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Case Report

Emergence of resistant pathogens against colistin

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ABSTRACT

Emergence of resistant strain to antimicrobials is a growing problem worldwide. Here, we report a case of multidrug-resistant *Klebsiella pneumoniae* and *Acinectobacter baumannii*, Gram-negative bacilli, which was only intermediate sensitive to colistin; a polymyxin E. Colistin has attracted more interest recently because of its significant activity against multi-resistant *Pseudomonas aeruginosa*, *A. baumannii* and *K. pneumoniae*, and the low resistance rates to it. The decrease in sensitivity of colistin against *K. pneumoniae* and *A. baumanni* sends alarming signals for the development of resistance to this antimicrobial drug. It is likely that colistin the important antimicrobial option against multi-resistant Gram-negative bacteria will be lost.

Keywords: Resistant, Gram-negative bacilli, Colistin, *Pseudomonas aeruginosa*

INTRODUCTION

Infections caused by multidrug-resistant (MDR) Gram-negative bacteria are increasing worldwide especially by *Pseudomonas aeruginosa, Acinetobacter baumannii*, and *Klebsiella pneumoniae.* Emergence of resistance to the use of β-lactam, aminoglycoside or quinolone by these bacteria has forced to think about alternative polymyxins, especially colistin.[1,2] Colistin became available for clinical use in the 1960s but was replaced in the 1970s with other antibiotics due its nephrotoxic potential.[1,3] Its use was restricted due to the availability of potentially less-toxic aminoglycosides and other antipseudomonal agents. In recent years, colistin has attracted considerable interest as an antibiotic for use against MDR strains. The largest cohort study on 258 patients having MDR Gram-negative bacterial infection by Falagas showed that colistin is a valuable antibiotic with acceptable nephrotoxicity[4] but extensive use of colistin is causing the emergence of resistant strains of Gram-negative bacilli. This is a matter of great concern as the last resort to treat multi-drug resistant Gram-negative bacilli will lose its effectiveness.

Here, we report a case of septicemia with renal failure due to MDR *K. pneumoniae* and *A. baumannii* which had intermediate sensitivity to colistin.

CASE REPORT

A 43-year-old female reported in the emergency department of tertiary care hospital with loss of sensorium and cellulitis right limb. Patient was known case of diabetes mellitus from the last 15 years. On examination patient was febrile, pale and not well oriented to time, place, and person.

On investigation, complete blood count was hemoglobin 9.8 g/dl, total leukocyte count (TLC) 17200/mm^3, differential

leukocyte count (DLC) P 95%, L 2%, M 3%, E 0%. Platelet count 1.58 lakh/cmm, red blood cells (RBS) 210 mg/dl. Urine routine examination showed 4-6 pus cells/HPF, protein, and sugar nil. Viral markers are negative for hepatitis B surface antigen, hepatitis C virus, hepatitis A virus, hepatitis E virus, human immunodeficiency virus. Blood sample and pus sample from the right limb was sent for culture sensitivity. Renal function test shows blood urea 244 mg%, serum creatinine 4.2%. Liver function test was normal. Blood gas analysis shows pH 7.19, PCO_2 23 mm Hg, PO_2 200 mmHg. Electrolytes Na^+ 127 mmol/L, K^+ 5.3 mmol/L, HCO_3^- 8.8 mmol/L, serum Ca^{2+} 8.4. Final diagnosis of type II diabetes mellitus, septicemia, metabolic acidosis, acute on chronic renal failure with right limb cellulitis was made. Conservative treatment was started.

On next day electrolytes level was Na^+ 136 mmol/L, K^+ 5.6 mmol/L, HCO_3^- 8.9 mmol/L, serum $Ca2^+$ 8.4. Post dialysis report showed decrease in the level of blood urea to 146 and serum creatinine to 3.5. Blood culture showed the growth of *K. pneumoniae* and pus culture showed the growth of *K. pneumoniae* and *A. baumannii*. Both organisms were found to be resistant to penicillins, fluoroquinolones, aminoglycosides and had intermediate sensitivity to colistin only (Table 1). Patient was administered colistin methanesulfonate 150 mg I/V in 100 ml normal saline over 30 mins once daily for 7 days. The renal function improved, after 2 days of treatment blood urea was 135 mg% and serum creatinine was 2.2 mg% and further falls to 79 mg%, 2.0 mg% after 5 days and ultimately values become normal to 38 mg% and 1 mg%, respectively after 7 days. There was decrease in TLC count to 11970 mm^3, DLC P 83%, L 7%, M 9%, E 1% after 2 days, after 5 days TLC 5740/mm^3, DLC P 68%, L 22%, M 8%, E 2% and 4540/mm^3, DLC P74%, L16%, M8%, E2%) after 7 days of treatment.

DISCUSSION

The recent trend of increase in MDR pathogens such as *A. baumannii, P. aeruginosa*, and carbapenem-resistant *K. pneumonia* is a matter of great concern. The usefulness of colistin has been clearly documented along with evidence of less nephrotoxicity.[5] However, extensive use of colistin has come up with emergence of resistance.[6] Cases have been reported with Gram-negative bacilli becoming resistant to colistin.[6-9] Another study from north India showed 8% of the pseudomonas to be colistin resistant.[10] SENTRY study by Gales reported 1.3%, 2.1% polymyxin resistance among *Pseudomonas* and *Acinetobacter,* respectively.[11] Taneja from north India reported 3.5% colistin resistance in *A. baumannii* isolates.[12] In the present case, the patient had bacteremia along with soft tissue infection. All antibiotics were resistant and had intermediate sensitivity only to colistin. Had this intermediate sensitivity to colistin not present, the doctor would not have other option for treatment. Hence, it is important to check the emergence of resistance to this useful antibiotic otherwise very little options will be left to treat these infections.

Table 1: Blood culture sensitivity report.

Antibiotics	Sensitivity
Beta-lactam antibiotics Penicillins: piperacillin Cephalosporins: ceftazidime, cefotaxime, ceftriaxone, cefpodoxime, cefoperazone, cefixime, cefepime Carbapenems: meropenems, imipenem Combination with beta lactamase inhibitors: amoxycillin and clavulanic acid, cefoperazone and sulbactam, piperacillin, and tazobactam	R
Fluoroquinolones: ciprofloxacin, ofloxacin, lomefloxacin	R
Aminoglycosides: amikacin, netilmicin	R
Tigecycline	R
Colistin	I

CONCLUSION

The emergence of MDR bacteria poses a serious therapeutic problem that resulted in increased interest in colistin. However, to maintain its effectiveness clinicians must choose colistin appropriately to prevent its resistance. Any case of resistance to colistin should be reported immediately. Different ways to maintain the usefulness and activity of colistin against MDR pathogens must be explored.

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