

Ochrobactrum Anthropi Bacteraemia: Report of Six Cases and Review of the Literature

Alicia Hernández-Torres^{1*}, Joaquín Ruiz Gómez², Elisa García-Vázquez¹ and Joaquín Gómez-Gómez¹

¹Department of Infectious Diseases, Hospital Universitario Virgen de la Arrixaca, Murcia, Spain

²Department of Microbiology, Hospital Universitario Virgen de la Arrixaca, Murcia, Spain

Abstract

Background: *Ochrobactrum anthropi* is an emerging opportunistic pathogen classically considered of low virulence. The purpose of this study is to describe the most recent cases of *O. anthropi* bacteraemia in our hospital, along with a brief review of the literature.

Methods: we have reviewed the cases of *O. anthropi* registered in the database of our hospital during the last 3 years. *Ochrobactrum* spp. was identified by the macroscopic appearance and growth characteristics; definitive identification was performed by the commercial system Vitek-2 (Biomerieux, France).

Results: We report 6 cases of bacteraemia secondary to *O. anthropi* infection, 5 of them occurring in immunocompromised patients; the last one was considered to be contaminated due to the lack of risk factors and the clinical improvement without an effective treatment. Two out of 6 patients had catheter-related infection, the most common infection associated to this organism. Another patient had an *O. anthropi*-related biliary sepsis. Probably the most relevant cases are patients number 1 and patient number 4, suffering from a pneumonia and a transjugular intrahepatic portosystemic shunt (TIPS)-related infection respectively, two uncommon infections caused by this bacterium. Clinical response was satisfactory in all cases, except in case number 4, probably in relation to the maintenance of the TIPS.

Conclusion: severe immunosuppression and association with an indwelling medical device are the main factors associated with most cases of *O. anthropi* bacteraemia. The most important point in the treatment is the removal of the infected device, in addition to an appropriate antibiotic treatment.

Keywords: *Ochrobactrum anthropi*; Bacteraemia; Septicaemia; Catheter-related infection

Introduction

Ochrobactrum anthropi is an aerobic, gram-negative bacillus widely distributed in environmental sources. It appears to be an emerging opportunistic pathogen associated with the implantation of intravenous catheters or other foreign bodies in patients with debilitating illness. Although the organism seems to be of relatively low virulence, it can produce clinically significant, fatal infections in immunocompromised patients. As a consequence, its importance is increasing, because of the common exposition to this organism and the increase in the number of immunocompromised patients. Also, we know that this organism has a predilection to adhere to silicone and foreign objects; this phenomenon is clinically relevant, because infections related to indwelling medical devices need device removal for clinical response. We describe here 6 cases of *O. anthropi* bacteraemia seen in our hospital in the last three years, and we review the data published in the literature.

Patients and Methods

We have reviewed the cases of *O. anthropi* registered in the database of our hospital during the last 3 years. *Ochrobactrum* spp. was identified by the macroscopic appearance and growth characteristics; definitive identification was performed by the commercial system Vitek-2 (Biomerieux, France).

Results

Case I: Pneumonia

We describe the case of a 73-year-old man with chronic obstructive pulmonary disease, hypertension, ischemic heart disease and chronic renal failure on haemodialysis through an arteriovenous fistula in his left arm. The patient was admitted to our hospital complaining of a

48-hours history of fever, increase in his chronic cough and wheezing. On admission, his temperature was 38.5°C, the blood pressure was 154/63 mmHg and the pulse 93/min. Blood was drawn for cultures, and thereafter the patient was given levofloxacin. On physical examination, he showed diffuse bilateral wheezes and in the chest X-ray a right lower lobe infiltrate was seen. The patient became afebrile in 48 hours and a 10-day course of oral levofloxacin was completed. This antibiotic was maintained when we received the blood cultures results, that showed the isolation of the same microorganism in all of them, identified as *O. anthropi*, which was susceptible to toimipenem, meropenem, ciprofloxacin, levofloxacin, tobramycin, doxycycline and cotrimoxazole, and resistant to amikacin, piperacillin-tazobactam, aztreonam and cephalosporins. There were no further episodes of fever or bacteraemia.

Case II: Catheter-related infection

A 38-year-old man, with no prior hospitalization and no underlying disease, was admitted to our hospital because of skin lesions on both legs consistent with purpura for the previous two months. Laboratory findings included a white blood cell count of 23700/mm³ and a platelet

***Corresponding author:** Alicia Hernández-Torres, PhD, Department of Infectious Diseases, Hospital Universitario Virgen de la Arrixaca, carretera Madrid-Cartagena, S/N, 30120, El Palmar, Murcia, Spain, Tel: +34650894657; Fax: +34968369417; E-mail: aliciahernandeztorres@gmail.com

Received November 23, 2013; Accepted December 29, 2013; Published January 07, 2014

Citation: Torres AH, Gómez JR, Vázquez EG, Gómez JG (2014) *Ochrobactrum Anthropi* Bacteraemia: Report of Six Cases and Review of the Literature. Intern Med 4: 134. doi:10.4172/2165-8048.1000134

Copyright: © 2014 Torres AH, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

count of 40000/mm³. After a thorough study of peripheral blood and bone marrow an acute myeloid leukemia subtype M4Eo was diagnosed, and treatment with idarubicin and cytarabine was initiated. Forty-eight hours later, his temperature was 38.5°C in relation to phlebitis; then, catheter was removed, two sets of blood cultures were collected and antibiotic therapy with meropenem and teicoplanin was started. The cultures yielded gram negative rods identified as *O. anthropi*, that was susceptible to all antibiotics tested (piperacillin/tazobactam, ceftazidime, cefepime, imipenem, meropenem, aztreonam, ciprofloxacin, levofloxacin, tobramycin, amikacin, doxycycline and cotrimoxazole); despite this fact, antibiotics were not changed. A 15 days course of antibiotic was completed and the patient was discharged. He has remained clinically well to this date.

Case III: Biliary sepsis

This is the case of a 49-year-old woman, with a history of diabetes mellitus type 2 and an urgent cholecystectomy because of an acute gangrenous cholecystitis in 2004. In June 2009, she was diagnosed of a pancreatic adenocarcinoma with hepatic metastases and obstructive jaundice that required external biliary drainage. In July 2009, 5 days after receiving gemcitabine and oxaliplatin, the patient presented with a history of fever (temperatures as high as 39°C) and pain in the upper abdominal region. A white blood cell count was 1390/mm³, with 930 neutrophils, the level of hemoglobin was 7.6 g/dl and cholestasis enzymes were elevated. With the diagnosis of febrile neutropenia secondary to a biliary tract infection, blood and biliary drainage were drawn for cultures, empiric antibiotic treatment with piperacillin-tazobactam was initiated and, as the presence of a complete obstruction of the bile duct, an internal biliary drainage was placed. Cultures were all positive for *O. anthropi*, susceptible to imipenem, meropenem, ciprofloxacin, levofloxacin and gentamicin, and resistant to amikacin, tobramycin, piperacillin-tazobactam, cotrimoxazole and all cephalosporins. After susceptibility tests were available therapy was switched from empirical piperacillin-tazobactam to levofloxacin, and the patient became afebrile within 48 hours; no fever and further symptoms have been noted and repeated blood cultures were negative.

Case IV: Transjugular intrahepatic portosystemic shunt device infection

A 61-year-old man was admitted to our hospital for liver transplantation. The patient had a history of Child-Pugh B alcoholic liver cirrhosis complicated by portal hypertension and splenomegaly with esophagus varices. The initial response is adequate and the patient is discharged from the ICU to the hospitalization ward. In the following days, the patient had significant ascites; a CT angiography showed that no vascular pathology was present and the measurement of portal pressure reported a moderate portal hypertension. Because of this reason, a transjugular liver biopsy was performed, with no significant findings, and finally, a transjugular intrahepatic portosystemic shunt was performed. Despite of that, ascites didn't response and, in the following weeks he developed fever and renal impairment. Several peripheral blood cultures grew *O. anthropi*, susceptible to cefepime, imipenem, meropenem, ciprofloxacin, levofloxacin, gentamicin, tobramycin, amikacin, tigecycline, minocycline, colistin and cotrimoxazole, and resistant to piperacillin, piperacillin-tazobactam, ampicillin-sulbactam, ceftazidime and aztreonam. He began receiving meropenem, but fever persisted for a long time and subsequent blood isolates, obtained over the following 2 months, were an identical organism. There was a progressive deterioration with a multiorgan dysfunction syndrome, and finally, the patient died 4 months after his admission.

Case V: Catheter-related infection

A 56 year-old woman with a history of hypertension, a depressive and anxiety disorder, was diagnosed in July 2008 of acute myeloblastic leukaemia M5a. Treatment was initiated, and after several relapses that required multiples cycles of chemotherapy, and being in remission, the patient was admitted to be studied previously to hematopoietic progenitor cell transplantation. At the time of admission, the patient presented severe chemotherapy-related pancytopenia, which required several blood transfusions and, 6 days after the admission, she developed fever. At that time, transcatheter and peripheral blood cultures were obtained and, with the diagnosis of febrile neutropenia, that was thought to be related to the central line infection and meropenem was initiated. All blood cultures grow *O. anthropi* susceptible to imipenem, meropenem, ciprofloxacin, levofloxacin and cotrimoxazole and resistant to aminoglycosides, all cephalosporins, piperacillin-tazobactam and aztreonam. However, central line was not removed and, although the patient became afebrile after initiation of the antibiotic treatment, repeated cultures remained positive until the catheter removal. The patient was discharged 10 days later, without further episodes of bacteraemia.

Case VI: Blood culture contamination

A 5-month-old child, without any underlying diseases, was attended in our hospital because of breathlessness during the last 3 days, as well as cough and nasal obstruction. On physical examination, he showed diminished breath sounds and bronchospasm and the X-ray didn't show any abnormality. Nebulized epinephrine was initiated and the initial response was good. However, 8 days after the admission, his temperature was 39°C, only a blood culture was taken and treatment with cefotaxime was initiated. Microbiologist informed about growing of *O. anthropi* in the blood culture, which was resistant to all cephalosporins, piperacillin-tazobactam, aztreonam and tobramycin, and susceptible to carbapenems, amikacin, doxycycline, colistin and cotrimoxazole. However, antibiotic was not modified due to the good evolution of the patient, and the culture was considered to be contaminated. Repeated cultures were negative.

Discussion

O. anthropi is a gram-negative, motile, nonfermentative, oxidase negative and urease positive, aerobic bacillus widely distributed in environmental sources (included inside the hospital). This organism rarely causes human infection but when encountered, it is frequently found to involve contaminated medical material/devices and immunocompromised patients, although infections in immunocompetent patients have been described as well [1]. Moreover, and especially in areas where the prevalence of *Brucella* is low, confusion with this organism is frequent. Because of their similar phenotypic properties, early diagnosis of a suspected brucellosis case is often miscoded as *O. anthropi* infection by automated identification systems in the clinical laboratory [2,3]. Catheter related bloodstream infection is by far the most common clinical presentation [4-7]. It is generally believed that *O. anthropi* is the only pathogenic species in the genus *Ochrobactrum* that is most commonly encountered in clinical settings, although another species of the same genus, *O. intermedium*, has been identified to cause pyogenic infections in humans [8].

All our patients were considered to be immunocompromised except the last one, who hadn't any underlying disease (we considered that in this case the blood culture was contaminated, but many cases of *O. anthropi* infection in immunocompetent hosts have been

reported) [9], and in almost all of them the source of the bacteraemia was a medical device (a central line in cases 2 and 5, an intrahepatic portosystemic shunt in case number 4 or a biliary drainage in case number 3). Although catheter-related bloodstream infection is the most common clinical presentation, cases of peritonitis, osteomyelitis, septic arthritis, endophthalmitis, infective endocarditis, and soft tissue infections have been reported [10]. In case number 1, infection was not related to any medical device (haemodialysis was performed through an arteriovenous fistula and he had no indwelling catheters) and the source seemed to be a pneumonia, since there were no others causes that could explain it; this is an exceedingly rare clinical manifestation; only two cases have been reported in the medical literature to date, the first one in a patient who underwent lobectomy and the last one was recently published; it was a case of ventilator associated pneumonia caused by *O. anthropi* [11,12]. In our revision we didn't find any case of *Ochrobactrum* spp. bacteraemia in patients with cystic fibrosis, although we know that *O. anthropi* is an opportunistic pathogen that colonizes the respiratory tract of these patients [13,14].

This organism, like *Staphylococcus*, has a predilection to adhere to silicone and foreign objects; this phenomenon is clinically relevant, because infections such as vascular catheter-related bacteraemia need catheter removal for clinical response. Nevertheless, in case number 3, the patient became afebrile and repeated blood cultures were negative despite the maintenance of the biliary drainage. We want to give special emphasis to case number 4; in this case, blood cultures remained positive probably because intrahepatic shunt device was not removed. Persistent transjugular intrahepatic portosystemic shunt (TIPS) infection, also known as 'endotipsitis' is a rare but serious complication of TIPS insertion [15,16]. We have performed a medline database search and there are no reported cases in the literature of this type of infection caused by *O. anthropi*. We think that the fact that portosystemic shunt device was not removed, because this removal is impractical, contributed to the fatal outcome.

Antibiotics that *O. anthropi* are more generally susceptible to are gentamicin, ciprofloxacin, imipenem, meropenem and trimethoprim-sulfamethoxazole. There is reported resistance to penicillins, monobactams and third-generation cephalosporins. There are high rates of clinical failure with fluoroquinolones described in the literature despite in vitro activity, and because of this, they should be used with caution. Two of our patients received levofloxacin with good clinical outcomes, and the others were treated with meropenem. However, the virulence of *O. anthropi* and many other nonfermentative gram-negative bacilli appears rather low, and there are no good data documenting excess mortality due to such infection. In fact, several cases of bacteraemia and other infections caused by *O. anthropi* successfully treated with no antibiotics have been reported, as in case number 6 [10,17].

Nonetheless, there is little doubt that the infection will be associated with a worse prognosis in immunocompromised patients. Only one of our patients died. Shi et al. [18] recently studied the incidence of bacteraemia in 475 liver transplant recipients in the first 6 months after transplantation, and they found *O. anthropi* to be responsible of 10.8% of the reported bacteraemia in this group [12]. The isolation of this microorganism is very much lower in our hospital, despite being the regional transplantation center. In this study, mortality is up to 50% when bacteraemia is accompanied by septic shock, and this rate is even higher if the bacteraemia is due to MDR gram negative bacilli, as *O. anthropi* [18].

We contend that *O. anthropi* is a bacillus widely distributed in

environmental sources and that severe immunosuppression and association with an indwelling medical device, including a central venous catheter (CVC), have been described as the prominent factors associated with most cases of *O. anthropi* bacteraemia. For this reason, isolation of the organism should raise suspicion of any medical device-related infection. In our experience, the most important point in the treatment is the removal of the infected device, in addition to an appropriate antibiotic treatment. It is also very important to implement effective methods of sterilization and infection control guidelines to prevent infection.

References

1. Arora U, Kaur S, Devi P (2008) *Ochrobactrum anthropi* septicaemia. Indian J Med Microbiol 26: 81-83.
2. Carrington M, Choe U, Ubillos S, Stanek D, Campbell M, et al. (2012) Fatal case of brucellosis misdiagnosed in early stages of *Brucella suis* infection in a 46-year-old patient with Marfan syndrome. J Clin Microbiol 50: 2173-2175.
3. Horvat RT, El Atrouni W, Hammoud K, Hawkinson D, Cowden S (2011) Ribosomal RNA sequence analysis of *Brucella* infection misidentified as *Ochrobactrum anthropi* infection. J Clin Microbiol 49: 1165-1168.
4. Cieslak TJ, Robb ML, Drabick CJ, Fischer GW (1992) Catheter-associated sepsis caused by *Ochrobactrum anthropi*: report of a case and review of related nonfermentative bacteria. Clin Infect Dis 14: 902-907.
5. Kern WV, Oethinger M, Kauffhold A, Rozdzinski E, Marre R (1993) *Ochrobactrum anthropi* bacteremia: report of four cases and short review. Infection 21: 306-310.
6. Mastroianni A, Cancellieri C, Montini G (1999) *Ochrobactrum anthropi* bacteremia: case report and review of the literature. Clin Microbiol Infect 5: 570-573.
7. Shrishrimal K (2012) Recurrent *Ochrobactrum anthropi* and *Shewanella putrefaciens* bloodstream infection complicating hemodialysis. Hemodial Int 16: 113-115.
8. Möller LV, Arends JP, Harmsen HJ, Talens A, Terpstra P, et al. (1999) *Ochrobactrum intermedium* infection after liver transplantation. J Clin Microbiol 37: 241-244.
9. Vaidya SA, Citron DM, Fine MB, Murakami G, Goldstein EJ (2006) Pelvic abscess due to *Ochrobactrum intermedium* [corrected] in an immunocompetent host: case report and review of the literature. J Clin Microbiol 44: 1184-1186.
10. Hardesty JS, Juang P (2010) Recurrent *Ochrobactrum anthropi*, Treatment and Clinical Relevance. Infect Dis ClinPract 18: 299-303.
11. Naik C, Kulkarni H, Darabi A, Bhanot N (2013) *Ochrobactrum anthropi*: a rare cause of pneumonia. J Infect Chemother 19: 162-165.
12. Cieslak TJ, Drabick CJ, Robb ML (1996) Pyogenic infections due to *Ochrobactrum anthropi*. Clin Infect Dis 22: 845-847.
13. Yagüe-Muñoz A, Gregori-Roig P, Valls-López S, Pantoja-Martínez J (2010) [*Ochrobactrum anthropi* bacteremia in a child with cystic fibrosis]. Enferm Infecc Microbiol Clin 28: 137-138.
14. Muenet M, Bittar F, Stremier N, Dubus JC, Sarles J, et al. (2008) First isolation of two colistin-resistant emerging pathogens, *Brevundimonas diminuta* and *Ochrobactrum anthropi*, in a woman with cystic fibrosis: a case report. J Med Case Rep 2: 373.
15. Mizrahi M, Adar T, Shouval D, Bloom AI, Shibolet O (2010) Endotipsitis-persistent infection of transjugular intrahepatic portosystemic shunt: pathogenesis, clinical features and management. Liver Int 30: 175-183.
16. Mizrahi M, Roemi L, Shouval D, Adar T, Korem M, et al. (2011) Bacteremia and "Endotipsitis" following transjugular intrahepatic portosystemic shunting. World J Hepatol 3: 130-136.
17. Wi YM, Peck KR (2010) Biliary sepsis caused by *Ochrobactrum anthropi*. Jpn J Infect Dis 63: 444-446.
18. Shi SH, Kong HS, Xu J, Zhang WJ, Jia CK, et al. (2009) Multidrug resistant gram-negative bacilli as predominant bacteremic pathogens in liver transplant recipients. Transpl Infect Dis 11: 405-412.