

Effective Enteral Treatment of Antibiotic for Patient with Respiratory Failure and Septic Shock in the Intensive Care Unit

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ABSTRACT

Background: Sepsis is life-threatening organ dysfunction caused by a dysregulated host response to infection. Hospital-associated pneumonia (HAP) and Ventilator-associated pneumonia (VAP) continue to be frequent complications in-hospital care. The study to assess clinical outcomes for a critically ill patient treated with an enteral antibiotic for bacterial pneumonia is still limited.

Case: We reported a case of pneumonia from 68 years old patient that caused respiratory failure and septic shock in the intensive care unit treated by enteral antibiotic and had a good outcome.

Conclusion: Pneumonia can cause respiratory failure and septic conditions. Optimum antibiotic management is one of the methods to solve this problem. The benefit of utilizing enteral antibiotics is substantial and probably appropriate in certain patients.

Keywords: pneumonia, septic, respiratory failure, enteral antibiotic



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INTRODUCTION

Sepsis is a life-threatening organ dysfunction caused by dysregulation of the host response to infection. Sepsis and septic shock affect millions of people worldwide each year and are one of the four leading causes of death. Early identification and appropriate management of sepsis in the initial hours after sepsis develops improved outcomes. The most common sources of infection are respiratory and abdominal.¹

Hospital-associated pneumonia (HAP) and Ventilator-associated pneumonia (VAP) continue to be frequent complications in-hospital care. These infections impact patient outcomes. In HAP and VAP, severe complications may arise, including pleural effusion, respiratory failure septic, septic shock, renal failure, and empyema. Optimum antibiotic management appears to be one of the methods that save patients from diseases.²

CASE

A 68 years old, 75 kg man with cancer pain et causa pancreatic caput carcinoma with diabetes mellitus type 2 and Hypertension stage 1 was admitted at Saiful Anwar General Hospital. Unfortunately, after two weeks of hospital treatment, he had shortness of breath. We found his clinical condition was worsening with respiratory rate 30x/minutes, SpO₂ 86% on a

non-rebreathing mask 10 liters per minute, his blood pressure dropped to 80/60 mmHg with heart rate 130x/ minutes, and he was unconscious. We intubated him and transferred him to the Intensive care unit (ICU) due to pneumonia, respiratory failure, and septic shock. We gave this patient empiric antibiotic intravenous meropenem. After three days, the culture of the patient's sputum revealed *Klebsiella pneumonia*, which was sensitive to meropenem, tigecycline, amikacin, and cefepime, and we decided to continue intravenous meropenem as definitive therapy. After three days of evaluation, the patient got worse, his antibiotic was replaced with intravenous amikacin, but there was no improvement in the patient's condition, and his renal function test worsened. Repeated sputum's culture discovered, *Acinetobacter baumannii*, which was sensitive to amikacin and cotrimoxazole. We decided to give this patient cotrimoxazole per enteral than intravenous amikacin because of his renal impairment and no improvement in his clinical condition. After 48 hours of cotrimoxazole therapy, the condition of the patient got better. He was extubated after 72 hours and discharged from ICU after 7 days of cotrimoxazole therapy. Chest x-ray showed improvement with minimal infiltrate (Figure 1) (Table 1).

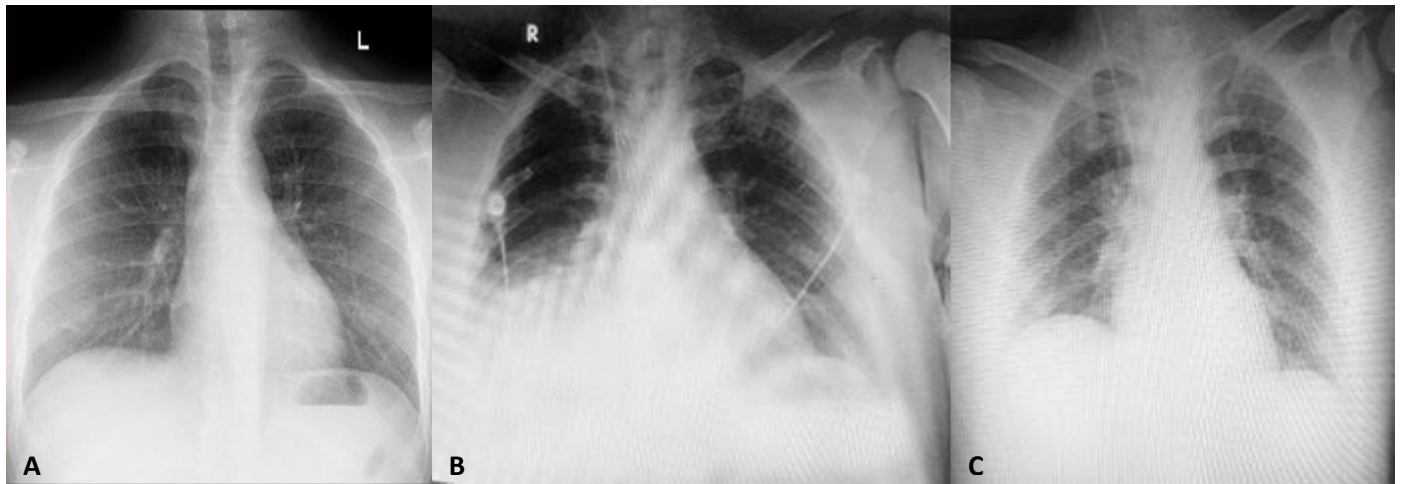


Figure 1. Chest X-ray A). Hospital admission showed normal Chest X-ray, B). ICU admission showed bilateral infiltrate and minimal pleural effusion on pulmonary sinistra, C). Day 15 of treatment showed improvement with minimal infiltrate on chest X-ray

Table 1. Clinical finding, laboratory test, and other tests during hospital care

Parameter	Admission to Hospital Room	Admission to ICU	Day 3	Day 6	Day 9	Day 12	Day 15 (Discharged from ICU)
Blood pressure		104/50 mmHg on NE 0.05 mcg/kg/min+ Dobutamin 3 mcg/kg/min	114/50 mmHg on NE 0.05 mcg/kg/min +Dobutamin 5 mcg/kgBB/min	134/70 mmHg on NE 0.1 mcg/kg/min +Dobutamin 5 mcg/kgBB/min	116/58 mmHg on NE 0.1 mcg/kg/min+ Dobutamin 5 mcg/kgBB/min	118/62 mmHg on NE 0.025 mcg/kg/min +Dobutamin 3 mcg/kgBB/min	124/58 mmHg
Heart rate		108x/min	98x/min	99x/min	101x/min	90x/min	86x/min
SpO2		99%	99%	98%	99%	99%	99%
P/F ratio		158	139	141	161	234	281
Laboratory Test							
Hemoglobin (gr/dl)	10.6	9.2	9.7	9.5	9.3	9	9.2
WBC (10 ³ /mm)	8.2	12.6	13.3	15.1	18.3	15.2	13.7
Platelet (10 ³ /mm)	189	102	84	196	365	365	317
Procalcitonin		2.02				1,02	
Lactic acid		3.4 → 2.1					
Urea/Creatinine		101.9/2.,19	55.4/1.16	101.1/2,01	142.3/2,28	131/2.25	64.4/1.31
Sputum's culture			<i>Klebsiella pneumonia</i> Sensitive to amikacin, cefepime, meropenem, tigecycline		<i>A.baumannii</i> Sensitive to amikacin, cotrimoxazole		
Antibiotic		meropenem	meropenem	amikacin	cotrimoxazole	cotrimoxazole	cotrimoxazole

DISCUSSION

Of paramount importance in the management of patients with sepsis is the concept that sepsis is a medical emergency. According to the guidelines, these patients require prompt assessment, treatment including initial fluid

resuscitation while pursuing source control, obtaining further laboratory tests, and achieving more precise measurements of hemodynamic status. The guiding principle is that these complex patients require a detailed initial assessment and ongoing re-evaluation of their response to treatment. Survival

Sepsis campaign (2018) recommends doing a "one-hour bundle" to treat this sepsis condition.³

1. Lactate level measurement. Remeasure if initial lactate > 2 mmol/L.
2. Obtain blood cultures before antibiotic administration.
3. Administer broad-spectrum antibiotics.
4. Perform rapid administration of 30 ml/kg crystalloid for hypotension or lactate > 4mmol/L.
5. Use vasopressor if the patient is hypotensive during or after fluid resuscitation to maintain MAP \geq 65 mmHg.

In the sepsis and septic shock, the empiric broad-spectrum therapy using one or more antimicrobials intravenous (i.v) to overcome all possible pathogens should be started directly. Empiric antimicrobial should be define when the infection pathogen was identified, or discontinued if patient does not have the infection. The relationship between early antibiotic administration for suspected infection and antibiotic stewardship remains an important aspect of high-quality management of sepsis. If infection is later shown to be absent, antimicrobials should be discontinued.⁴ We perform broad-spectrum antimicrobial (i.v) therapy according to guidelines, and after the sputum's culture was revealed, we gave this patient the definitive antibiotics.

Hospital-associated pneumonia occurs 48 hours or more after hospital admission, which was not incubating at the time of admission. HAP may be treat in the hospital ward or in the ICU when the illness become severe.⁴

The American Thoracic Society and Infectious Disease Society of America Guidelines for HAP and VAP recommend that all patients be initiated on intravenous therapy. The

purpose of this intravenous therapy in critically-ill patients are for instant outcomes, and patient which poor oral absorption.⁵

For the most common antibiotics such as macrolides, glycopeptides, or beta-lactams, antimicrobial eradication does not depend on peak blood levels but rather on the time period during which antibiotic levels, above the minimum inhibitory concentration. Even higher doses (i.v) is allowed to administered, the duration above the minimum inhibitory concentration is similar to well-absorbed oral antibiotics. In this case is cotrimoxazole, compared with intravenous antibiotics.⁶

Cotrimoxazole is well absorbed from the gastrointestinal tract and widely distributed in body fluids and tissues, including cerebrospinal fluid. Infections with *Pneumococcus jiroveci* and any other pathogen organism can be treated orally with a high dose combination of sulfamethoxazole and trimethoprim (dose base of trimethoprim component at 15–20 mg/kg).⁶ In this case, we used enteral antibiotics to treat the patient because of his renal impairment and no improvement of pneumonia after administration of intravenous amikacin.

CONCLUSION

Pneumonia can cause respiratory failure and septic conditions. Optimum antibiotic management is one of the methods to solve this problem. The benefit of utilizing enteral antibiotics is substantial and probably appropriate in certain patients. In this case, we use it for patient safety and minimize the side effect of the intravenous nephrotoxic drug. Furthermore, it can be the way out for a remote area with minimum facility and limited type of drugs.

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CONFLICT OF INTEREST

None

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