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CASE REPORTS

CASE REPORT OF MENINGITIS IN A PREMATURE NEONATE DUE TO RARE ISSOLATE, PANTOEA DISPERSA

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ABSTRACT

Pantoea genus belongs to the family Enterobacteriaceae.It is known to cause opputunistic infections in immunocompromised hosts.However, Pantoea infections in neonates have been infrequently reported, especially Pantoea dispersa.

In the light of emerging multidrug resistance, it becomes imperative for the neonatologist to understand the patterns of sensitivity of Pantoea to various antimicrobials.Recent advances in microbiology like MALDI-TOF help us identifying such bacteria. Early identification helps to initiate early antimicrobial therapy, which ahs shown to improve outcomes in neonated with Pantoea dispersa infection. Here, we report a case of meningitis in a preterm neonate caused by Pantoea dispersa. Both CSF culture and blood culture showed Pantoea dispersa growth and neonate showed improvement after antibiotic therapy.

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Introduction

Neonatal meningitis is a major cause of mortality and morbidity worldwide. It is the inflammation of the meninges during the first 28 days of life.[1] Group B streptococci, E. Coli, Klebsiella, Coagulase negative streptococci, Acinetobacter are some of the pathogens recognized which cause neonatal infections including meningitis.[2] To initiate appropriate antibacterial therapy, multidrug resistance of pathogens to extended spectrum Cephalosporins, Carbapenems and other antimicrobials, like glycopeptides and Colistin is an emerging challenge.[3] Enterobacteriaceae is one such family posing as a threat with multidrug resistant pathogens. Pantoea genus belongs to family Enterobacteriaceae which is a group of opportunistic pathogens Here we report a case of neonatal meningitis in a preterm neonate caused by Pantoea dispersa.

Case Report

A 14 day old preterm neonate was shifted to our facility from a different centre. On admission, the neonate was pale, with decreased tone and activity and was on dual ionotrope support and requiring mechanical ventilation. All the relevant investigations including blood culture, CSF analysis and CSF culture were done. Retrospectively, neonate was of 34+2 weeks of gestation, birth weight 1.54 kg, delivered by emergency LSCS i/v/o pre eclampsia to 26 year old primigravida mother(Antenatal steroids received) on 24/9/2022 at 8.24 pm. Neonate developed RDS and as given one dose of surfactant after birth and antibiotics Piperacilllin-Tazobactam were started. He was on ventilator support when on DOL3. He showed clinical deterioration with positive septic screen with dropping platelet count for which antibiotics were graded up to Meropenem. The neonate showed improvement till DOL 10 post which patient started showing temperature instability, lethargy, decreased perfusion, abdominal distension with hypotension with increasing CRP 116 mg/L and thrombocytopenia 13,000/microlitre and anemia Hb 9.3 gm/dl and leucopenia WBC 4320/ microlitre (neutrophils 63% lymphocytes 29% monocytes 9% eosinophils 2.8%) for which patient was started on ionotropes and antibiotic was graded up to Colistin. Platelets, FFP and PRBC were transfused and patient was shifted to our facility.

In or facility, lumbar puncture was done which showed 168 cells with 52% polymorphs, 38% lymphocytes, 169.3 protein, <5 sugar, Inj Meropenem was graded up to meningitis dose and Colistin was continued. Inj Vancomycin was added. Multiple platelet transfusions were given. Neonate had 1 episode of convulsion and hence loading dose of Levetiracetam was given followed by maintenance dose. Ultrasound brain showed diffuse effacement of sulcal spaces with subtle hypoechogenecity along sulcal spaces and basal cistern, likely secondary to meningitis and cerebral oedema. Blood culture and CSF report came positive for Pantoea dispersa. (By MALDI-TOF MS) which showed sensitivity to Amikacin, Ciprofloxacin, Colistin, Gentamycin, Trimethoprim-Sulphmethoxazole, Tigecycline, Chloramphenicol, Doxycycline and Levofloxacin. As the baby showed clinical improvement after Colistin and Meropenem, they were continued and basing on the sensitivity report Inj Amikacin was added and Inj Vancomycin was stopped. Ionotropes were gradually weaned and stopped. Trophic feeds were started and upgraded to full feeds. Patient was extubated and shifted to NIV mode on DOL 25 and gradually shifted to CPAP on DOL 27. Repeat lumbar puncture was done on DOL 21. After completing 7 days

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Table 1. Complete blood counts report.

	DOL-1	DOL-4	DOL-11	DOL-13
WBC	12810	8790	3840	4230
N	50.5	59.4	43.8	63.6
L	32.9	21.2	50	23.9
M	14.6	8.2	3.1	9.5
WBC	12810	8790	3840	4230
E	0.6	0.9	2.6	2.8
B	1	0.3	0.5	0.2
RBC	4.18	4.24	2.86	2.4
HB	17.2	17.1	11.2	9.3
HCT	53.1	51.4	35	27.6
PLATELET	198	124	22	13
hsCRP(0-0.6)	0.3	0.6	50.5	116.2

Table 2. Sensitivity of pantoea dispersa in blood culture in preterm neonate, instrument used : batec fx(bd-usa).

SENSITIVE	RESISTANT
AMIKACIN	AMOXICILLIN/CLAVULANIC ACID
CIPROFLOXACIN	CEFTRIAXONE
COLISTIN	CEFEPIME
GENTAMICIN	ERTAPENEM
TRIMETHOPRIM SULPHMETHOXAZOLE	MEROPENEM
TIGECYCLINE	PIPERACILLIN/TAZOBACTAM
CHLORAMPHENICOL	CEFTAZIDIME/AVIBACTAM
DOXYCYCLINE	CEFOXITIN
LEVOFLOXACIN	TOBRAMYCIN

Table 3. CSF report.

	DOL-15	DOL-21
SUGAR	<5	<5
PROTEIN	169.3	139.7
TOTAL CELL COUNT	168	22
WBC	L-38% N-52% M-10%	L-88% N-04% M-08%
RBC	FEW	ABSENT
GRAM STAIN	NEGATIVE	NEGATIVE
ZN STAIN	NEGATIVE	NEGATIVE

of antibiotic which showed improving trend with 22 cells, 04% polymorphs, 88% lymphocytes. Antibiotics were continued for 28 days. At discharge USG brain was repeated after completion of antibiotic therapy which revealed ill defined, nearly symmetric hypodensities in bilateral periventricular, deep and subcortical white matter predominantly in the frontal and parietal lobes with early gliotic changes in the frontal lobe.

Imaging features are in favour of subacute insult? Hypoxic-ischemic etiology? Sequelae of encephalitis. ROP screening was done on DOL 30 which showed zone 2 avascularity and follow-up after 2 weeks was advised. Patient was shifted to room air on DOL 34 and discharged on DOL 43. On follow up after 1month baby was doing well accepting feeds and was active.

Discussion

The genus Pantoea belongs to family Enterobacteriaceae. They are disparate group of yellow pigmented, rod shaped species of Gram negative bacteria. It was named first as Bacillus agglomerans, which was later called as Enterobacter agglomerans. Some other names such as Bacterium herbicola, Pseudomonas herbicola, Erwinia herbicola and Erwinia millitiae were also given.[4]

Pantoea strains have been frequently isolated from many aquatic and terrestrial environments, as well as in association with insects, animals and humans.[4]

Seven Pantoea species are currently distinguished: P. agglomerans, the prototype species of the genus; Pantoea ananatis; Pantoea stewartii (divided into the two subspecies Pantoea stewartii subsp. stewartii and Pantoea stewartii subsp. indologenes); Pantoea dispersa; Pantoea citrea; Pantoea punctata; and Pantoea terrea.[4,5]

Previous studies have shown that most cases of infections are caused by Pantoea agglomerans.[6]

2003 onwards, there have been slowly, but steadily emerging evidence about the increasing involvement of P. dispersa spp., in producing opportunistic infections, especially in compromised, elderly patients.[7,8]

This was followed by, first report of neonatal sepsis involving this subspecies in central India.[9] In 2014, there was a reported case of P dispersa, being the cause of bacteremia via a central line, again an opportunistic invasion.[10]

Our patient was born preterm at 34+2 week of gestation and prematurity and associated immature immune systems resulting in the relative immunocompromised state which are the major risk factors for hospital-acquired infections due to Pantoea in newborn infants.

75% (30 out of 40) of all neonatal Pantoea infections reported in the English literature as of July 2020 occurred in preterm infants. However this included all species of Pantoea.[9,11,12]

Clinical features : was presented with respiratory distress at birth which is comparible to previously presented case of neonatal Pantoea dispersa infection.[9] Newborn infants with Pantoea bacteremia present with pulmonary symptoms most commonly.[13]

Patient presented with early onset sepsis with clinical deterioration on DOL-3 similar to the previously presented cases with Pantoea dispersa. However mother had no symptoms prior to delivery except for preeclampsia.

Clinical features were respiratory distress, apnea, temperature instability, lethargy, hypoglycemia and septicemic shock requiring ionotropic support which is comparable to findings obtained in Pantoea bacteriamia.

Complete blood counts showed leucopenia, anemia, thrombocytopenia and high CRP matching with findings of previous case reports of neonatal infection with pantoea dispersa.[9]

CSF examination showed meningitis with clinically patient showing seizures. Previous cases of neonatal sepsis with Pantoea dispersa did not show meningitis in clinical presentation. However, meningitis have been rarely reported with other Pantoea species.

P.dispersa was identified in both CSF and blood culture which confirmed that both sepsis and meningitis was caused by same organism. P dispersa has not been isolated from CSF in previous case reports. Other species pantoea have been isolated from CSF in 2 cases of meningitis in child and adult in postsurgical patients.[14,15] This proves that P. dispersa can cause severe meningitis hence CSF examination with CSF culture should be done in these patients.

It is difficult to identify P DISPERSA accurately with conventional methods. With traditional methods the culture and characteristics of P DISPERSA are similar to enterobacteriaciceae. MALDI-TOF MS analysis performed to identify the specific species of this isolate. Result illustrated that the isolate was P DISPERSA with probability of 99.9%. This analysis can achieve species level identification with high speed, high accuracy and relatively low cost.[13]

P DISPERSA on culture sensitivity report showed sensitivity to amikacin, ciprofloxacin, colistin, gentamycin, trimethoprim sulphmethoxazole, tigecycline, chloramphenicol, doxycycline and levofloxacin.

Strain is considered a multidrug resistant if an isolate is resistant to representatives of three and more classes of antibiotics[16] This organism was resistant to Carbapenem, 3rd generation cephalosporins, antipseudomonal penicillin, B lactam and some aminoglycosides. Along with b -lactam and b-lactamase combination drugs. In the prior 2 case reports of neonatal sepsis by Meher et al pantoea dispersa this strain was sensitive to Amikacin which was similar to our report and patient showed good clinical response to Inj Amikacin.[9]

In the study done on antibiotic susceptibility patterns of Pantoea species in Iraq[17] 95% of Pantoea sp bacteria were susceptible to Imipenem which are corresponding to other studies by Tiwaril and Berih[11] and Mehar et al[9] and were treated successfully with IV Meropenem. However, in our patient organism was resistant which led to further clinical deterioration during hospital stay. According to our knowledge there are no clinical studies that have compared antibiotic regimen against Pantoea. Hence early diagnosis and antibiotic treatment with appropriate antibiotic is necessary. In our case Inj Amikacin was continued for 28 days. Baby was admitted for the total duration of 34 days and was discharged on oral feeds and off oxygen treatment with normal neurological examination.

Mortality is very high especially in preterm infants. The reported mortality among case series and case reports of Pantoea infections in NICU is 45% among which 95% infants were preterm and most common cause of mortality was septic shock and respiratory failure.[12] Mortality among sepsis Pantoea dispersa has not been established. As our patient had meningitis

however USG brain was done to look for morbidity which showed ill defined nearly symmetric hypodensities in bilateral periventricular, deep and subcortical white matter predominantly in the frontal and parietal lobes with early gliotic changes in the frontal lobe. Post-encephalitic changes have not been mentioned in previous literature.

Conclusion

Pantoea dispersa can also cause meningitis as seen in this case and warrants vigilance as the pathogen can be multidrug resistant. Early detection and appropriate antibacterial therapy can improve overall outcome and survival of these patients.

Compliance with Ethical Standards

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Conflict of Interest : None

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