

# Ambu Bag as a Source of *Acinetobacter baumannii* Outbreak in an Intensive Care Unit

Irfan Ali Mirza, Aamir Hussain, Shahid Ahmed Abbasi, Nasrullah Malik, Luqman Satti and Umme Farwa

## ABSTRACT

This case report describes an outbreak of multidrug resistant *Acinetobacter baumannii* in the intensive care unit of a tertiary care hospital. Three patients were infected on the same day from an Ambu bag which was used on all the patients. The outbreak was immediately identified and the source was traced within one week. Appropriate measures were taken and a continuous surveillance was carried out resulting in reporting of no such case from the intensive care unit in the last 6 months.

**Key words:** *Acinetobacter baumannii*. Outbreak. Multidrug resistance. Intensive care unit. Ambu bag.

## INTRODUCTION

*Acinetobacter baumannii* is an emerging micro-organism which causes outbreaks all over the world in the immunocompromised patients especially those hospitalised in Intensive Care Units (ICUs). It is a gram negative coccobacillus which can survive in different hospital environments, food, water, as well as on human skin for weeks.<sup>1</sup> It is considered non-pathogenic in normal individuals but causes life threatening infections in compromised patients. In intensive therapeutic care units (ITC) it usually causes ventilator associated pneumonia but can also cause skin and wound infections, bacteremia and meningitis.<sup>2</sup> In the last few years multidrug resistant (MDR) *Acinetobacter* species have been responsible for major outbreaks in intensive care settings all over the world.<sup>3</sup> We present here a series of three such cases, admitted in ICU of a tertiary care setting who were infected from a common source. All the three patients were infected on the same day by the same strain of *Acinetobacter baumannii*.

## CASE REPORT

The first patient, 67 years old male, resident of Rawalpindi, was admitted on 28th August 2009 with complaints of generalized abdominal pain, abdominal distension, constipation and high grade fever of 2 days duration. His abdomen was soft, tender in epigastric region and bowel sounds were sluggish. Routine laboratory investigations revealed increased random

plasma glucose, urea, creatinine and LDH. Two days later he developed coarse crepts on left side. He was put on ventilator as his arterial blood gases (ABGs) indicated respiratory acidosis. On 2nd September patient's bronchial secretions were sent for culture and sensitivity which revealed no growth. On 4th September tracheostomy was done and next day suction catheter tip was sent for culture and sensitivity which revealed growth of *Acinetobacter baumannii*. The antimicrobial susceptibility of the isolate was performed against Ampicillin, cotrimoxazole, Gentamicin, Amikacin, Doxycycline, Minocycline, Ciprofloxacin, Ceftazidime, Imipenem, Tazobactam/piperacillin, sulbactam/cefoperazone and Tigecycline using Clinical and Laboratory Standards Institute (CLSI) 2010 guidelines. Isolate was resistant to all the medicines except Tigecycline. The patient expired on 6th September 2009 before the start of antimicrobial therapy.

The 2nd patient, 29 years old male resident of Nowshera, was transferred on 1st September 2009 from a peripheral hospital with fractures of right femur and radius after a road traffic accident. Next day patient underwent surgery but during recovery from anesthesia he had a breathing difficulty and was put on ventilator. On 5th September patient's suction catheter tip was sent for culture and sensitivity which revealed growth of MDR *Acinetobacter baumannii* which was sensitive only to Tigecycline. Patient was started with injectable Tigecycline 100 mg stat and 50 mg twice daily. On 16th September patient was removed from the ventilator and was shifted to ward. On 29th September patient was discharged from the hospital after due recovery.

The 3rd patient, 75 years old male, resident of Rawalpindi, was admitted on 17th August after a road traffic accident. He had acetabular fracture and surgery was performed. He had an uneventful recovery and was discharged from the hospital on 29th August. On 31st

Department of Microbiology, Armed Forces Institute of Pathology, Rawalpindi.

**Correspondence:** Dr. Irfan Ali Mirza, Consultant Microbiologist, Armed Forces Institute of Pathology, Rawalpindi.

E-mail: [Irfanmirza651@hotmail.com](mailto:Irfanmirza651@hotmail.com)

Received June 01, 2010; accepted January 10, 2011.

August 2009 he was readmitted with complaints of sudden unconsciousness, shortness of breath and difficulty in breathing. On admission his Glasgow Coma scale was 6/15. Bilateral crepts were auscultated on chest examination. A provisional diagnosis of acetabular fracture, intracranial bleed (left) and aspiration pneumonia was made. Next day due to deteriorating oxygen saturation, the patient was put on ventilator. On 4th September tracheostomy was done and suction catheter tip was sent for culture and sensitivity which revealed growth of MDR *Acinetobacter baumannii*. Like other 2 patients, the isolate was sensitive only to Tigecycline. Patient was put on injectable Tygecycline 100 mg start and 50 mg twice daily. On 22nd September, the patient expired while still on ventilator.

To trace out the possible source of this outbreak a team headed by a microbiologist from AFIP visited the ICU and 25 specimens were collected from different possible sources of infection, including health care workers (nasal and interdigital swabs), laryngoscope blades, ventilators, Ambu bag and emergency tray. All the specimens were cultured and specimen from the Ambu bag revealed the growth of *Acinetobacter baumannii* which had the same biochemical profile and sensitivity pattern as was seen in the isolates from three patients. Hence the Ambu bag was identified as a source of infection of *Acinetobacter baumannii* for three infected patients in the ITC. The ITC was informed accordingly and Ambu bag was removed. Fumigation was done and follow-up surveillance was carried out for 2 months.

## DISCUSSION

In this case series three suction-catheter tips were received at the Department of Microbiology, Armed Forces Institute of Pathology (AFIP) for culture and sensitivity on the same date, which revealed a growth of MDR *Acinetobacter baumannii*. All the isolates had similar biochemical profile as well as antimicrobial sensitivity pattern. The growth of three MDR *Acinetobacter baumannii* on the same day from three different patients from ICU arose the suspicion of an outbreak. While on ventilator the same Ambu bag was used on all the patients, whereas no other equipment/tubing was shared between them.

The role of *Acinetobacter* species in causing salient infection dates back to 1955 when presumed strains of *Acinetobacter* (then called *Achromobacter*) caused a blood stream infection in Korean War military recruits.<sup>4</sup> *Acinetobacter* species are also known to cause outbreaks in disaster affected casualties. *Acinetobacter* was the most prevalent pathogen in Turkish ICUs in which casualties of 1999 Marmara earthquake were treated.<sup>5</sup> After 2002 bombing in Bali, a patient infected with *Acinetobacter*

was transferred to a Swiss ICU for patients with burn injuries and became the presumed source of extensive environmental contamination and an ICU outbreak.<sup>6</sup> After the South East Asia Tsunami in December 2004, scores of *Acinetobacter* species were isolated from wounds, blood and respiratory secretions.<sup>7</sup> More recently 15 patients were infected by multi drug resistant *Acinetobacter baumannii* in a surgical ICU after cardiac surgery in Onasis Cardiac Surgery Center, Athens, Greece in 2006.<sup>8</sup> Similarly 9 patients were infected with multidrug resistant *Acinetobacter baumannii* in one month in a surgical intensive care unit in Germany in June 2006. In this case the source was traced after hectic efforts of 32 days but only after the source had infected 8 other patients. Three out of 9 patients died in this outbreak.<sup>9</sup> A study conducted at AFIP in 2009 showed that 68% of all the *Acinetobacter* isolates were MDR and out of these 44% were pandrug resistant. All the pandrug-resistant isolates were sensitive to polymyxin only.<sup>10</sup>

In this case, the source was identified in a very short period of time, thus preventing a potentially larger outbreak in the intensive care setting. It is, therefore, imperative that strict measures be adopted in implementing the hospital control practices. Health care workers should thus remain extremely vigilant in using the equipment/gadgets which can be contaminated with organisms like *Acinetobacter baumannii*.

## REFERENCES

- Schreckenberger PC, Daneshvar MI, Weyant RS, Hollis DG. *Acinetobacter*, *achromobacter*, *chryseobacterium*, *moraxella*, and other nonfermentative gram-negative rods. In: Murray PR, Baron EJ, Jorgensen JH, Landry ML, Pfaller MA, editors. Manual of clinical microbiology. 9th ed. Washington: ASM Press; 2007. p. 770-802.
- Towner KJ. Clinical importance and antibiotic resistance of *Acinetobacter* spp. Proceedings of a symposium held on 4-5 November 1996 at Eilat, Israel. *J Med Microbiol* 1997; **46**: 721-46.
- Munoz-Price LS, Weinstein RA. *Acinetobacter* infection. *NEJM* 2008; **358**:1271-81.
- Lindberg RB, Wetzler TF, Marshal JD, Newton A, Strawitz JG, Howard JM. The bacterial flora of battle wounds at the time of primary debridement: a study of the Korean battle casualty. *Ann Surg* 1955; **141**:369-74.
- Oncül O, Keskin O, Acar HV, Küçükardali Y, Evrenkaya R, Atasoyu EM, et al. Hospital-acquired infections following the 1999 Marmara earthquake. *J Hosp Infect* 2002; **51**:47-51.
- Maegle M, Gregor S, Steinhausen E, Bovillon B, Heiss MM, Perbix W, et al. The long-distance tertiary air transfer and care of Tsunami victims: injury pattern and microbiological and psychological aspects. *Crit Care Med* 2005; **33**:1136-40.
- Zanetti G, Blanc DS, Federli I, Raffoul W, Petignat C, Maravic P, et al. Importation of *Acinetobacter baumannii* into a burn unit: a recurrent outbreak of infection associated with widespread

- environmental contamination. *Infect Control Hosp Epidemiol* 2007; **28**:723-725. Epub 2007 May 11.
8. Papadopoulos K, Tasouli A, Douka E, Manoli E, Soroglor G. Multi drug-resistant *Acinetobacter baumannii* susceptible only to colistin outbreak in cardiac surgical intensive care unit. *Crit Care* 2009; **11**:99.
  9. Lewejohann J , Prang M, Seyfried F, Henning A, Zimmermann C, Hansen M, *et al.* Management of an outbreak of multiresistant *Acinetobacter baumannii* infection in a surgical intensive care unit. *Crit Care* 2007; **11**:98.
  10. Satti L, Ikram A, Butt T, Malik N, Roshan M, Hussain W. Multidrug resistant *Acinetobacter* species: an emerging super bug in hospital settings. *Infect Dis J Pak* 2009; **18**:44-7.

