Journal of
TRAVEL MEDICINE

Multidrug-Resistant *Acinetobacter baumannii* Infections in Three Returning Travelers Evacuated From Algeria, Thailand, and Turkey After Hospitalization in Local Intensive Care Units

Claire Hussenet, MD,* Stéphane Jauréguiberry, MD,* Jerôme Robert, MD, PhD,† Jean-Jacques Rouby, MD, PhD,‡ François Bricaire, MD,* and Eric Caumes, MD*

Departments of *Infectious and Tropical Diseases, †Bacteriology-Hygiene, EA 1541/ER5, and ‡Multidisciplinary Intensive Care Unit, Department of Anaesthesiology and Critical Care, Pitié Salpêtrière Hospital, Université Pierre et Marie Curie, APHP, Paris, France

DOI: 10.1111/j.1708-8305.2011.00546.x

We report three cases of returning travelers evacuated from Algeria, Thailand, and Turkey by aero-medical repatriation, following overseas hospitalization in local intensive care units for accidental injuries or medical problems. All three patients presented with imipenem-resistant *Acinetobacter baumannii* infections. One died whereas two recovered.

Multidrug-resistant (MDR) bacterial infections are an emerging health problem in travelers. For example, strains of gram-negative *Enterobacteriaceae* with resistance to carbapenem conferred by New Delhi metallo-beta-lactamase-1 (NDM-1) have been recently isolated in Great Britain in travelers returning from India and Pakistan having been hospitalized abroad for medical tourism or accidental injuries during travel.[1]

However, the risk of importing MDR bacteria does not concern only the Indian subcontinent and NDM-1-associated resistance in *Enterobacteriaceae*.[2]

We report three cases of travelers evacuated from Algeria, Thailand, and Turkey. All were diagnosed with MDR *Acinetobacter baumannii* infections, following hospitalization in intensive care units (ICUs) of local hospitals.

Case Reports

Case 1: A 31-year-old woman was admitted to an ICU of our hospital in August 2010 following medical evacuation from Algeria, 2 days after a car accident (day 1). She suffered multiple trauma with several vertebral fractures, a fractured pelvis and sternum, associated with a burst fracture of T6 that caused paraplegia, and bilateral pulmonary contusions with multiple rib fractures. She initially underwent splenectomy for hemorrhagic shock, secondary to peritoneal hemorrhage due to splenic and hepatic lesions.

On arrival (day 3), she was mechanically ventilated, with fever but hemodynamically stable. Rectal swabbing was performed on day 4 and was positive for *A baumannii* and extended-spectrum beta-lactamase (ESBL)-producing *Enterobacter cloacae*. Susceptibility testing was performed by the disk diffusion method as recommended by the CA-SFM (Comité de l'Antibiogramme de la Société Française de Microbiologie Recommendations 2010, http://www.sfm-microbiologie.org/UserFiles/file/casfm_2010.pdf) and imipenem E-Test as recommended by the manufacturer (BioMérieux, Marcy l'Etoile, France). The *A baumannii* strain was resistant to all antibiotics including imipenem with the exception of amikacin and colistin. Surgical management consisted of vertebral arthrodesis from T4 to T6 and immobilization. She also underwent a thoracic drainage of a hemopneumothorax.

On day 9, ventilator-associated pneumonia with septicemia due to *A baumannii* (same MDR strain as that previously found on the rectal swabbing) was diagnosed. Treatment consisted of aerosolized colistin during 14 days and intravenous amikacin for 5 days.

Corresponding Author: Eric Caumes, MD, Infectious and Tropical Diseases Unit, Pitié Salpêtrière Hospital, 47-83 Bld de l'Hôpital, F-75651 Paris Cedex 13, France. E-mail: eric.caumes@psl.aphp.fr

Guest Editor: Robert Steffen, MD

On day 18, she was diagnosed with another ventilator-associated pneumonia due to *Pseudomonas aeruginosa* and *Proteus mirabilis*. Treatment with piperacillin for 14 days and amikacin for 5 days eliminated the infection.

She was discharged from the ICU on day 21 and transferred to our unit. Clinical outcome was favorable, and she was transferred to a rehabilitation unit.

Case 2: A 61-year-old man was evacuated from Bangkok in May 2008 after an 8-day hospitalization, suffering from tetraparesia associated with paresthesia and loss of balance due to acute myelitis. Clinical status rapidly deteriorated, resulting in neurologically associated respiratory insufficiency, necessitating mechanical ventilation.

He was then transferred to another ICU of our hospital. Rectal swabbing was performed on admission and was negative. Five days after repatriation, he was diagnosed with ventilator-associated pneumonia. *Acinetobacter baumannii* was isolated from a bronchoalveolar lavage. This strain was only susceptible to amikacin, rifampin, and colistin. He was successfully treated with aerosolized and intravenous colistin with oral rifampin. He later suffered from septicemia due to *P aeruginosa* that was successfully treated with appropriate antibiotics.

Regarding his neurological symptoms, he was treated with systemic corticosteroids with partial efficacy. He was then transferred to a rehabilitation unit, where he stayed for 4 months without improvement of his neurological status. The cause of acute myelitis was never established.

He was once again transferred to our unit in November 2008 for sepsis secondary to a urinary tract infection. *Acinetobacter baumannii* was isolated from the urine. This strain was the same MDR strain as that which had been previously attributed to his ventilator-associated pneumonia, and was only susceptible to amikacin, rifampin, and colistin. In spite of broad-spectrum antibiotic therapy including amikacin and colistin, he died 8 days later, in the context of unexplained dysautonomia.

Case 3: An 81-year-old female patient was repatriated from Turkey in November 2010, after a bus accident (day 1). She suffered from multiple trauma with left arm amputation, deep right arm injuries, right pneumothorax and broken nose, without any hemodynamic distress. Besides amputation, she was hospitalized in an ICU in Turkey and ventilated during 3 days. She was then transferred to the same ICU as for patient 1. On admission (day 5), rectal swabbing showed colonization with MDR *A baumannii*, and ESBL-producing *Citrobacter freundii*. The *A baumannii* strain was only susceptible to tobramycin, colistin, and trimethoprim–sulfamethoxazol.

On day 8, she was diagnosed with a ventilator-associated pneumonia due to methicillin-resistant *Staphylococcus aureus* (MRSA) and *P aeruginosa*. Clinical outcome was favorable after therapy associating piperacillin–tazobactam, amikacin, and vancomycin.

She was transferred to our unit on day 15, where she was diagnosed with a urinary tract infection due to *A baumannii* (same MDR strain as that previously found on the rectal swabbing). She was successfully treated by 7-day trimethoprim–sulfamethoxazol and 2-day tobramycin and was discharged on day 45 for transfer to a rehabilitation center.

Discussion

These three aero-medically evacuated travelers were diagnosed with four MDR *A baumannii* infections, a ventilator-associated pneumonia in two patients and a urinary tract infection in two patients as patient 2 had two successive infections with the same MDR strain.

In two patients (cases 1 and 3), the strains were undoubtedly acquired in Algeria and Turkey, respectively, as the rectal swabs were positive on admission and the day after ICU admission. However, we cannot rule out that the third patient (case 2) acquired *A baumannii* infection just after his arrival in France. Indeed, this patient was diagnosed with MDR *A baumannii* ventilator-associated pneumonia 5 days after repatriation, whereas rectal swabbing on admission was negative. Therefore, and by definitions used routinely by infection control practitioners, this patient could be considered to have a nosocomial infection more likely acquired in our hospital than in Thailand. Nonetheless, there is enough evidence to support a relationship with an overseas hospitalization. First, this infection developed within 5 days after repatriation. Furthermore, this was the only patient diagnosed with such an infection in this ICU, no other patient being identified by screening during this time period (Jerôme Robert, personal data). Therefore, hospitalization in Thailand could be considered in the acquisition of MDR *A baumannii* infection in case 2, although the relationship with travel is less solid than that in the two other cases.

MDR *A baumannii* infection contributed to death in one of our cases (case 2). Similarly, it has been shown that having MDR bacterial infections is a risk factor for increased duration of hospitalization, even if not directly responsible for an unfavorable outcome.[3] Indeed, the additional length of stay (LOS) attributable to antibiotic-resistant health care-associated infections (HAIs) caused by gram-negative bacteria has been estimated to be 23.8% (95% CI, 11.01–36.56) higher than that attributable to HAIs caused by antibiotic susceptible bacteria. In addition, LOS may increase the risk of acquiring another nosocomial infection as illustrated by these case presentations.

Travelers may be exposed to MDR bacteria when hospitalized abroad. Hospitalization for a travel-related illness has been estimated to occur in about 1% of travelers per month of travel, whereas the corresponding figure for medical evacuation was estimated to be about

1/1000 travelers per month of travel in developing countries.[4] However, another emerging cause of overseas hospitalization is medical tourism, which particularly exposes patients to the risk of acquiring of MDR bacteria.[2]

Two of our travelers were repatriated for car accidents during travel. This is consistent with studies of medical evacuation etiology. Among 504 cases of medical evacuation in Germany, traumas (ie, femoral neck fractures, cerebrocranial trauma, and multiple trauma) were the primary cause of repatriation accounting for 25% of evacuations, followed by cardiovascular diseases (ie, strokes for 14% and myocardial infarctions for 8%).[5] Among 115 patients repatriated in the Netherlands from 1998 to 2002, one third of the younger patients (below 50 years) were evacuated for trauma, whereas in older patients, cardiopulmonary incidents were the most frequent causes of evacuation.[6] It should be noted that exacerbation of chronic diseases was an important cause of medical repatriation among older patients. In addition, the median duration of illness before evacuation of the German patients was 7 days (interquartile range, 4–13 days) putting them at risk of acquiring MDR bacteria when hospitalized during this period of time.[5]

Infection with MDR bacteria is an emerging and serious worldwide problem. In the past 10 years, many cases of MDR bacteria have been reported in various countries. For example, gram-negative *Enterobacteriaceae* (*Klebsiella pneumoniae* and *Escherichia coli*) with resistance to carbapenem conferred by NDM-1 are known to be widespread in India and Pakistan.[1] These bacteria may be acquired by travelers and imported into their home country on their return. Indeed, of 1167 Dutch travelers repatriated from foreign hospitals to the Netherlands, 18% were diagnosed as carriers of MDR bacteria such as MRSA, vancomycin-resistant enterococci (VRE), and gentamicin-resistant gram-negative bacteria (GGNB).[7] The carrier rates of MRSA, VRE, and GGNB were higher than those found in patients hospitalized in Dutch hospitals.

In addition to carriers, returning travelers may also be diagnosed with MDR bacterial infections. This mainly concerns MRSA infections.[8] However, as we suggest from these episodes and other recently published studies, MDR gram-negative bacteria are also concerned.[1,2] Moreover, this not only refers to repatriated hospitalized travelers but also to patients with community-acquired infections with an associated history of travel. In fact, a Canadian study showed that foreign travel was an important risk factor for developing community-acquired ESBL-producing *E coli* infections.[9] More precisely, overseas travel above all increased the risk of ESBL-producing *E coli* infections by 5.7 (4.1–7.8), and this risk was higher for travelers to India (OR 145), the Middle East (OR 18), and Africa (OR 7.7).

Conclusion

Physicians should be aware of the risk of MDR bacteria carriage among international travelers after hospitalization abroad. In case of direct hospital-to-hospital transfer or hospitalization close after return, special attention should be paid to hygiene measures in addition to systematic screening for MDR bacteria carriers to prevent cross-transmission. Injured travelers as well as medical tourists are directly concerned by this strategy.

Acknowledgment

This article has been kindly proofread by Amy Whereat, Medical English Consultant.

Declaration of Interests

The authors state they have no conflicts of interest to declare.

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