

Primary Bacteremia Caused by *Rhizobium radiobacter* in Neonate: A Rare Case Report

SHREEKANT TIWARI¹, SIBA SHANKER BERIHA²

ABSTRACT

Rhizobium radiobacter is a gram-negative tumourigenic plant pathogen that rarely causes infections in humans. *Rhizobium radiobacter* has a strong predilection to cause infection particularly in those patients who have long standing indwelling foreign devices. Herewith we report a rare case of *Rhizobium radiobacter* bacteremia in a new born baby without other risk factors. The patient was successfully treated with gentamicin and imipenem. To the best of our knowledge this is the first documented case of *R. radiobacter* from India causing neonatal infection.

Keywords: Gentamicin, Imipenem, Newborn

CASE REPORT

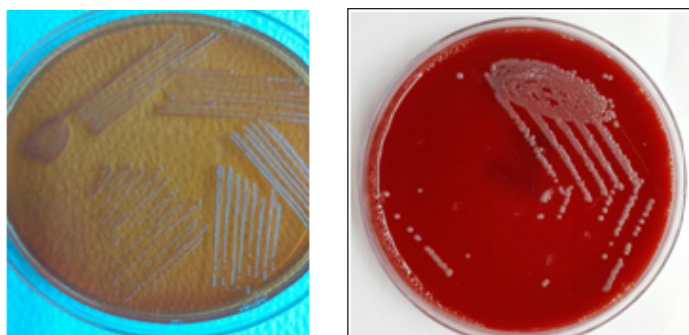
A four-day-old male baby, delivered vaginally at term in our hospital, was shifted to neonatal intensive care unit (NICU) for better management when he presented with fever, lethargy, refusal to feed and tachypnoea. Mother of the baby was a 22-year-old gravida 2 and para 1 belonging to a rural area. Prenatal history of the mother was uneventful. Routine prenatal laboratory screening was unremarkable. There was history of premature rupture of membrane around 6-8 hours before delivery. No foul smelling discharge was noted from vagina. Baby was delivered vaginally and the Apgar score was 8 at 1 minute and 9 at 5 minutes. The baby was apparently all right for the next 3 days and on 4th day he presented with fever (100°F), lethargy, refusal to feed, tachypnoea and decreased oxygen saturation (up to 70%). He was immediately transferred to NICU. Blood sample was collected with complete aseptic precaution into aerobic and anaerobic paediatric blood culture bottle (Bact/alert/3D; Biomerieux, Mercy l' Etoile. France). Patient was then started empirically on a combination of gentamicin and vancomycin. Aerobic blood sample beeped positive 3 hours after incubation. Aliquot of broth was sub-cultured on Mac-Conkey agar and 10% sheep blood agar. After overnight incubation non-lactose fermenting translucent colony with 1-2 mm in size was grown on Mac-Conkey agar [Table/Fig-1]. Blood agar also showed similar colony morphology but was non haemolytic [Table/Fig-2]. Isolate was identified as *Rhizobium radiobacter* with 98% probability by VITEK-2 (fully automated identification system) Using gram negative card (Biomerieux, Mercy-l' Etoile, France). The isolate was found to be sensitive to gentamicin, amikacin, cefotaxime,

ceftriaxone, cefepime, ciprofloxacin, imipenem, meropenem, Piperacillin+tazobactam, levofloxacin, Ticarcillin+clavulinic acid and resistant to cotrimoxazole and aztreonam. After getting the sensitivity report therapy was changed to gentamicin 4mg/kg/dose daily and imipenem 25mg/kg/dose 8 hourly for 10 days. Other laboratory parameters were: total leukocyte count-21000/cmm, neutrophil-90%, lymphocyte count-10%, C-reactive protein-2.3mg/dl, haemoglobin-10 gm%. Anaerobic culture bottle showed no growth so it was reported as no growth after 7 days. One week after completion of therapy a repeat blood culture was done and no microorganisms were grown. Baby is seven-month-old now and during follow up it was found that he is growing well.

DISCUSSION

Bacteria from the genus *Rhizobium* (formerly *Agrobacterium*) are plant pathogens and usually associated with tumourigenic disease in plants [1]. Genus *Rhizobium* contains five species (i.e. *Rhizobium radiobacter*, *Rhizobium rhizogenes*, *Rhizobium rubi*, *Rhizobium undicola* and *Rhizobium vitis*) out of which *Rhizobium radiobacter* has been recognized as a most common opportunistic human pathogen [2]. Infections due to *R. radiobacter* are strongly related to the presence of foreign plastic materials [3]. Most commonly the human infections are community acquired. Catheter related bacteremia, continuous ambulatory peritoneal dialysis peritonitis, urinary tract infections and rarely endophthalmitis, endocarditis, brain abscess and pneumonia are the most common clinical conditions caused by these bacteria [4]. Before 1977, the growth of *Rhizobium* species was mostly considered as laboratory contaminants or colonization rather than true infection [5]. It was only in the 1980s that the microorganisms was accepted as a cause of infection in humans, especially those carrying silicone tubes with which these organisms have marked propensity for adhesion. Now it is recognized as an emerging opportunistic pathogen affecting mostly immunocompromised and chronically debilitated host with underlying conditions such as malignancies, chronic renal failure (CRF), human immunodeficiency virus (HIV) as well as bone marrow transplant recipients. Corticosteroid therapy and diabetes have also been identified as predisposing factors [5,6].

After a thorough review of medical literature we found that around 12-14 cases of *R. radiobacter* infection in children were reported, but out of which not a single case from India [4,7-9]. From India, the first case of *R. radiobacter* infection was documented by



[Table/Fig-1]: Non-lactose fermenting, translucent colony of *Rhizobium radiobacter* on Mac-Conkey agar **[Table/Fig-2]:** Non haemolytic colony of *Rhizobium radiobacter* on blood agar

Sood et al., in a 51-year-old male. In a neonate this is the first case report from India. This bacterium has an ability to adhere to silicone surface by producing extracellular slime which explains its predilection to indwelling devices [1]. Though in most of the cases removal of foreign devices was required to treat bacteremia, in many cases only antibiotic therapy without the removal of devices was also successful [1,3,5]. Although there is no uniform opinion for the catheter removal, however it is recommended when there is clinical deterioration or the culture remains positive 48 hours after initiating treatment [10].

Rhizobium radiobacter bacteremia associated to central venous catheter is the most common presentation [10]. There is very few case report of *R. radiobacter* bacteremia in new born infant without other risk factors such as central venous catheter or known immunodeficient conditions. One such case was reported by Kaselitz TB et al., [9]. In our case there was bacteremia but without any other risk factors such as indwelling plastic devices. It may be possible that the *Rhizobium radiobacter* isolated from our patient was not a true pathogen. As *R. radiobacter* is not common contaminants of blood culture, and no other cause of his clinical deterioration was identified, and also patient responded very well to antibiotic therapy. All these circumstances suggest that it may be a case of primary immunodeficiency.

There are no clinical trials on the optimal therapy for *Rhizobium radiobacter* infection due to its low virulence and incidence. Based on local antimicrobial susceptibility pattern it was found that *Rhizobium radiobacter* is most commonly sensitive to 3rd generation cephalosporins, aminoglycosides, fluoroquinolones and carbapenems [1,5,11]. Previous study showed that gram-negative bacilli usually develop resistance to single antimicrobial agent in about 10% of the cases [12]. The susceptibility report in our patient was consistent with previous reports. Ceftriaxone and carbapenems are the antibiotics of choice in children as ciprofloxacin is unsafe due to its adverse effect on the growth of cartilage and tendons [4].

No death has been attributed directly to *R. radiobacter* infection in any of the reported cases [1,6,9]. Our patient had no evidence of disseminated disease and did not demonstrate any long-term consequences of infection. We believe that our patient being a neonate and the immune system not being properly developed, this

primary immunodeficiency status might have played a role in the development of the infection.

CONCLUSION

Rhizobium radiobacter is an emerging opportunistic pathogen mainly affecting immunocompromised children. Though it has a low virulence but it's highly susceptibility pattern to many antibiotics appears to be consistently successful for treatment. Usually appropriate antimicrobial therapy and removal of foreign devices is necessary to control infection but as in our case there was bacteremia without any other risk factors. So our case may be a clue or eye opener to the clinicians that *R. radiobacter* infection may occur even without any other risk factors.

REFERENCES

- [1] Oncel EK, Ozsurekci Y, Aytac S, Kara A, Cengiz AB, Ceyhan M. Implantable vascular access port associated bloodstream infection caused by *Rhizobium radiobacter*: a case report. *The Turkish J Pediatr*. 2013;55:112-15.
- [2] Lai CC, Teng LJ, Hsueh PR, et al. Clinical and microbial characteristics of *Rhizobium radiobacter* infections. *Clin Infect Dis*. 2004;38:149-43.
- [3] Christakis GB, Alexaki P, Alvizatos AS, et al. Primary bacteraemia caused by *Rhizobium radiobacter* in a patient with solid tumours. *J Med Microbiol*. 2006;55(10):1453-56.
- [4] Mantadakis E, Kondi A, Christidou A, Kalmanti M. *Agrobacterium radiobacter* bacteremia in a child with acute lymphoblastic leukemia. *World J Pediatr*. 2010;6:181-84.
- [5] Paphitou NI, Rolston KV. Catheter-related bacteremia caused by *Agrobacterium radiobacter* in a cancer patient: case report and literature review. *Infection*. 2003;31:421-24.
- [6] Sood S, Nerukar V, Malvankar S. Catheter associated bloodstream infection caused by *Rhizobium radiobacter*. *Indian J Med Microbiol*. 2010;28(1):62-64.
- [7] Edmond MB, Riddler SA, Baxter CM, Wicklund BM, Pasculle AW. *Agrobacterium radiobacter*: a recently recognized opportunistic pathogen. *Clin Infect Dis*. 1993;16:388-91.
- [8] Roliides E, Mueller BU, Letterio JJ, Butler K, Pizzo PA. *Agrobacterium radiobacter* bacteremia in a child with human immunodeficiency virus infection. *Pediatr Infect Dis J*. 1991;10:337-38.
- [9] Kaselitz TB, Hariadi NI, Lipuma JJ, Weinberg JB. *Rhizobium radiobacter* bacteremia in a neonate. *Infection*. 2012;40:437-39.
- [10] Amaya RA, Edmonds MS. *Agrobacterium radiobacter* bacteremia in padiatric patients: Case report and review. *Pediatr Infect Dis J*. 2003;22:183-86.
- [11] Plotkin GR. *Agrobacterium radiobacter* prosthetic valve endocarditis. *Ann Intern Med*. 1980;93:839-40.
- [12] Erol Cipe F, Dogu F, Sucuoglu D, Aysev D, Ikinociogullari. Asymptomatic catheter related *Rhizobium radiobacter* infection in a haploidentical hemapoetic stem cell recipient. *J Infect Dev Ctries*. 2010;4:530-32.

PARTICULARS OF CONTRIBUTORS:

1. Associate Professor, Department of Microbiology, Hi-Tech Medical College & Hospital, Bhubaneswar, Odisha, India.
2. Assistant Professor, Department of Paediatrics, SVBP Post Graduate Institute of Paediatrics, Shishu Bhawan, Cuttack, Odisha, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Shreekant Tiwari,
Kathagola Sahi, Mangalabag, Cuttack, Odisha-753001, India.
E-mail : drshreekant@rediffmail.com

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