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A Rare Case Report of *Sphingomonas paucimobilis* Bacteremia in a Neonate

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Abstract: ***Human infection due to Sphingomonas paucimobilis (S. paucimobilis) was first reported in 1979 and it was then named Pseudomonas paucimobilis. In 1990, it was renamed as S. paucimobilis based on the phylogenetic data. S. paucimobilis can cause a variety of infections from mild to lethal illness in both healthy and immunocompromised hosts. Early identification such unusual pathogen and optimization of the treatment according to the sensitivity pattern can avoid adverse outcome. We report a case of S. paucimobilis bacteraemia in a neonate.***

Keywords: Neonatal sepsis, rare pathogen, *Sphingomonas paucimobilis*, bacteraemia

1. Introduction

Sphingomonas paucimobilis (formerly known as *Pseudomonas paucimobilis* and CDC group IIk-1) is strictly aerobic, non-spore-forming and non-fermentative Gram negative bacillus [1]. *S. paucimobilis* has a diverse nutritional substrate spectrum and it is found in both environmental and healthcare settings [2]. *S. paucimobilis* is an opportunistic pathogen and rarely isolated from any clinical specimen [1]. The reports of this low virulence organism causing a variety of diseases has been noted since 1979 [2]-[4]. There have been reports of its association with both community acquired and nosocomial diseases including bacteraemia, catheter related infection, diarrhoeal diseases, peritonitis, meningitis, cutaneous infections, endophthalmitis, visceral infections, urinary tract infections etc. [1], [2]. In the present study we report an unusual case of primary bacteraemia by *S. paucimobilis* in a neonate.

2. Case Report

A low birth weight, non-vigorous male baby was born in our hospital on 22nd April 2019. He was full term baby delivered by vaginal route. Baby did not cry immediately after birth and liquor was meconium stained. He cried after suction and stimulation at 1.5 minutes of life, it was a poor cry. Umbilical cord was cut and clamped under aseptic conditions. Routine care was provided to the baby. APGAR score at 1 minute was 6 and at 5 minutes of life it was 9. His pulse rate was 140 beats per minute and respiratory rate 46 breaths per minute. The patient was suffering from neonatal hyperbilirubinemia with serum bilirubin 9.8mg/dl (direct bilirubin-0.3, indirect bilirubin-9.5) at 26 hours of life. Phototherapy was started to treat hyperbilirubinemia.

At 30 hrs of life, his C-reactive protein (CRP) was negative, haemoglobin-18.2 g/l, total leukocyte count was 20,800/cumm, neutrophils were 67%, lymphocytes were 28%, monocytes 3% and eosinophils 2%. In the peripheral smear, toxic granulations were seen in the polymorphs, which are suggestive of neonatal sepsis. The patient was given intravenous fluid, dextrose 10% at 4.6ml/hr. In view of the sepsis, he was started on injection cefotaxime and amikacin. Blood sugar monitoring was done at regular intervals.

Blood sample was inoculated into BacT/ALERT 3 D bottles and incubated in BacT/ALERT 3 D system (bioMerieux). The machine flashed positive for the bottle within 24 hours of incubation. Gram's stain from the culture bottle showed Gram-negative bacilli. Subculture from the bottle was done on Blood agar and MacConkey agar. On Blood agar circular, smooth, convex, raised and non-haemolytic small colonies were observed after incubation for 24 hours at 37ºC. MacConkey agar showed no growth. Gram stain from Blood agar showed Gram-negative bacilli which were sluggishly motile. The microorganism was positive for Oxidase and Catalase test, while it was negative for citrate utilization, urease test and nitrate reduction test. On TSI agar slant it showed alkaline/no change reaction with no gas and no H_2S production. The isolate was identified as *S. paucimobilis* by Vitek 2 (bioMerieux) GN card. Antibiotic susceptibility test (AST) was also done by VITEK 2. The isolate was found to be resistant to colistin while it was sensitive to most of the antibiotics tested as shown in Table 1. Patient responded well and was discharged after 6 days of treatment.

3. Tables

Table 1: Antibiotic susceptibility pattern of *S. paucimobilis* isolate

S.no.	*Antibiotic*	MIC (µg/ml)	Sensitivity
1.	Ceftriaxone	≤1	S
2.	Cefoperazone/Sulbactam	≤8	S
3.	Cefepime	≤1	S
4.	Imipenem	≤0.25	S
5.	Meropenem	≤0.25	S
6.	Gentamicin	4	S
7.	Ciprofloxacin	≤0.25	S
8.	Colistin	≥16	R
9.	Amikacin	≤2	S

Table 2: Recent case reports of *S. paucimobilis* bacteremia reported worldwide

Place/Year	Age/Sex	HA/CA	Patient outcome	Reference

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Taiwan/ 2004-2008	Patients' age ranging from 5 months to 87 years	6CA/ 10 HA	Recovery	5
Turkey/2006	Patients' age ranging from 3 years to 11 years	4HA	Recovery	7
USA/2007	Patients' age ranging from 38 years to 69 years	8HA	7 Recovery/1 mortality	11
Turkey/2010	13 new born infants	HA	12 Recovery/1 mortality	12
Taiwan/2011	13 cases	CA	12 Recovery/1 mortality	1
India/2013	1 day/M	HA	Recovery	8
India/2013	55yrs/F	CA	Recovery	2
	2yrs/M	CA	Recovery	2
Turkey/2013	24 cases in children aging 3 days to 15 yrs	13 CA/ 11 HA	Recovery	6
India/2016	10years/M	CA	Recovery	13
Indonesia/2016	55years/F	HA	Mortality	14
Colombia/2019	64years/F	HA	Recovery	15

4. Discussion

S. paucimobilis is an emerging pathogen with low virulence. The low virulence of this organism can be explained by the fact that it lacks lipo-polysaccharide layer in the cell wall and instead has sphingolipids.[2], [4] *S. paucimobilis* has been reported to cause outbreaks of bacteraemia among immunocompromised patients in haematology & oncology units, these outbreaks were possibly related to colonization of hospital water systems.[5]-[7] In hospital setting, this organism has been isolated from indwelling catheters, sterile intravenous fluid, or contaminated hospital environment such as tap and distilled water, nebulizer, ventilator, and haemodialysis device.[3], [6], [8] Community acquired infections due to *S. paucimobilis* have also been reported.[1,6] The case reported here is of a neonate born at the same facility, but the source of infection could not be traced.

Han-Siong Toh et al., showed that primary bacteremia was common presentation of *S. paucimobilis* and most of the infected patients were immunocompromised or had some underlying disease.[1] Bayram et al., have reported 24 cases of *Sphingomonas* infection in paediatric patients with a clinical presentation of primary bacteremia in 12 cases.[6] Chowdhary P et al., have reported a case of neonatal septicaemia due to *S. paucimobilis*, which is similar to our study.[8]

S. paucimobilis has variable susceptibility towards carbapenems, aminoglycosides, trimethoprim-sulfamethoxazole, piperacillin/tazobactam and is mostly resistant to penicillins and first generation cephalosporins. [2,5,6,8] Penicillins and first-generation cephalosporins resistance is due to the production of chromosomally encoded beta-lactamase.[9] Colistin resistance has been observed to be intrinsic.[10] The published results of susceptibility tests as well as the present study suggest that carbapenem alone or a third-generation cephalosporin with an aminoglycoside should be considered for the treatment of these infections.

5. Conclusion

S. paucimobilis should not be discarded as contaminant as it has been reported to cause varied clinical conditions both in immunocompromised as well as immunocompetent individuals. Therefore, this pathogen should not only be reported but also its mode of spread and source of infection should be studied extensively.

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