *G. terrae*, with the accession number AY771333.1.

Resistance testing was performed by the Etest method (AB Biodisk), using an inoculum corresponding to McFarland standard 0.5, applied on Mueller–Hinton agar plates containing 5% (v/v) sheep blood (Becton Dickinson Microbiology Systems), and a period of 48 h of incubation. *G. terrae* was susceptible to penicillin G (PEN G), amoxicillin/clavulanic acid (AUC), piperacillin/tazobactam (P/T), gentamicin (GEN), amikacin (AN), ceftriaxone (CRO), imipenem (IPM), meropenem (MP), ciprofloxacin (CIP), moxifloxacin (MOXI) and vancomycin (VA), but resistant to ceftazidime (CAZ), oxacillin (OXA) and clindamycin (CC). The MICs obtained (mg l⁻¹) were 0.38 for PEN G, 0.125 for AUC, 0.125 for P/T, 0.125 for GEN, 0.064 for AN, 1.0 for CRO, 0.016 for IPM, 0.032 for MP, 0.006 for CIP, 0.006 for MOXI and 0.125 for VA and >256 for CAZ, 8.0 for OXA and 8.0 for CC, respectively.

Discussion

Gordonia species are Gram-positive coryneform bacteria. Their taxonomy has been complicated by several reclassifications (Arenskötter *et al.*, 2004). *G. terrae*, which was previously known as '*Gordona terrae*' and '*Rhodococcus terrae*', was initially isolated from soil and described by Tsukamura (1971). To date, only six case reports of bloodstream infections caused by *G. terrae* have been found in the literature, and all of the infections occurred in the United States. Pham *et al.* (2003) previously reported five cases of central venous catheter related bacteraemia caused by *G. terrae* between 1992 and 2001. All of these patients had the primary diagnosis of cancer and were treated successfully with antibiotics, with the requirement of catheter removal for two patients. One case of *G. terrae* bloodstream infection associated with a Hickman catheter in an immunocompetent patient receiving parenteral nutrition was described by Buchman *et al.* (1992). The patient required catheter removal and was treated successfully with i.v. vancomycin.

Drancourt *et al.* (1994, 1997) reported one case of a brain abscess in an immunocompromised child and one case of meningitis and brain abscesses due to *G. terrae* in an immunocompetent woman. Other sites of infection by *G. terrae* have been reported, e.g. granulomatous mastitis following nipple piercing, which was treated successfully by a course of tetracycline (Zardawi *et al.*, 2004), a mycetoma of the hand, which is a granulomatous, infectious, non-contagious disease of the subcutaneous tissue mainly seen around the equator (Bakker *et al.*, 2004), and one case of skin infection with lymphadenitis in a Native American girl (Martin *et al.*, 1991).

The isolate described here exhibited an antibiotic susceptibility pattern identical to that previously reported for *G. terrae* strains, indicating common susceptibility to

imipenem, aminoglycosides and fluoroquinolones and various susceptibilities to other antibiotic families; the strain was resistant to ceftazidime, oxacillin and clindamycin (Pham *et al.*, 2003). Although in our patient the *G. terrae* strain showed susceptibility to piperacillin/tazobactam and C-reactive protein levels decreased, the patient died 4 days after admission due to multisystem organ failure. This fatal outcome was probably enhanced by the patient's abuse of the highly liver-toxic anabolic steroid methandienone (Herr *et al.*, 2002). Particularly in high doses, anabolic steroids may have immunosuppressive effects and thus may increase susceptibility to bacteraemia (Angele *et al.*, 2006).

We conclude that *G. terrae* may eventually cause catheter-related bacteraemia, particularly in patients with severe underlying diseases. On the basis of this case and previous reports in the literature, we propose that *G. terrae* should be considered a rare but potential pathogen in both immunocompromised and immunocompetent patients.

References

- Angele, M. K., Frantz, M. C. & Chaudry, I. H. (2006). Gender and sex hormones influence the response to trauma and sepsis – potential therapeutic approaches. *Clinics* **61**, 479–488.
- Arenskötter, M., Bröker, D. & Steinbüchel, A. (2004). Biology of the metabolically diverse genus *Gordonia*. *Appl Environ Microbiol* **70**, 3195–3204.
- Bakker, X. R., Spauwen, P. H. & Volmans, W. M. (2004). Mycetoma of the hand caused by *Gordonia terrae*: a case report. *J Hand Surg [Br]* **29**, 188–190.
- Buchman, A. L., McNeil, M. M., Brown, J. M., Lasker, B. A. & Ament, M. E. (1992). Central venous catheter sepsis caused by unusual *Gordonia* (*Rhodococcus* species): identification with a digoxigenin-labeled rDNA probe. *Clin Infect Dis* **15**, 694–697.
- Drancourt, M., McNeil, M. M., Brown, J. M., Lasker, B. A., Maurin, M., Choux, M. & Raoult, D. (1994). Brain abscess due to *Gordonia terrae* in an immunocompromised child: case report and review of infections caused by *G. terrae*. *Clin Infect Dis* **19**, 258–262.
- Drancourt, M., Pelletier, J., Cherif, A. A. & Raoult, D. (1997). *Gordonia terrae* central nervous system infection in an immunocompetent patient. *J Clin Microbiol* **35**, 379–382.
- Herr, A., Rehmer, A., Kunde, K., Gust, R. & Gries, A. (2002). A thirty-year old bodybuilder with septic shock and ARDS from abuse of anabolic steroids. *Anaesthesist* **51**, 557–563.
- Martin, T., Hogan, D. J., Murphy, F., Natyshak, I. & Ewan, E. P. (1991). *Rhodococcus* infection of the skin with lymphadenitis in a non-immunocompromised girl. *J Am Acad Dermatol* **24**, 328–332.
- Pham, A. S., De, I., Rolston, K. V., Tarrand, J. J. & Han, X. Y. (2003). Catheter-related bacteremia caused by the nocardioform actinomycete *Gordonia terrae*. *Clin Infect Dis* **36**, 524–527.
- Tsukamura, M. (1971). Proposal of a new genus, *Gordonia*, for slightly acid-fast organisms occurring in sputa of patients with pulmonary disease and in soil. *J Gen Microbiol* **68**, 15–26.
- Zardawi, I. M., Jones, F., Clark, D. A. & Holland, J. (2004). *Gordonia terrae* induced suppurative granulomatous mastitis following nipple piercing. *Pathology* **36**, 275–280.