Ibrahim Card Med J 2012;2(1): 65-66

Use of 'Amikacin Nebulisation' in Ventilator Associated Pneumonia from pseudomonas to reduce nephrotoxicity: A case report

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INTRODUCTION

The use of antibiotics through nebulisation is very limited. Recently, reports are coming on the use of Amikacin, both from animal and human studies,[1,2,3,4,5] although randomized multi-centre studies are still lacking. Here, we report a complicated case, where we used Amikacin nebulisation to deal with respiratory pseudomonas as well as to avoid nephrotoxicity.

Case report:

An 82 years old woman, presented to the Emergency Department of Ibrahim Cardiac Hospital & Research Institute, Dhaka with non-ST elevation myocardial infarction, acute left ventricular failure (LVF), pulmonary edema, hypoxia, and dyspnoea. She was intubated, mechanically ventilated and transferred to CCU (Coronary Care Unit) for further management. She had history of chronic atrial fibrillation (AF), IHD (Ischemic Heart Disease), hypertension, recurrent pulmonary infection, chronic renal insufficiency, and Parkinson's disease. Only three days back, she had a stroke with right hemiplegia and aphasia.

Subsequently she improved but had two consecutive extubation failure. She developed ventilator associated pneumonia (VAP) after first re-intubation. Culture of tracheal aspirate revealed growth of *Acinetobacter* which was only sensitive to colistin and was treated with it. After second reintubation, tracheal aspirate had grown *Pseudomonas* species which was multidrug resistant (MDR). CT scan of chest revealed evidence of pulmonary fibrosis. Meanwhile, her renal function was worsening. Serum creatinine rose up to 2.8 mg/dl and 24 hours urine for creatinine clearance was 11 ml/min.

Later, the patient again developed respiratory infection from *Pseudomonas* which was MDR. Along with the new infection serum creatinine started creeping up again. We decided to treat respiratory *Pseudomonas* with two antibiotics but, meanwhile, we wanted to avoid drug induced nephrotoxicity. Unfortunately, *Pseudomonas* was only sensitive to Piperacillin-Tazobactam and Amikacin. To avoid nephrotoxicity, we decided to administer Amikacin by nebulisation which provides high level of Amikacin in the Mucosal Lining Fluid (MLF)[1,2,3,4,5] while maintaining low serum level. As the patient's ideal body weight (IBW) was 30 kg, Amikacin nebulisation dose was reduced to 250 mg 12 hourly. After 3 days, serum creatinine level started to creep up slowly and the Amikacin nebulisation dose was further reduced to 250 mg once daily. After this, serum creatinine level dropped to 1.7 mg/dl. She maintained acceptable urine output with Frusemide, added to deal with acute LVF.

After 4 days of antibiotics, culture of tracheal aspirate showed no growth. Subsequently, cultures of tracheal aspirates were repeated twice, done every alternate day. Both the cultures result showed no growth. The patient was extubated successfully. As the 3 consecutive cultures were negative, WBC count was normal, chest X-ray showed no infiltration, CRP (C-reacting protein) level came down and the patient was afebrile, we discontinued antibiotics. As the post extubation period was uneventful, the patient was transferred to the floor.

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DISCUSSION

The recommendation for treating respiratory Pseudomonas infection, is to add two antibiotics.[6] We used Piperacillin + Tazobactam and Amikacin in our patient, for respiratory pseudomonas. Recent animal studies[1,2,3] and studies on human-being showed[4,5] that nebulised Amikacin provides very high pulmonary concentration, ranging from 3-30 times MIC (Minimum Inhibitory Concentration). Studies on nebulised Amikacin showed low serum concentration[4] and reduced nephrotoxicity.[5,7] We wanted to avoid drug related nephrotoxicity, since the patient already had significant renal impairment. Hence, we decided to administer Amikacin through nebulisation to avoid worsening of renal status.

Treating respiratory *Pseudomonas* infection, with two antibiotics is not uncommon.[8] But using Amikacin nebulisation, as one of the two antibiotics, is not common. As the control of respiratory *Pseudomonas* infection was quick, without any renal deterioration, we suggest to apply this principle on larger number of patients to obtain sufficient information using Amikacin nebulisation in *Pseudomonas* VAP, particularly where MIC and serum drug level monitoring facilities are not available and where there is already some degree of renal compromise.

CONCLUSION

Centres with limited facilities for monitoring MIC and patients with renal compromise, may treat respiratory *Pseudomonas* with Amikacin nebulisation along with another systemic antibiotic if sensitive. This may reduce the duration of ventilatory support and length of hospital stay. Since this one is a case report further larger studies are required to confirm our findings.

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