POLYMYXIN B AND DOXYCYCLINE FOR TREATMENT OF MULTIDRUG RESISTANT KLEBSIELLA PNEUMONIAE AND STAPHYLOCOCCUS AUREUS PNEUMONIA IN INTENSIVE CARE UNIT

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ABSTRACT

Doxycycline is a broad spectrum antibiotic. We hereby report a case report of patients that developed multidrug resistant hospital acquired pneumonia. Patients were treated with Polymyxin B and Doxycycline. From this we want to emphasize that Doxycycline can be used as alternative agent in combination with Polymyxin B for treatment of multidrug resistant pneumonia although there are no large scale studies on combination of Polymyxin B and Doxycycline.

KEY WORDS

doxycycline; MDR; pneumonia; polymyxin B

INTRODUCTION

Multidrug resistant (MDR) bacteria like Klebsiella pneumoniae and Staphylococcus aureus are common cause of pneumonia in most of intensive care unit. It is due to overuse, over the counter availability, lack of antibiotic stewardship, prescription of antibiotic by paramedics in developing countries.[1] There are different antibiotic used in combination to treat this infection. There is no clinical trial and studies on combination of Polymyxin B and Doxycline for treatment of MDR bacteria. This is first case report that has used Doxycycline in combination with Polymyxin B for treatment of MDR bacteria pneumonia.

CASE HISTORY:

CASE 1

A 31 year male, with past history of depression under regular treatment presented with Cough, Fever, Shortness of breath, Vomiting for three days. At presentation his Glasgow Coma Scale (GCS) was 15/15, Pulse rate was 160 beats/per min, Blood pressure was 76/40 mm of Hg, Respiratory rate was 31 breaths/min with use of accessory muscles, Oxygen saturation was 78% on 15 litre oxygen and Temperature was 102°F. On auscultation of chest, bilateral crepitation and wheeze was present. Cardiovascular examination showed tachycardia. Other system examinations were normal. Immediately patient was resuscitated and intubated.

His investigation profiles were as follows Total Leucocyte count(TLC)- 13500/mm^3, Platelets-90000/mm^3, Hemoglobin (Hb)-9gm/dl, Urea-90 mg/dl, Creatinine 1.4 mg/dl, Sodium and Potassium were normal. Total bilirubin 3.4mg/dl in which direct was 3mg/dl, Total protein 5.9mg/dl in which albumin was 3.1mg/dl, Alanine aminotransferase (ALT) 601U/L, Aspartate aminotransferase (AST) 681U/L. Chest x-ray showed bilateral pneumonia (Figure 1). Patient was diagnosed as bilateral community acquired pneumonia with multiorgan dysfunction and septic shock with acute kidney injury.

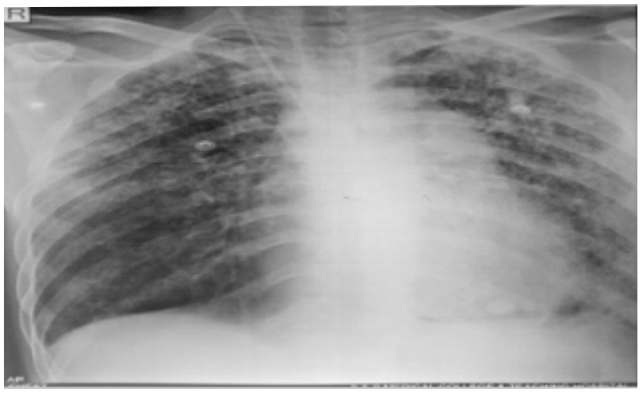

Figure 1: Chest X- ray showing Bilateral Pneumonia

Patient was started empirically on Meropenem, Levofloxacin, and other supportive treatment with Vasopressors, Hydrocortisone, Fluids and Ventilator support. On third day there was no improvement and sputum culture report showed Carbapenem resistant Klebsiella pneumoniae sensitive to Polymyxin B, Chloramphenicol and Doxycycline. Patient was started on Polymyxin B 10 lac two times a day and doxycycline 200 milligram two times a day. Patient got extubated on fifth day and was transferred out on seventh day and antibiotic was continued for 14 days. Patient was discharged on 15th day.

CASE 2

A 38 year old chronic alcoholic male, presented with complain of severe abdominal pain, nausea vomiting for a duration of two days. At presentation, his Glasgow Coma Scale (GCS) was 15/15, Pulse rate was 138 beats/per min, Blood pressure was 110/800 mmHg, Respiratory rate was 26 breaths/min, Oxygen saturation was 94% on 5 liter oxygen, and Temperature was 98°F. On examination there was tenderness at epigastric region. Other systems examinations were normal. His investigation profile was TLC-17000/mm^3, Platelets-110000/mm^3, Hb-10gm/dl, Urea-90 mg/dl, Creatinine-1.9 mg/dl, Sodium and Potassium were normal. Total bilirubin 6mg/dl in which direct 2.3mg/dl, total protein 5.9mg/dl in which albumin 2.9 mg/dl, ALT- 1021U/L, AST-1821U/L. Serum amylase 1017 U/L, Lipase 2012 U/L. He was diagnosed to have acute severe alcoholic pancreatitis. He was managed conservatively with fluids and analgesics. On 6th day he developed fever and shortness of breath. Chest x-ray showed bilateral pneumonia (Figure 2). Sputum and blood culture showed Vancomycin resistant Staphylococcus aureus sensitive to Polymyxin B and Doxycycline. He was started on Polymyxin B 10 lac two times a day and Doxycycline 200 milligram two times a day. He was treated for 14 days.

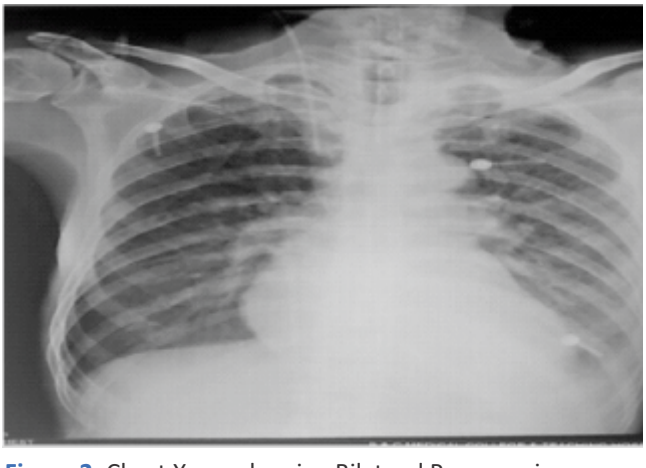

Figure 2: Chest X- ray showing Bilateral Pneumonia

DISCUSSION

Studies have shown that prevalence of multidrug resistant bacteria in intensive care unit ranges from 20 to 96%.[1-3] Gram negative infections are most MDR followed by gram positive in developing and developed country respectively in Intensive Care Unit(ICU).[2]

The incidence of Carbapenem resistance Klebsiella pneumoniae is 7 to 25%.[4,5] Studies have shown that Polymyxin B or Colistin is used in combination with Chloramphenicol,

Rifampin, Tigecycline for treatment of Carbapenem resistance Klebsiella pneumoniae as monotherapy with Colistin or Polymyxin B causes resistance. There are no case reports and studies that has shown that Doxycycline can be used with Polymyxin B for treatment of Carbapenem resistance Klebsiella pneumoniae.

The incidence of Vancomycin resistance Staphylococcus aureus (VRSA) is arising all over the world and will be rising in near future.[6,7] Daptomycin, Telavancin and Quinupristin-Dalfopristin are used in combination with Gentamicin, Rifampin, Linezolid and Trimethoprim-Sulfamethoxazole, Doxycycline, Minocycline for treatment of VRSA. In our patient culture report showed sensitivity of VRSA to Polymyxin B and Doxycycline which was used for treatment.

Monotherapy with Polymyxin B causes emergence of resistance and failure of therapy. Therefore, it is used in combination with other drugs to prevent resistance. Chloramphenicol causes aplastic anemia and patient in ICU are receiving other drugs that cause bone marrow suppression. Therefore, Doxycycline can be alternative in such patients with less side effects and good outcome.

Antibiotic resistance and MDR pathogens is a serious problem all over the globe but is more common in south east Asia and middle east due to over the counter availability of antibiotic. There are no studies on combination of Polymyxin B and Doxycycline for treatment of MDR bacteria so, large scale studies are required to show the efficacy of this combination.

CONCLUSION

New antibiotic has not been developed in pace with growth of MDR organisms. Therefore, treatment with older antibiotic like Polymyxin B and Doxycycline in combination may play a role in treatment of MDR bacteria induced pneumonia and bacteremia but requires large scale randomized control trial to show the benefit of combination therapy.

CONFLICT OF INTEREST

None

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