

Case Report

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Acinetobacter baumannii: A non-classical case with an unregular management**Fatima A Dirani^{1*}; Hadia M Abou Hamdan¹; Racha S Zaraket²; Khalil I Maatouk²; Noura M Shakaroun³**¹Faculty of Medical Sciences, Lebanese University, Lebanon.²Faculty of Medicine, Balamand University, Lebanon.³Pulmonologist and ICU Physician, Private Hospital, Lebanon.***Corresponding Author: Fatima A Dirani**Faculty of Medical Sciences, Lebanese University,
Lebanon.

Email: fatimadirani14@gmail.com

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Abstract

Introduction: Acinetobacter is a gram negative cocco-bacillus that is ubiquitous and can be found in hospital settings. A *baumannii* can colonize ICU wards in hospitals leading to infection of multiple systems in hospitalized patients including the skin, soft tissue, urinary tract, and mainly the respiratory tract. Pneumonia caused by A. baumannii is a threatening condition in mechanically ventilated patients.

Case description: A 47-year-old man had a sudden cerebro-vascular accident that led to a decreased level of consciousness and intubation of the patient. Few days later he started deteriorating and was discovered to develop a necrotizing pneumonia mainly of the right lung. The causative agent was found to be multi-drug resistant organism A. baumannii and was treated successfully with a combination of antibiotics and surgical lobectomy.

Discussion: When facing a complicated case of necrotizing pneumonia caused by a multi-drug resistant organism in a mechanically ventilated patient, it is required to think out of the box and considering treatment options that are not used in daily cases. Thus, antibiotic combination therapy with lobectomy was the management of choice for such patient.

Conclusion: Decreasing the frequency of nosocomial infections is becoming a must in the countries of the developing world. This requires cooperation of physicians and infection control specialists.

Keywords: Acinetobacter baumannii; Necrotizing pneumonia; Multi-drug resistance; Lobectomy.

Introduction

The genus Acinetobacter was discovered in 1971. With time more species are being discovered due to the DNA hybridization. It is gram-negative, non-spore-forming, nonmotile, nonfermentative, aerobic cocco-bacillary germ. An important element that differentiates Acinetobacter from other gram negative organisms such as Pseudomonas, Neisseria, and Moraxella is that Acinetobacter species are oxidase negative. It is considered

ubiquitous because it can be isolated from different natural reservoirs such as soil, water and animals. Within the hospitals, it is being isolated from sinks, trolleys, suctioning equipment, ventilators, food and others.

Epidemiologically, Acinetobacter species can be colonizing the skin of 40% of healthy adults mainly those working within hospitals. Also, it can be isolated from the respiratory tracts of humans. This later is the most frequent site of infection [1].

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In particular, *Acinetobacter baumannii* poses a significant risk for ICU patients who are chronically ill and are exposed to different hospital equipment such as ventilators, catheters, sutures and others.

Pneumonia is the main threat of ICU admitted patients especially those who are mechanically ventilated due to the ability of *A. baumannii* to form biofilms on endotracheal tubes and lead to lower respiratory tract colonization and infection. Rarely do *A. baumannii* result in necrotizing pneumonia which is the case of the patient presented in this article.

Case presentation

History and presentation

A case of 47 years old male, whose medical history comprises of hypertension well controlled on Amlodipine 5 mg and Bisoprolol 5 mg with hypothyroidism treated with Levothyroxine, presented to a peripheral health care facility complaining of a sudden onset of severe headache. Soon after his arrival to that hospital, he had sudden loss of consciousness. Patient was immediately intubated due to low Glasgow Coma Scale and failure of maintenance of secured airways.

Vital signs after intubation were as follows: SpO₂ = 97% on FiO₂ = 40% and BP 16/9. Workup started to investigate the event with an ECG (electrocardiography) that showed no abnormalities with a regular sinus rhythm. This was followed by a CT (computed tomography) scanner of the brain showing a 21 mm intra-parenchymal hemorrhage at the level of the posterior aspect of the midbrain associated with intraventricular bleed seen at level of lateral and fourth ventricles.

At that hospital, patient was admitted to the ICU, but 5 days later and due to the poor medical equipment at that facility, the patient was transferred intubated to our hospital and admitted to the ICU under the supervision of our medical team composed of a neurosurgeon and an intensive care specialist.

Diagnostic focus and assessment

Upon his arrival and after thorough assessment of the patient's history and clinical state, the neurosurgeon decided that no interventions are needed at this state. On the other hand, a chest X-ray was done revealing mild basal infiltrates of the right lung. Also, a cardiologist was consulted to perform a cardiac echography that may unveil an underlying disease, but the results came back with an ejection fraction of 60% and normal valves. Patient was still intubated and maintained on intravenous antibiotics (ceftriaxone and vancomycin).

Few days later, the patient developed high grade fever associated with increased secretions from the endotracheal tube and an increase in the oxygen requirements. Immediately, blood samples were taken and sent for laboratory testing that showed an elevation in inflammatory markers (results shown in Table 1). A portable CXR was done and revealed right lower lobe consolidation suggesting lobar pneumonia associated with right sided pleural effusion (image not available). Moreover, a Deep Tracheal Aspirate (DTA) sample was taken for culture.

Before the results of the DTA culture came back, the patient was shifted from ceftriaxone and vancomycin to linezolid and meropenem. Despite this change, the fever did not show spac-

Table 1: Laboratory results of the patient following the febrile episode.

Test	Result	Test	Result
Hemoglobin (g/L)	10.6	BUN (mg/dL)	20
White blood cells (cu/mm ³)	18,400	Creatinine (mg/dL)	0.9
Hematocrit (%)	33	Sodium (mEq/L)	139
Mean cell volume (fL)	80	Potassium (mEq/L)	4.7
Platelets (cu/mm ³)	250,000	HCO ₃ (mEq/L)	18
Neutrophil (%)	63	Chloride (mEq/L)	100
Lymphocyte (%)	33	CRP (mg/dL)	250
Eosinophil (%)	0	SGPT (IU/L)	27

Table 2: Antibiogram of *Acinetobacter baumannii* present in DTA culture of the patient.

Drug	Susceptibility
Colistin	Sensitive
Amikacin	Resistant
Gentamycin	Resistant
Imipenem	Resistant
Piperacillin/Tazobactam	Resistant
Ceftazidime	Resistant
Cefepime	Resistant
Trimethoprim/Sulfamethoxazole	Sensitive
Ciprofloxacin	Resistant
Tetracycline	Resistant
Tigacycline	Intermediate

ing so a multi-drug resistant organism was suspected.

Later, DTA culture came back showing *Acinetobacter baumannii* with multi-drug resistance according to the antibiogram shown in Table 2.

Accordingly, infectious disease consultant suggested shifting to intravenous Colistin and Bactrim for a total of 6 weeks.

Also, CT scan of the chest was done (Figure 1) and revealed right hydro-pneumothorax (3 cm) in thickness with large consolidation in the right lower lobe and a 3 cm cavitory lesion in the middle lobe of right lung with infiltrates in the posterior segment of the lower lobe of the left lung.

Therapeutic focus and assessment

Based on the previously mentioned results, the patient was started on Colistin and high dose extended infusion of meropenem with Trimethoprim/Sulfamethoxazole (TMP-SMX). To be added, a chest tube was inserted to the right lung and pleural fluid drained and sent to analysis which showed an exudative fluid that was most probably due to a para-pneumonic effusion. Also, this fluid was sent to culture that came back negative. Later TMP-SMX was discontinued due to the occurrence of acute kidney injury.

Then bronchoscopy was done with Broncho-alveolar lavage showing the following:

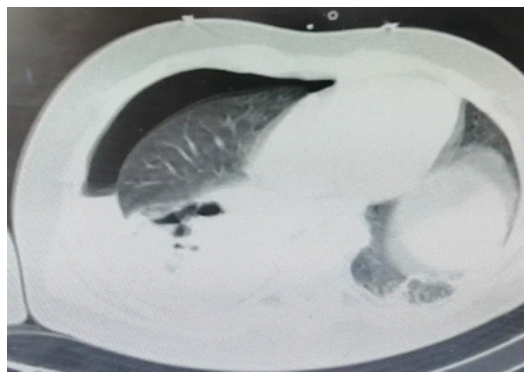


Figure 1: CT scan of the chest showing cavitary lesion and pneumonia with pleural effusion of the right lung.



CT scan done one week after beginning of therapy:

Resolution of the right sided pneumothorax. New necrotizing pneumonia with abscess formation in the posterior segment of the right lower lobe, the largest measuring 6.3 cm. Moderate right sided pleural effusion with collapse of the right lower lobe.



CT scan done 2 weeks after beginning of therapy:

Increase in size of the previously seen necrotizing pneumonia noted in the posterior segment of the right lower lobe showing air fluid level, the largest one measuring 9.2 cm*8.8cm. Subsegmental left lower lobe (posterior segment) consolidation is noted.

Figure 2: Comparison of the 2 CT scans of the chest done one week and 2 weeks after beginning of therapy.

- >100,000 CFU/ml *Acinetobacter baumannii* (antibiogram with same sensitivity as DTA culture done earlier)
- Acid fast bacilli stain was negative
- Galactomannan assay was negative ruling out aspergillois
- PCR for non-tuberculous mycobacteria was negative

One week later, despite the double coverage of the germ with Colistin and Bactrim, the inflammatory markers were still increasing and the patient was still febrile, so a series of CT scans of the chest with DTA cultures were taken to check response to therapy.

The DTA cultures taken also showed the persistence of the *Acinetobacter baumannii*, so patient was started on nebulized Polymyxin which was also ineffective in eliminating the germ.

Patient was deteriorating clinically with no response to antibiotics with inflammatory markers rising to CRP= 270 mg/dL and WBC= 24000 cu/mm³ so the decision was taken for decortication. A cardiothoracic surgeon performed the operation successfully.

After surgery, patient started improving rapidly. Repeated CT scan of the chest showed a decrease in the size of the previously seen cavitary lesions and the inflammatory markers had a drop to a CRP of 24 mg/dL and WBC of 13000 cu/mm³.

Two DTA cultures done one week apart following the surgery showed absence of *Acinetobacter baumannii*.

The patient continued to improve clinically and he was fortunately extubated. No more febrile episodes took place and minimal respiratory secretions were noticed. Also, the chest tube was removed. He stayed at the hospital until he completed the course of antibiotics for a total of 6 weeks and was transferred to a nursing facility.

Discussion

Acinetobacter baumannii which is a gram negative ubiquitous organism, has been found to cause infection in multiple systems of the human body mainly the skin, soft tissue, respiratory tract and digestive system. It is known that *A. baumannii* has been isolated from different units within hospitals especially the ICU where it poses a great risk on patients who are mechanically ventilated. According to a study done in the United States about 6% of Ventilator-Associated Pneumonias (VAP) are caused by *A. baumannii* [2].

The patient described above suffered from ventilator associated pneumonia and what made it worse is the fact that the germ was a multi-drug resistant organism that was resistant to several combinations of antibiotics. By definition, *Acinetobacter* is considered multi-drug resistant when it is not susceptible to at least one agent in three or more antibiotic groups including third- or fourth-generation cephalosporins, aminoglycosides, carbapenems, fluoroquinolones, ampicillin-sulbactam, piperacillin-tazobactam [3]. A study performed in Lebanon found out that infections caused by multi-drug resistant *A. baumannii* increased markedly since 2007 so that it became the number one cause of VAP in hospitals [4].

Moreover, as mentioned above the patient developed necrotizing pneumonia which is a very rare complication of *A. baumannii* infection. Necrotizing pneumonia is an inflammatory process of the lung tissue that leads to consolidation, necrosis and formation of multiple cavities that compresses the bronchial and pulmonary blood supply leading to loss of lung parenchyma. Loss of blood supply to the area leads to poor antibiotic delivery to the lung tissue and ending by an uncontrolled infection. This is why surgical approach was the last life-saving option available during the treatment of the above patient.

This required the cooperation of the whole medical team in order to save his life. Infectious disease specialist was responsible for choosing the appropriate antibiotics regimen, pulmonologists and ICU specialists were responsible for rapid response to any clinical deterioration and keeping an eye on the therapy effectiveness, and finally the cardiothoracic surgeon who performed the lobectomy which was a great turning point in the management of the patient and let the team reach to a favorable outcome.

Regarding the antibiotic options for *Acinetobacter*, the choice of the drug depends on the location of the infection, the state of the patient (comorbidities and severity of infection), and on the susceptibility profile of the germ. For the case mentioned above where the germ is highly resistant and the infection is a severe necrotizing pneumonia, the optimal option is a triple therapy consistent of a combination of high-dose extended-infusion ampicillin-sulbactam with any two of the following: high-dose extended infusion of meropenem, polymyxin, or a tetracycline derivative. To be mentioned that some studies recommend that colistin be given inhaled due to the low bioavail-

ability of intravenous form in the lung parenchyma. To be added, that surgical intervention has multiple indications one of which is an unresponsive necrotizing pneumonia to the suitable antibiotic protocol.

Conclusion

Acinetobacter baumannii is posing a great threat for the hospitalized patients in the developing world, especially cases of multi-drug resistant *A. baumannii* that requires prolonged courses of non-classical antibiotic combinations. Clinicians and infection control teams must augment their efforts to minimize such outbreaks that are expensive on both the humanitarian and financial aspects.

Declarations

Declaration of interest: We declare that we have no conflict of interest.

Informed consent: An informed consent was signed by the patient family and they agreed to publish the above information and data.

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