

Bloodstream infection by *Acinetobacter radioresistens*: the first case report in Brazil

Bacteremia por Acinetobacter radioresistens: primeiro relato de caso no Brasil

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ABSTRACT

This report is the description of the first case in Brazil of community-acquired bloodstream infection caused by *Acinetobacter radioresistens*. A 73-year-old male patient with Alzheimer's and Parkinson's disease was hospitalized and diagnosed with pneumonia at a general hospital. MacConkey agar pure culture was obtained from blood cultures. Conventional tests identified the isolate as *Acinetobacter baumannii* complex. However, the matrix-assisted laser desorption ionization-time of flight (MALDI-TOF) technique identified it as *Acinetobacter radioresistens*. The isolate was sensitive to all antibiotics tested by the disk diffusion method, including carbapenem. However, *bla*_{oxa-23} gene was detected by the polymerase chain reaction (PCR) assay. *Acinetobacter radioresistens* can be considered an important agent of opportunistic infections in immunocompromised patients, a potential disseminator of resistance genes.

Key words: *Acinetobacter*; bacteremia; Alzheimer disease.

RESUMO

Este relato é a descrição do primeiro caso no Brasil de bacteremia adquirida na comunidade causada por Acinetobacter radioresistens. Paciente do sexo masculino, 73 anos de idade, portador da doença de Alzheimer e de Parkinson, foi assistido em um hospital geral e diagnosticado quadro de pneumonia. Cultura pura em ágar MacConkey foi obtida a partir de hemoculturas. Testes convencionais identificaram o isolado como complexo Acinetobacter baumannii, porém o sistema matrix-assisted laser desorption ionization-time of flight (MALDI-TOF) identificou como Acinetobacter radioresistens. O isolado apresentou-se sensível a todos os antibióticos testados por meio da técnica do disco difusão, incluindo os carbapenens. Contudo, foi detectado o gene bla_{oxa-23} pela técnica da reação em cadeia da polimerase (PCR). Acinetobacter radioresistens pode ser considerado um agente importante de infecções oportunistas em pacientes imunocomprometidos, um potencial disseminador de genes de resistência.

Unitermos: *Acinetobacter*; bacteremia; doença de Alzheimer.

RESUMEN

Este reporte es la descripción del primer caso en Brasil de bacteriemia por Acinetobacter radioresistens adquirida en la comunidad. Paciente masculino de 73 años de edad, portador de las enfermedades de Alzheimer y de Parkinson, fue atendido en un hospital general y diagnosticado con cuadro de neumonía. Cultivo puro en agar MacConkey fue obtenido de hemocultivos. Pruebas convencionales identificaron el aislado como complejo Acinetobacter baumannii, pero el sistema desorción/ionización láser asistida por matriz-tiempo de vuelo (MALDI-TOF) lo identificó como Acinetobacter radioresistens. El aislado se presentó sensible a todos antibióticos probados mediante el método de difusión en disco, incluyendo los carbapenemas. Sin embargo, el gen bla_{oxa-23} fue

detectado por la técnica de reacción en cadena de la polimerasa (RCP). *Acinetobacter radioresistens* puede ser considerado un agente importante de infecciones oportunistas en pacientes inmunocomprometidos, un potencial diseminador de genes de resistencia.

Palabras clave: *Acinetobacter*; bacteriemia; enfermedad de Alzheimer.

INTRODUCTION

Acinetobacter spp. has shown to be a potential opportunistic pathogen, which mainly affects patients with some comorbidity⁽¹⁾. The *Acinetobacter baumannii* species, in particular, is in the first place of the “critical state” list of bacteria requiring special attention, according to the World Health Organization⁽²⁾. However, the special attention given to this species should also be directed towards other emerging members of this genus, such as *Acinetobacter radioresistens*. This species shows great adaptability to an environment with low relative humidity, and great persistence and survival in hospital environments, under such conditions⁽³⁾. It is also considered a possible reservoir and disseminator of genes that confer resistance to carbapenem⁽⁴⁾. To date, there are a few clinical case reports involving *A. radioresistens*⁽⁵⁻⁷⁾, of which only one describes a community-acquired bloodstream infection, from a human immunodeficiency virus (HIV)-positive patient⁽⁷⁾.

CASE REPORT

A 73-year-old male patient was hospitalized at a general hospital localized in Natal, Brazil Northeast, presenting fever, respiratory secretions and wheezing on chest auscultation. The patient was diagnosed with pneumonia and was breathing with the aid of a 50% ventilation mask. He was hypertensive and presented Alzheimer's and Parkinson's disease. Urine, sputum and blood samples were collected for cultures in three different sites upon hospital admission. The urine culture on cystine-, lactose-, and electrolyte-deficient (CLED) agar (HiMedia, India) was negative, and the sputum culture on chocolate agar (HiMedia, India) showed growth (50,000 cfu/ml) with Gram-negative features (i.e. small and non-pigmented), however, this was considered a non-significant growth by the microbiology laboratory. Three blood samples were later inoculated on chocolate agar (HiMedia, India) and incubated at 37°C on microaerophilic environment for 18 h, and all of them yielded significant monomicrobial growth. After Gram staining performance, Gram-negative coccobacilli isolate was observed. Biochemical tests results revealed a non-fermenting isolate. In addition, the strain presented oxidase-negative, catalase-positive,

immobile properties and growth at 44°C, which was suggestive of *Acinetobacter baumannii* complex. Still, the matrix-assisted laser desorption ionization-time of flight (MALDI-TOF) technique (VITEK-MS® – bioMérieux, Rio de Janeiro, Brazil) identified the strain as *Acinetobacter radioresistens* (NT5476 strain). Antimicrobial susceptibility was evaluated by the Clinical and Laboratory Standards Institute (CLSI) disk-diffusion technique assays⁽⁸⁾. According to CLSI breakpoints the NT5476 strain was susceptible to all antimicrobials *in vitro* tested: ciprofloxacin (5 µg), amikacin (30 µg), gentamicin (10 µg), ceftriaxone (30 µg), ampicillin + sulbactam (20 µg), meropenem (10 µg), imipenem (10 µg), sulphamethoxazole + trimethoprim (25 µg), piperacillin + tazobactam (30 µg), and cefotaxime (30 µg).

Polymerase chain reaction (PCR) assays screening for carbapenem-hydrolyzing class D β-lactamases encoding genes were performed, as previously published⁽⁹⁾. The strain showed positive results for *bla*_{oxa-23} gene. The amplicon was observed in an agarose gel electrophoresis at 2%, stained with ethidium bromide, visualized under ultra-violet (UV) transilluminator, and photographed. After *bla*_{oxa-23} gene was confirmed, NT 5376 strain was also screening for the insertion sequence *ISaba1* by PCR assay, as previously described by Segal *et al.* (2005)⁽¹⁰⁾. The strain presented negative results for this insertion sequence.

DISCUSSION

This is the first report of bloodstream infection by *A. radioresistens* in Brazil. Antimicrobial therapy was performed with ceftriaxone and the patient received hospital discharge in good clinical condition. This infection can be considered as a community-acquired infection since it was detected upon patient's hospital admission and was not related to any previous hospitalization⁽¹¹⁾. Community infections associated to *Acinetobacter* spp. mainly affect patients with some morbidity⁽¹⁾. The patient from this report presented Alzheimer and Parkinson's disease. In addition, diseases such as Alzheimer and Parkinson increase the risk of saliva aspiration, more prone to respiratory infections. The infection occurred, possibly, through the upper airways with subsequent dissemination through the bloodstream.

The respiratory systems are a gateway for *Acinetobacter* spp. bloodstream infection⁽¹²⁾, which is in agreement with the initial diagnosis of the case, which was pneumonia. The development of aspiration pneumonia with Alzheimer's disease is related to the reduced level of consciousness, dysphagia, and loss of reflexes, favoring the aspiration of commensal microorganisms from the environment to the airways, causing pneumonia with subsequent dissemination through the bloodstream⁽¹³⁾. Although the strain harbored *bla*_{oxa-23} gene, it was susceptible to the carbapenems tested and it showed absence of *ISaba1* by PCR screening. Our findings agree with some other studies, which also detected *bla*_{oxa-23} gene and absence of *ISaba1* in *A. radioresistens* sensitive to carbapenems. This phenomenon has been explained by relating this sensitivity to the absence of genetic elements in the genome, particularly the *ISaba1* insertion sequences⁽⁵⁾.

Therefore, further studies will be needed to better understand the pathogenic potential of the *Acinetobacter radioresistens* species, since it may play a significant role as an infectious agent, especially in immunocompromised patients. Furthermore, additional experiments are required to understand the importance of harboring resistance genes in their genome, which show no expression, and their ability to disseminate them to other species.

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