Case Report

*Rahnella aquatilis* Sepsis in a Premature Newborn

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Received 16 February 2015; Revised 21 April 2015; Accepted 6 May 2015

Academic Editor: Giovanni Montini

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*Rahnella aquatilis* is an infrequently isolated Gram-negative rod within the Enterobacteriaceae family. The organism’s natural habitat is water [1]. The organism is rarely isolated from clinical specimens and it seldom causes infection in immunocompetent individuals. The infections ascribed to this organism are bacteremia, sepsis, respiratory infection, urinary tract infection, wound infections in immunocompromised patients, and infective endocarditis in patients with congenital heart disease. Here we present a one-month-old boy who was born prematurely at 27th week of gestation by cesarean section with a birth weight of 730 g. He developed sepsis caused by *Rahnella aquatilis* during the treatment for ventilator associated pneumonia due to *Stenotrophomonas maltophilia* with ciprofloxacin. He was successfully treated with a combination of amikacin plus meropenem. Although *R. aquatilis* is one of the *saprophyticus* organisms, it may cause life-threatening infection in newborn.

1. Introduction

*Rahnella aquatilis* is an infrequently isolated Gram-negative rod within the Enterobacteriaceae family. The organism’s natural habitat is water [1]. The organism is rarely isolated from clinical specimens and it seldom causes infection in immunocompetent individuals. The infections ascribed to this organism are bacteremia, sepsis, respiratory infection, urinary tract infection, wound infections in immunocompromised patients, and infective endocarditis in patients with congenital heart disease. Here we present a one-month-old boy who was born prematurely at 27th week of gestation by cesarean section with a birth weight of 730 g. He developed sepsis caused by *R. aquatilis* despite ciprofloxacin according to ventilator associated pneumonia caused by *Stenotrophomonas maltophilia*. The mother who underwent bone marrow transplantation 3 years before pregnancy for essential thrombocytosis had reportedly preeclampsia during the last trimester.

2. Case

He was born prematurely at 27th week of gestation by cesarean section with a birth weight of 730 g, APGAR score 8 at 1 minute and 7 at 5 minutes. He was supported by mechanical ventilator for respiratory distress syndrome and was given parenteral nutrition by an umbilical venous catheter. Because of CRP of 10 mg/L and platelets count of 170,000/μL, ampicillin and gentamicin were initiated for suspected septicemia on the first day of his life. There were not any positive cultures (Table 1). On the second postnatal day, after the increase in both oxygen demand and pressure requirement as well as laboratory findings including leukocytes count of 30,000/μL, platelets count of 80,000/μL, and CRP of 42.4 mg/L, the antibiotic regimen was replaced by vancomycin and cefepime (Table 1). Meanwhile on echocardiography, patent ductus arteriosus was determined; then ibuprofen was added. However ibuprofen was discontinued because of side effects such as increased creatinine and thrombocytopenia.

On the 4th postnatal day, fluconazole prophylaxis was given to prevent invasive fungal infection. On the 8th postnatal day, he was extubated but he needed reintubation on the same day. Despite therapy, we observed deep thrombocytopenia (5,000/μL), leukocytes count of 1,000/μL, CRP of 120 mg/L, and clinical deterioration including abdominal distension and hypotension and, thus, cefepime was replaced by meropenem and liposomal amphotericin B as
well as intravenous immunoglobulin. An adjuvant therapy was added to antimicrobial regimen (Table 1). At the same time no pathologic finding was found. Any additional finding with respect to necrotizing enterocolitis was not also found. Then, his clinical picture improved.

However, on the 14th postnatal day, his clinical picture deteriorated again. The umbilical venous catheter was removed. Because he developed suspected pneumonia, the antimicrobial treatment was replaced by linezolid, meropenem, and liposomal amphotericin B. Moreover findings were considered as atelectasis, so the appropriate therapy was given (Table 1). On the 19th postnatal day his clinical picture was noted to improve; therefore he was extubated and any microorganism was not isolated from all cultures, so linezolid was stopped. Meropenem and liposomal amphotericin B were continued.

On the 21st postnatal day apnea and bradycardia occurred. He was supported by mechanical ventilator. Ciprofloxacin was added to liposomal amphotericin B, because *Stenotrophomonas maltophilia* was isolated from endotracheal aspirate culture at the time of clinical deterioration. On the 25th postnatal day, since leukocytes count was 21000/μL, it was determined that platelets count was 33,000/μL and CRP 110 mg/L. Vancomycin was added to antimicrobial regimen, including ciprofloxacin. Liposomal amphotericin B was discontinued. Ceftazidime was added to antimicrobial treatment according to antibiogram susceptibility, because *Stenotrophomonas maltophilia* was isolated in endotracheal aspirate culture again. At the same time echocardiography did not show any pathologic findings suggesting endocarditis and patent ductus arteriosus was closed. Meanwhile *Rahnella aquatilis* resistant to piperacillin and cephalosporins, and susceptible to carbapenems and aminoglycosides, was isolated from both blood cultures taken on 22nd and 23rd day were resulted in on 26th day. *Rahnella aquatilis* was isolated from blood cultures. The patient was successfully treated with a combination of amikacin plus meropenem for 21 days. His clinical picture and laboratory findings returned normal. Upon starting full enteral feeding, he was discharged from the hospital.

### Table 1: All the patient’s significant laboratory/microbiological findings and the corresponding therapeutical changes.

| Postnatal day | Clinical picture                                                                 | Leukocytes count (μL) | Platelets count (μL) | CRP (mg/L) | Culture          | Treatment                                                                 |
|---------------|----------------------------------------------------------------------------------|-----------------------|----------------------|------------|-----------------|----------------------------------------------------------------------------|
| 1st day       | Suspected septicemia                                                             | 40,000                | 170,000              | 10         | Negative        | Ampicillin and gentamicin                                                  |
| 2nd day       | Increasing in both oxygen demand and pressure requirement                        | 30,000                | 80,000               | 42.4       | Negative        | Vancomycin and cefepime                                                   |
| 8th day       | Need for reintubation, abdominal distension, and hypotension                     | 1,000                 | 5,000                | 120        | Negative        | Meropenem and liposomal amphotericin B                                    |
| 14th day      | Pneumonia and atelectasis?                                                       | 23,000                | 150,000              | 36         | Negative        | Linezolid was added                                                       |
| 21st day      | Pneumonia, oxygen desaturation, increasing ventilation demand, and suctioning    | 28,000                | 110,000              | 89         | *S. maltophilia* | Ciprofloxacin was added to liposomal amphotericin B                      |
| 25th day      | Pneumonia, oxygen desaturation, increasing ventilation demand, and suctioning    | 21,000                | 33,000               | 110        | Vancomycin and  | Ciprofloxacin and cefazidime were added to ciprofloxacin; liposomal       |
|               | requirement                                                                       |                       |                      |            | cefazidime were added | amphotericin B was discontinued                                           |
| 26th day      |                                                                                  |                       |                      |            | The blood cultures | Meropenem and amikacin for 21 days                                        |
|               |                                                                                  |                       |                      |            | taken on 22nd and | was isolated from blood cultures                                          |
|               |                                                                                  |                       |                      |            | 23rd day were    | *Rahnella aquatilis* resistant to piperacillin and cephalosporins, and   |
|               |                                                                                  |                       |                      |            | resulted in on   | susceptible to carbapenems and aminoglycosides, was isolated from both     |
|               |                                                                                  |                       |                      |            | 26th day.       | blood cultures taken on 2nd day and 3rd day of ciprofloxacin; the         |
|               |                                                                                  |                       |                      |            | *Rahnella aquatilis* | antimicrobial regimen was changed to meropenem and amikacin (Table 1).    |
|               |                                                                                  |                       |                      |            | was isolated     | The patient was successfully treated with a combination of amikacin plus   |
|               |                                                                                  |                       |                      |            | from blood cultures | meropenem for 21 days. His clinical picture and laboratory findings        |
|               |                                                                                  |                       |                      |            |                 | returned normal. Upon starting full enteral feeding, he was discharged    |
|               |                                                                                  |                       |                      |            |                 | from the hospital.                                                        |

### 3. Discussion

*Rahnella aquatilis* is environmental bacteria commonly isolated from water [1]. To our knowledge, there are 18 reports...
in the literature about human infection caused by R. aquatilis. The majority of these suggested that the infection had been accompanied by diabetes mellitus, alcoholism, cancer, AIDS, and immunosuppression secondary to medications, suggesting that the microorganism may have been an opportunistic pathogen. However, 5 reported cases were in nonimmunosuppressed patients [1–5]. The organisms were isolated from blood [1–4, 6–12], wounds [5, 8], urine [8, 13–15], the respiratory tract [8, 16], and stool cultures [8]. In our patient, considering the patient’s clinical deterioration, R. aquatilis was accepted as active agent because it reproduced in the separate blood cultures. The origin of the R. aquatilis strain isolated from our patient is unclear. There were no other reported R. aquatilis infections in the hospital during his time there. We did not think of an outbreak due to R. aquatilis, so newborn intensive care unit water was not tested for R. aquatilis. Our patient was successfully treated with a combination of amikacin plus meropenem. Although R. aquatilis is one of the saprophyticus organisms, it may cause life-threatening infection in newborn, especially early preterm and very low birthweight babies.

Conflict of Interests

The authors declare no conflict of interests.

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