Journal of Advances in Medicine and Medical Research

32(7): 42-46, 2020; Article no.JAMMR.56855
ISSN: 2456-8899
(Past name: British Journal of Medicine and Medical Research, Past ISSN: 2231-0614, NLM ID: 101570965)

Hospital-acquired *Sphingomonas paucimobilis* Infection in a Neonate: A Case Report

Ahaneku Iherue Osuji[1*], Jennifer Eneyi Imaji[1], Eyinade Kudirat Olateju[2], Bissallah Ahmed Ekele[3], Nicholas Baamlong[4] and Yunusa Tahiru[5]

[1]Department of Microbiology and Immunology, University of Abuja Teaching Hospital, Gwagwalada, Abuja, Nigeria.
[2]Special Care Baby Unit, Department of Pediatrics, University of Abuja Teaching Hospital, Gwagwalada, Abuja, Nigeria.
[3]Department of Obstetrics and Gynecology, University of Abuja Teaching Hospital, Gwagwalada, Abuja, Nigeria.
[4]Department of Family Medicine, University of Abuja Teaching Hospital, Gwagwalada, Abuja, Nigeria.
[5]Department of Medical Microbiology and Parasitology, Faculty of Basic Clinical Sciences, College of Health Sciences, University of Abuja, Abuja, Nigeria.

Authors' contributions

This work was carried out in collaboration among all authors. Author AIO did the entire write up of the manuscript. Author EKO put the entire case note together. Authors AIO and JEI performed the laboratory investigations. Author YT managed the literature searches. Authors BAE and NB proofread and edited manuscript. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/JAMMR/2020/v32i730448
Editor(s):
(1) Dr. Rameshwari Thakur, Muzaffarnagar Medical College, India.
Reviewers:
(1) Sayan Bhattacharyya, India.
(2) Esra Ersoy Omeroglu, Ege University, Turkey.
Complete Peer review History: http://www.sdiarticle4.com/review-history/56855

Case Study

Received 05 March 2020
Accepted 11 May 2020
Published 24 May 2020

ABSTRACT

Introduction: The organism *Sphingomonas paucimobilis* formerly known as *Pseudomonas paucimobilis* is a strict aerobe, motile, non-spore forming, non-fermentative, Gram-negative bacillus, characterized by catalase and oxidase activities. It is an opportunistic pathogen that causes infection in healthy and immunocompromised individuals. *Sphingomonas paucimobilis* is ubiquitous and has been isolated from diverse sources including the hospital environment.

**Corresponding author: E-mail: ahanekuos@gmail.com;*

Presentation of Case: We describe the clinical characteristics, manifestations, laboratory findings and management of hospital-acquired *Sphingomonas paucimobilis* sepsis in a neonate, delivered through caesarean section and brought in from postnatal ward to special care baby unit of the University of Abuja Teaching Hospital, Gwagwalada, Abuja, Nigeria.
Discussion: The laboratory findings showed normal values for complete blood count, electrolytes, urea and creatinine but positive blood culture. *Sphingomonas paucimobilis* isolated from the blood was susceptible to Imipenem, Ampicilin-sulbatam, Azithromycin, Lincomycin, Ofloxacin, Ciprofloxacin and Sparfloxacin but resistant to Cefuroxime, Ceftazidime, Augumentin and Ampicillin. The isolation of this organism from the newborn whose laboratory tests were within normal acceptable values, and from the hospital environment is a case of hospital-acquired infection. The patient recovered and was discharged because of adequate treatment by the managing team and also low virulence of this organism.
Conclusion: The study thereby recommends adequate and consistent cleaning of the newborn and maternity units of the hospital, in particular, the entire hospital equipment and its environment using a potent disinfectant to minimize the risk of hospital-acquired infections.

Keywords: Sphingomonas paucimobilis; hospital-associated infection; neonate; Nigeria.

1. INTRODUCTION

Sphingomonas paucimobilis formerly known as *Pseudomonas paucimobilis* is a strict aerobe, motile, non-spore forming, non-fermentative, Gram-negative bacillus,characterized by catalase and oxidase activities [1]. This organism is ubiquitous and has been isolated from seawater, sea ice, river water, wastewater, mineral water and soil [2]. It has also been recovered from diverse sources in the hospital environment, including hospital water system, respiratory therapy equipment, and laboratory instruments [3]. It can cause infection in healthy as well as immunocompromised individuals [4]. Nosocomial outbreaks of *S. paucimobilis* have been reported and considered to originate from contaminated hospital environment and equipment [5,6]. *S. paucimobilis* has been isolated from blood, sputum, urine, wound, bile, cerebrospinal fluid, vagina, and cervix [7]. A great variety of community-acquired and healthcare-associated infections have been reported, in which catheter-related infection is the most common form [8]. This case report describes the clinical characteristics and manifestations of *S. paucimobilis* sepsis in a neonate at the University of Abuja Teaching Hospital Gwagwalada, Abuja, Nigeria.

2. CASE DESCRIPTION

A 12 hour old, term male neonate was brought in from the postnatal ward to the Special Care Baby Unit (SCBU) of University of Abuja Teaching Hospital, Gwagwalada, Abuja, Nigeria with complaints of repeated vomiting and neonatal jaundice. Baby was delivered by emergency caesarian section with good apgar scores 8^1 and 9^5 respectively and birth weight of 3.4 kg. Vomiting started few hours after birth and had vomited five times prior to presentation with the vomitus containing brownish effluent. Examination findings were mild respiratory distress with flaring of the nostrils but good oxygen saturation in room air (99%), mild hypothermia, mild jaundice and moderate dehydration. Baby was commenced on empirical antibiotics- Augmentin and Gentamycin, intravenous fluid and prophylactic phototherapy. On the 2nd day of admission, baby developed features of Ophthalmia neonatorum and had just one episode of vomiting; a Chloramphenicol (Gut) eye drop was added to the initial treatment. By the 3rd day of life, the clinical condition had improved significantly, jaundice had cleared, and the baby was now tolerating breast milk. As the condition remained stable, baby was maintained on Augmentin and Gentamycin until discharged after seven (7) days of admission.

Meanwhile, laboratory investigations such as blood culture, full blood count, electrolytes, urea, and creatinine were ordered by the managing team. The samples were collected aseptically into ethylene diamine tetra acetic acid (EDTA), plain and blood culture bottles and sent to the various laboratories for processing. The sample for full blood count was processed using a well-mixed EDTA sample and analyzed with a mythic hematology auto analyzer. A thin blood film was made and used to describe blood morphology. The clinical chemistry tests were processed using serum obtained from the sample collected in a plain bottle. This was processed using Labjeniks Ion selective electrode (ISE) for

electrolytes and Selectra chemistry analyzer (ELITech Group, France) for urea and creatinine. The blood culture (Bi-state culture medium, China) was processed by first incubating for 24hrs from the time of delivery to the Microbiology laboratory. This was followed by a dual inoculation into chocolate and Cystine Lactose Electrolyte Deficiency (CLED) agars and were incubated aerobically and anaerobically for another 24 hrs at 37ºC, allowing for the growth of the organisms. The culture yielded moist, grey, 1-2 mm colonies on chocolate agar and non lactose fermenting colonies on the CLED agar on aerobic incubation. Gram staining was performed from the grown organism which gave a Gram-negative bacillus. Further identification was done using the Vitek 2 machine (bioMerieux, France). The organism was identified as *Sphingomonas paucimobilis* at 99% probability. Antimicrobial susceptibility testing of the isolate was done by disc diffusion technique as described by Clinical and Laboratory Standards Institute (CLSI) technical manual [9]. The antibiotics used include: Cefuroxime 30 ug Oxoid, Ciprofloxacin 5 ug Oxoid, Augmentin 30 ug Oxoid, Imipenem 30 ug Oxoid, Vancomycin 30 ug Oxoid, Ampicillin 10 ug Oxoid, Azithromycin 15 ug Oxoid, Ampicillin-sulbactam 30 ug Oxoid, Lincomycin 5 ug Oxoid, Ofloxacin 5 ug Oxoid and Sparfloxacin 5 ug Oxoid.

Samples taken from the SCBU environment such as swab from the floor, work surface, water from the tap and other equipment used in treating the baby were cultured and identified as S. *paucimobilis*. Other organisms isolated from the environment include *Pseudomonas aeroginosa* and *Staphylococcus epidermidis.* The summary of the laboratory results and the interpretations are presented in Table 1.

3. RESULTS

The results of the hematology, clinical chemistry and microbiological tests performed on the patient including environmental testing of the newborn unit are presented in Table 1.

Table 1. Results of laboratory investigations performed

Test profile	Results	Interpretations
Hematology (Full Blood Count)	WBC: 13.3×10^{9}/l, RBC: 4.12×10^{12}, HGB:13.6 g/dl, PCV:42%, MCV: 102.4fl, MCH: 33.0pg, MCHC: 32.2 g/dl, PLAT 284×10^{9}/l, Neutrophils: 54%, Lymphocytes: 42% Monocytes:2%, Eosinophils: 2% Basophils: 0% Blood film report: Mild poikilocytes, target cells and anisocytosis were observed. Platelets and white blood cells appeared normal and adequate.	Normal values for neonates
Clinical Chemistry (Electrolytes, Urea and Creatinine)	Sodium: 135 mmol/L, Potassium: 5.6 mmol/L, Chloride: 104 mmol/L, Bicarbonate: 15 mmol/L, Urea: 16.8 mmol/L, Creatinine: 67.2 umol/L	Normal values for neonates
Microbiology (Blood Culture and Antibiogram)	Gram negative bacilli identified using Vitek machine with excellent identification (99% Probability). Antibiotics susceptibility testing showed sensitivity to: Imipenem, Ampicilin-sulbatam, Azithromycin, Lincomycin, Ofloxacin, Ciprofloxacin and Sparfloxacin. Resistance to: Cefuroxime, Ceftazidime, Augumentin and Ampicillin	*Sphingomonas paucimobilis* isolated with good Antibiogram

Test profile	Results	Interpretations
Microbiological Examination of the environment/Equipment at Special Care Baby Unit	Before Disinfection Staphylococcus spp. *Pseudomonas aeroginosa* and *Sphingomonas paucimobilis were* isolated After Cleaning with Hypochlorite Solution: No Bacterial growth	Indication of Hospital-Acquired infection

Key: WBC- White blood cells; RBC: Red blood cells; PCV: Pack cell volume; MCV: Mean cell volume; MCH: Mean cell hemoglobin; PLAT: Platelets

4. DISCUSSION

Sphingomonas paucimobilis is an opportunistic pathogen that rarely causes infection in humans because of its low virulence. It has a unique sphingoglycolipid in the cell wall and lacks the lipopolysaccharide component along with its endotoxin activity. This could be the explanation for the low virulence of this organism [4]. Isolation of *Sphingomonas paucimobilis* organism from a neonate and work environment at Special Care Baby Unit of UATH is clear evidence that the infection is hospital-acquired. Although it is known to have a low virulence, it may cause bacteremia, septicemia and community-acquired pneumonia with a high mortality potential [7,10].

The results of laboratory investigations showed that the electrolytes, urea and creatinine levels, as well as the full blood count, were within the normal acceptable ranges for the neonate. The patient responded well to the prescribed antibiotics and other treatment administered and was discharged from the unit. The dramatic response could be attributed to the low pathogenicity of the organism as well as protection from the mother's breast milk taken by the baby. Our result shows that the patient contracted this infection from the hospital, possibly from the postnatal/labour ward or newborn unit. The newborn unit was subjected to intensive cleaning using hypochlorite solution to stop further spreading of nosocomial infection. Cultures of the environmental samples after 2 weeks of cleaning with hypochlorite solution showed no bacterial growth indicating the potency of the hypochlorite solution. The baby responded well to amoxicillin potentiated clavulanic acid with gentamycin and was discharged a few days later. Though the virulence of this organism is low, a case of death has been reported in a premature neonate [11]. and a 55 year old female who presented with an ulcer on the sole of the left foot with irreversible septic shock as the cause of death caused by *Sphingomonas paucimobilis*. Therefore efforts should be put in place to prevent infection by this organism.

5. CONCLUSION AND RECOMMENDATIONS

In conclusion, this is a case of hospital-associated infection as the infectious agent was isolated from both the patient and the environment. This organism is an emerging pathogen and should not be discarded as a contaminant. The study thereby recommends adequate and consistent cleaning of newborn and maternity units of the hospital in particular, the entire hospital equipment and its environment using a potent disinfectant to minimize the risk of hospital-acquired infections.

6. LIMITATIONS OF THE STUDY

The molecular methods were not used for the identification of this organism because of limited fund as this project was solely funded by the researchers.

CONSENT AND ETHICAL APPROVAL

Ethical approval was obtained from the health research ethics committee of University of Abuja Teaching Hospital, with Protocol number: UATH/HREC/PR/2020/4/004 and approval number: UATH/HREC/PR/2020/004. Informed consent was obtained from the mother of the child for the publication of this case report.

FUNDING

The study was principally funded by the authors as there was no grant or sponsorship from any organization.

ACKNOWLEDGEMENTS

The authors were grateful to all Staff of SCBU, Microbiology, Hematology and Clinical Chemistry

departments of the University of Abuja Teaching Hospital Gwagwalada, Abuja that provided logistics support during the study. This paper has been presented as poster at 2nd National and Regional conference of Nigerian Biological Safety Association held on 18th- 23rd November, 2019 at International Conference Centre Abuja, Nigeria.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Ryan MP, Adley CC. *Sphingomonas paucimobilis*: A persistent gram-negative nosocomial infectious organism. Journal of Hospital Infection. 2010;75:153–157.
2. Yabuuchi E, Yano I, Oyaizu H, Hashimoto Y, Ezaki T, Yamamoto H. Proposals of *Sphingomonas paucimobilis* gen. nov. and *comb. nov., Sphingomonas parapaucimobilis sp. nov., Sphingomonas yanoikuyae sp. nov., Sphingomonas adhaesiva sp. nov., Sphingomonas capsulata comb. nov.,* and two genospecies of the genus *Sphingomonas.* Microbiology and Immunology. 1990;34: 99-119.
3. Holmes B, Owen RJ, Evans A, Malnick H, Willcox WR. *Pseudomonas paucimobilis*, a new species isolated from human clinical specimens, the hospital environment and other sources. International Journal of Systematic Bacteriology. 1977;27:133–146.
4. Bayram N, Devrim L, Apa H, Gulfidan G, Turkyilmaz HN, Guynay L. *Spingomonas paucimobilis* infection in children: 24 case reports. Mediterranean Journal of Hematology and Infectious Diseases. 2013;5(1):e2013040.
5. Meric M, Willke A, Kolayli F, Yavuz S, Vahaboglu H. Water-borne *Sphingomonas paucimobilis* epidemic in an intensive care unit. Journal of Infection. 2009;58:253-255.
6. Bourigault C, Daniel L, Jourdain S, Hardy E, Heriaud K, Virmaux M. Contamination with *Sphingomonas paucimobilis*: About seven cases isolated in conservation and transport mediums of corneal grafts. Pathological Biology (Paris). 2007;55:127-130.
7. Lin JN, Lai CH, Chen YH. *Sphingomonas paucimobilis* bacteremia in humans: 16 case reports and a literature review. Journal of Microbiology, Immunology and Infection. 2010;43(1):35–42.
8. Cheong HS, Wi YM, Moon SY, Kang CI, Son JS, Ko KS. Clinical features and treatment outcomes of infections caused by *Sphingomonas paucimobilis*. Infection Control and Hospital Epidemiology. 2008;29:990-992.
9. Clinical and Laboratory Standards Institute (CLSI). Performance standards for antimicrobial susceptibility testing. 29th Ed. Supplement M100. Wayne PA: Clinical and Laboratory Standard Institute. 2019;1-25.
10. Tai ML, Velayuthan RD. *Sphingomonas paucimobilis*: An unusual cause of meningitis-case report. Neurologia Medico-Chirurgica (Tokyo). 2014;54:337–340.
11. Mutlu M, Bayramoglu G, Yilmaz G, Saygin B, Aslan Y. Outbreak of *Sphingomonas paucimobilis* septicemia in a neonatal intensive care unit. Indian Pediatrics. 2011;48(9):723–725.

Peer-review history:
The peer review history for this paper can be accessed here:
http://www.sdiarticle4.com/review-history/56855