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Case Report

Successful Treatment of *Pantoea dispersa* Bacteremia Septic Shock in Immunocompromised Patient with Combined Intravenous Antibiotic

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Abstract

Background: *Pantoea* species belong within the family Enterobacteriaceae and it is natural inhabitant of the environment including plants [1]. *Pantoea* is currently composed of 20 recognized species [2]. Some are human pathogen. It is an uncommon pathogen in a clinical setting and rarely reported as a cause of serious infection. Six cases of infections by *Pantoea dispersa* have previously been reported in literature review. We report a case of septic shock caused by *Pantoea dispersa* bacteremia in acute lymphoblastic leukemia pediatric patient. Up to our knowledge, this is the first case report of *Pantoea dispersa* bacteremia causes septic shock in pediatric population.

Case Presentation: 4-year-old boy known case of acute lymphoblastic leukemia who developed septic shock after flushing his central venous catheter, which removed immediately after the event. Blood culture from CVC reveled *Pantoea dispersa*. Patient received fourteen days course of meropenem and five days amikacin with neither complication nor recurrence of similar infection.

Conclusion: The pathogenic and clinical importance of *P. dispersa* infection are unclear. Challenges faced when treating severe infections in high-risk patients. We need more case reports of *P. dispersa* infection to understand the epidemiology, clinical and microbiologic characteristics.

Keywords: *Pantoea dispersa; Septic Shock; Bacteremia; Pediatrics*

Introduction

Pantoea belongs to Enterobacteriaceae family. It is isolated from plants, humans and the natural environment [1]. *Pantoea* is currently composed of 20 recognized species [2]. Species like *P. deleyi, P. anthophila, P. allii, P. cypripedii, P.wallisi, P. rodasii* and *P. rwandensis* have been isolated from only plant sources while *P. calida, P. dispersa* and *P. gavinae* were identified from the natural environment or processed products [2]. *P. agglomerans, P. conspicua, P. brenneri, P. septica* and *P. eucrina* were isolated from clinical sources. *P. agglomerans* is the most commonly isolated species in humans. Only a limited number of clinical cases with *Pantoea dispersa* have been described especially in pediatric population. There is limited data on virulence factors, pathogenicity and mechanism of acquiring resistance to antimicrobial therapy.

We report a case of four year old boy; known case of acute lymphoblastic leukemia who developed septic shock following flushing his central venous catheter (CVC) which was removed immediately after the event. Blood culture from CVC revealed *Pantoea dispersa.* Patient received fourteen days course of meropenem and five days amikacin with neither complication nor recurrence of similar infection.

Case Presentation

A 3 year and 6 month old boy known case of acute lymphoblastic leukemia in consolidation phase**;** presented to daycare clinic on May 4, 2019 for scheduled chemotherapy. He has no complain upon presentation and his physical examination was normal. However, when Central venous catheter (CVC) was flushed in order to administer the chemotherapy; the patient started to vomit. Half hour later he developed fever up to 39.9°C with shivering. Blood pressure dropped to 103/43 mmHg, heart rate was 145 beat/minute, oxygen saturation was 100% room air and the respiratory rate was 20 breath/minute. Resuscitation was started with normal saline bolus and first dose of meropenem, amikacin and vancomycin were given after blood culture were obtained from CVC. Central venous line was removed on spot. Blood pressure improved after third normal saline bolus. He started to develop desaturation to 88% oxygen in room air which improved with 4litter oxygen mask up to 100%, chest auscultation revealed mild decrease air entry in right side with fine crepitation. Immediate blood investigations revealed the following: Blood gas PH- 7.300, PCO_2- 34.1, PO_2- 162.2, HCO_3- 16.4, BE- 9.1. Total leukocyte count of 2,200 cu/mm, neutrophil count 690, hemoglobin of 9.5 g/dl, prothrombin time (PT) of 18 seconds, partial thromboplastin time (PTT) 54 second, INR 1.6, renal function tests and liver function tests were normal. C- reactive protein was 12.1 mg/L then raise to 316, D-Dimer 6.96. Nasopharyngeal aspirate sent for multiplex PCR testing were positive for Human Rhinovirus/Enterovirus. After 24h incubation; blood culture from central venous catheter showed Gram negative bacilli which was identifies by VITEK MS (MALDI-TOF) and VITEK-2 systems as *Pantoea dispersa*. Confirmation by molecular methods such as PCR was not performed, as it was not available in our institution. Antimicrobial susceptibility testing was performed simultaneously by using VITEK2-MIC detection method (Table 1). Patient antibiotic was tailored according to antibiotic sensitivity test result to meropenem for fourteen days and amikacin for five days.

Antimicrobial	MIC (M/ml) Interpretation
Amoxicillin/Clavulanate	4S
Piperacillin/tazobactam	16S
Ceftriaxone	≤ 1S
Ciprofloxacin	≤ 0.25S
Cefepime	≤ 1S
Meropenem	≤ 0.25S
Imipenem	≤ 0.25S
Amikacin	≤ 2S
Gentamicin	≤ 1S

Table 1: *MIC: Minimum Inhibitory Concentration; S: Susceptible.*

During the hospital Stay of fifteen days, patient's fever resolved after 24 hour of starting antimicrobial therapy. Neutrophil count raised gradually to normal range. Patient respiratory symptoms improved with no additional oxygen support. Repeated blood culture taken on second and third day of admission turned to be negative. Patient discharged in good clinical condition with no recurrence of similar infection.

Discussion

Immunocompromised patient like oncology patient are highly predisposed to infection with variety of pathogens i.e. bacteria, viruses, fungi, and parasites who are often opportunistic. Early recognition and treatment are critical for optimal chances of survival and minimal morbidity. The selection of initial empiric therapy for these patients when febrile is based on the type and the degree of immune suppression plus other predisposing factors such as the presence of central venous lines.

The genus *Pantoea* is rod shaped Gram-negative bacteria belongs to Enterobacteriaceae family. Only a limited number of clinical cases with bacteria belonging to *P. dispersa* have been described especially in pediatric population. There is limited data on virulence factors, pathogenicity and mechanism of acquiring resistance to antimicrobial therapy.

Pantoea dispersa has rarely been reported to cause human infection. Six cases of *P. dispersa* infections have been reported in literature in immunocompromised as well as immunocompetent patients. Two of them were neonate and the other four cases were adult. First case report was in 2003 from Germany of a 71-year old immunocompromised female with acute myeloid leukemia developed left focal pneumonia with pleural effusion. Broncho-alveolar lavage Culture reveled *P. dispersa* and the patient improved after appropriate antibiotic therapy [3]. Then in 2013, there was two reported cases of early onset neonatal sepsis caused by *P. dispersa*. The first was a term baby and improved well with companied antibiotic therapy of meropenem and amikacin for fourteen days duration of therapy. However, the second was a preterm neonate with co-morbidities and *P. dispersa* bacteremia rapidly deteriorating at 12 hour of life with intracranial hemorrhage and shock. Despite early initiation of antibiotics and supportive therapy baby died after 24h of life [4]. Fourth case in 2014 was a 64-year-old man with dilated cardiomyopathy, diabetes mellitus who had a central venous catheter (CVC) and a permanent pacemaker. Admitted 2 month after pacemaker insertion with fever, *P. dispersa* was detected from both blood and catheter tip cultures, which was persistence for second time after removing the CVC. Patient received total four week of antibiotic as suspected pacemaker infection without recurrence of infection [5]. Fifth case at 2018, 23-year multiparous female, in post lower uterine segment cesarean section had been performed for intrauterine fetal death presented with fulminant septic shock, hepatic failure, coagulopathy, and ventilator-associated pneumonitis. The culture from endotracheal secretions showed *P. dispersa*, resistant to almost all the conventional antimicrobial agents. In spite of all the efforts, the patient could not be survive [9]. Last case in 2019 a 38-year-old woman with *P. dispersa* bacteremia caused by acute cholangitis. The treatment was successful with intravenously administered meropenem, and it was switched to oral levofloxacin according to microbiological susceptibility.

Our case was immunocompromised patient who developed septic shock after flushing his CVC, blood culture from central line was positive for *P. dispersa* without peripheral line blood culture sent on same time to confirm the diagnosis of CLABSI. The isolate was pan sensitive; however, the patient on presentation was in shock with febrile neutropenia who improved since starting companied antibiotic therapy. It was chosen to keep him on meropenem for total of fourteen days plus amikacin for total of five days in order to eradicate as Gram negative bacteremia in febrile neutropenic high risk patient. From reviewing reported cases, the only two pediatric cases were on meropenem and amikacin with comparable organism sensitivity.

Being an uncommon pathogen of human infection and due to the similarity and diversity in bacterial properties of the species of the genus *Pantoea,* biochemical identification alone would not be appropriate and may even be misleading [7]. VITEK MS system has been reported as a reliable method for the identification of the genus *Pantoea* [6]. Even though; 13.6% of clinical isolates of *P. agglomerans* were misidentified as species of the genus *Enterobacter* by the VITEK MS system [6]. This limitation in identification even extended to genetic detection method including 16SrRNA analysis [8].

Conclusion

The pathogenic and clinical importance of *P. dispersa* infection are unclear. Challenges were faced when treating severe infections in high-risk patients. We need more case reports of *P. dispersa* infection to understand its epidemiology, clinical and microbiologic characteristics.

Consent

Written informed consent was obtained from patient's legal guardian for publication of this case report.

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