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Case Report

A CASE OF POLY-INFECTION WITH cUTI AND GRADE III BED SORE IN TYPE II DIABETES TREATED WITH NEW ANTIBIOTIC ADJUVANT ENTITY: A CASE REPORT

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ABSTRACT

Critically ill patients with diabetes are commonly associated with urinary tract infection and high-risk of bed sores or pressure ulcers. We report a case of 72 years male patient, a known case of meningoencephalitis, treated 1 month back. He arrived to our emergency department, with chief complaints of fever and increased drowsiness since 10-12 days. Based on the initial examination, the patient was empirically managed with intravenous meropenem 1 g every 8 hrs. However, due to patient poor clinical response antibiotic therapy was switched to Elores 1.5 g B.D dose with 90 minutes infusion. The patient received Elores therapy for 7 days, based on lab reports and general condition, he was put on oral antibiotics and shifted to ward. On the 5th day of post ward transfer, the patient developed mild pleural effusion with mild hypokinesis, he was again shifted to Medical Intensive Care Unit. Cardiology consultation was sought and was managed. In view of suspected hospital-acquired pneumonia, prophylactic treatment of Elores 1.5 g B.D was continued for 5 days. The patient responded to the treatment well, was stable and discharged with follow-up advice.

Keywords: Antibiotic adjuvant entity, Complicated urinary tract infections, Elores, Poly-infection.

INTRODUCTION

Urinary tract infection (UTI) is a common infection observed in diabetic patients. The incidence of UTIs in diabetic patients is reported to be three to four times higher than non-diabetic patients. The hyperglycemic nature of urine and impaired bladder emptying in diabetics favors rapid bacterial growth and colonization [1]. Other risk factors associated with UTI are sexual intercourse, age, duration of diabetes, glycemic control, and complications of diabetes [2].

Gram-negative organisms: *Escherichia coli, Klebsiella pneumoniae,* and *Proteus mirabilis* are common infecting pathogens causing UTIs. *E. coli* and *K. pneumoniae* are major pathogens isolated in diabetic patients with UTI [2]. Apart from this, diabetic patients in critically ill condition are at high risk for bed sores or pressure ulcers. The longer the patient is intensive care units (ICU) the greater the chances of bedsore development. The global incidence of bedsores in ICU ranged widely from 1% to 56% [3].

A history of diabetes has been found to be an indicator of developing pressure ulcers in ICU patients. Infection risk in skin ulcers depends on various host factors: Nutrition, oxygenation or tissue perfusion, medical conditions (diabetes, immobilized either temporarily or permanent), and type of organism colonized. In wounds <1 month old, cutaneous and Gram-positive organisms tend to predominate.

Aerobic or facultative species

Staphylococcus aureus, Pseudomonas aeruginosa, and beta-hemolytic Streptococci are most commonly found in the skin ulcers. Bacterial colonization in the skin ulcers slows down the healing process. Wounds fail to improve or degenerate despite a healthy appearance if bacteria produce a biofilm. Biofilm protects the bacteria from antibiotic therapy and the patient's immune response [4]. In acute wound infection, wound cleansing and dressings with systemic antibiotic therapy often provide effective cure. Along with systemic antibiotic therapy, removal of necrotic or devitalized tissue is important for treating skin ulcers [5].

Here, we present a case of complicated UTI (cUTI) and Grade III bed sore in Type II diabetes mellitus treated with new antibiotic adjuvant entity Elores after failed to respond to initial meropenem therapy.

CASE REPORT

Presenting a case of 72 years male patient, a known case of meningoencephalitis, treated 1 month back and discharged. Arrived at our emergency department, with chief complaints of fever and increased drowsiness since 10-12 days. The patient was under treatment from a general practitioner but found no relief and complained of gradual increase in fever and drowsiness. The patient is on regular medications for diabetes mellitus and hypertension.

On careful examination, his overall health condition was poor and seemed disoriented. He was febrile (102°F) with the irregular pulse of 140 beats/minutes, respiratory rate of 36/minute, blood pressure of 200/104 mmHg. Random blood sugar by glucometer was 324 mg/dL. Local examination revealed: multiple infected bed sores. Systemic examination revealed cardiovascular system S1S2 normal, respiratory examination: bilateral wheeze was present while per abdomen was soft. Laboratory investigations were carried out with blood and urine sample sent for routine investigations.

The expert evaluation was done. Chest X-ray was advised and revealed right sided pneumothorax. Chest physician opinion was taken, and intercostal chest tube drainage was done in the 5th IC space. Lung expanded after the procedure except at the apex. Blood reports revealed few deranged parameters with total leukocyte count: 3100/cumm (low), hemoglobin 7.8 g/dl (low), lymphocyte: 12% (low), haematocrit: 30% (low), red blood cell (RBC): 3.6×10^{12}/L (low) with raised erythrocyte sedimentation rate of 46 mmHg. Liver function test parameters were slightly deranged. Urine routine analysis and microscopy revealed RBCs and pus cells. Based on the initial examination, the patient was empirically put on intravenous meropenem 1 g every 8 hrs, antipyretic, antacid, antiemitics, insulin and shifted to medical ICU (MICU). The patient was further evaluated by a chest physician, diabetologist, and physician, advice followed. But, the patient condition was not improved even after 3 days, considering patient's poor clinical response to meropenem, he was switched to Elores broad-spectrum antibiotic, effective against most β-lactamase producing organisms including carbapenemases. Elores 1.5 g B.D dose with 90 minutes infusion along with potassium supplement, bronchodilators, and other conservative and supportive therapy was initiated. Psychiatric consultation was sought for irrelevant talks and managed accordingly. Neurology

consultation was sought for dementia and managed accordingly. The patient was having low serum sodium (128 mEq/L) and was managed with salt supplements. The patient received multiple units of blood transfusion. Surgery consultation was sought for multiple Grade III bed soars and was managed with debridement and topical dressing with Ampucare The patient received Elores for 7 days and based on lab reports and general condition, was put on oral antibiotics and shifted to ward with supportive treatment. On the 5th day post ward transfer, the patient suddenly had the onset of breathlessness, vomiting, fever, and became unconscious. Arterial blood gas revealed respiratory alkalosis (PH 7.53, pCo_2 25.1, HCO_3 25.8). ECG revealed ST-segment and T-wave changes suggestive of the acute cardiac event. Chest X-ray showed B/L mild pleural effusion. The patient condition deteriorated and was again shifted to MICU. Echocardiography revealed hypokinesis mild/anterior/septal mild and distal interventricular septum anterior wall. Left ventricle ejection fraction was 35%. Cardiology consultation was sought and was managed accordingly. The patient was kept on a ventilator (continuous positive airway pressure) and ionotropic support. Prophylactic Elores 1.5 g B.D with 90 minutes infusion was started in view of suspected hospital-acquired pneumonia and continued for 5 days. The patient responded to the treatment well, was stable and discharged with follow-up advice.

DISCUSSION

UTIs are more frequent in patients with diabetes mellitus than in subjects with normal glucose metabolism. Changes in host defense mechanisms, presence of static pools of urine due to dysfunctional bladders contractions, serve a favorable media for bacterial growth. Hyperglycemic urine also promotes rapid bacterial growth and colonization.[1] Bacteriological studies reveal the involvement of Gram-negative enteric organisms: *E. coli, Klebsiella* species, and *Proteus* species as pathogens commonly causing UTI [2]. *E. coli* is the most common grown organism followed by *K. pneumoniae* in UTI among diabetic patients [2].

In this case, urinalysis revealed pyuria (presence of RBCs and pus cells). Clinical suspicion of a cUTI was raised in this diabetic patient with pyuria, dysuria, and fever.

As evidenced by numerous studies, the longer the patient remains in ICU, the greater the risk of bed sores development. Grade III bed sore ulcers are more prone in diabetic patients. Frankel and team also reported that diabetes has a positive association with bed sores occurrence [3]. Risk factors associated with skin ulcers increase, based on the type of causative pathogens colonized, nutrition, oxygenation, or tissue perfusion, medical conditions with co-morbidities and immobilization either temporarily or permanent. Chronic wounds often display the typical findings of infection, including warmth, purulent drainage, and advancing erythema. Gram-positive organisms tend to predominate in wound that are 1 month old, harboring a wide range of multiple drug-resistant organisms. Aerobic or facultative species: *S. aureus*, *P. aeruginosa,* and beta-hemolytic *streptococci* are commonly associated with skin ulcers [4]. In chronic wounds, bacteria produce a biofilm which protect against immune system of host and antibiotics [4,5].

Kirketerp-Moller *et al.* microscopically evaluated specimens from 50 chronic and 16 acute wounds for the presence of bacteria producing biofilm and they found the highest percentage of biofilm production (60%) in chronic wounds as compared to acute wounds (6%). This indicates chronic wounds are associated with more complications. The biofilm protects the bacteria from antibiotics making them 1000 times less susceptible to antibiotics [5]. Systemic antibiotics for treatment of wound infections for cellulitis and osteomyelitis have level I evidence of effectiveness [4]. Removal of necrotic and devitalized tissue minimizes the burden of the wounds by decreasing the presence of a bacterial load, reducing wound hypoxia, and local inflammatory reaction [5]. In treatment of skin ulcers, infections in the deep compartment might not respond to topical treatments. In the present case of poly infection, Gram-positive could be a causative pathogen in bed sore and gram negative in cUTI.

As in this case, for the management of cUTI and Grade III bed sore, empiric broad-spectrum intravenous antibiotics to cover Gram-negative and Gram-positive bacteria was necessary. Based on the clinical, hematological and serological findings patient was empirically put on intravenous Meropenem 1 g every 8 hrs, but the patient did not responded well to the meropenem even after 3 days, considering poor clinical response and possibility of carbapenamase producing bacteria treatment was switched to Elores 1.5g B.D dose with 90 minutes infusion.

Elores broad-spectrum activity showed good results in Phase III clinical trial with a clinical cure rate of 83.33% (85/102) in patients treated for UTI [6]. In an *in vitro* study by Manu Chaudhary and Payasi Elores reported good antibacterial activity against carbapenamase producing uropathogens. Elores showed lower MIC values of 8-16 µg/ml to these pathogens [7]. Elores also showed biofilm reducing activity by inhibiting the curli formation and bacterial adhesion [8]. Sahu *et al*. reported up to 89% sensitive to carbapenamase producing clinical strains isolated from urine, tissue, sputum, blood and pus [9].

In addition to this, Elores is also effective in skin structure infections (SSSIs) and bone joint infections (BJIs). In a Phase-III, study done on SSSIs and BJIs, Elores achieved 80.33% clinical cure rate and 85.25% bacterial eradications [10].

Based on the above-mentioned research data use of Elores as a suitable choice in treating UTI with skin infections in the present case.

In patients with bed sores, the necrotic material provides a good medium for bacterial growth and colonization [5]. In this case, debridement was used as adjunct therapy along with parental antibiotics to reduces the bacterial burden, controls biofilm formation, and increase oxygen supply to the wound bed along with infection management in cUTI.

The patient responded well to the treatment with Elores and shifted to ward. In the present case, patient developed respiratory alkalosis, this possibly was due to the mild pleural effusion, not associated with any medication. Mild left ventricular hypokinesia was managed in the present case with cardiology consultation.

Current evidence suggests that Elores may be a suitable option in the treatment of a patient with poly-infection like cUTI and Grade III bed sore in Type II diabetes mellitus.

CONCLUSION

With the prevalence of poly-infection in a non-ambulatory diabetic patient, the need for a broad-spectrum antibiotic arises. Single antibiotic therapy is targeting Gram-negative and Gram-positive organisms increases safety and reduce treatment cost, in comparison to multiple antibiotic therapy. Based on the present case study, Elores therapy can be considered as an effective mono therapy to treat poly-infections possibility due to carbapenamase producing pathogens in diabetic patients suffering from other infectious diseases like cUTI.

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