Bloodstream infection with *Kocuria rhizophila*: A case report and review of literature

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Abstract

Background: *Kocuria rhizophila* is a Gram-positive microorganism, which has recently been known as an organism that can cause infection in humans. However, the reports regarding this organism and its possibility to cause severe infections in children are relatively limited.

Case Presentation: On October 28th, 2018, a 30-day old boy presented to the Maternity & Children's Hospital, Abha City, Saudi Arabia, with a history of cough and shortness of breath for two days, followed by apnea and cyanosis. On clinical examination, he was in moderate respiratory distress with compensated shock. He developed supraventricular tachycardia, which was controlled by adenosine. He was admitted to the Pediatric Intensive Care Unit (PICU). Blood culture showed positive growth with *Kocuria rhizophila*, sensitive to Gentamicin, Erythromycin, and Moxifloxacin. The patient developed respiratory distress and needed non-invasive respiratory support. At that time, antibiotics were upgraded with no significant improvement of clinical condition till Gentamycin was added on the second day, which led to a dramatic response and the patient was shifted from PICU to the pediatric medical ward.

Conclusion: *K. rhizophila* can cause severe infections in pediatric patients that necessitate PICU admission. Therefore, it should be considered as a true pathogen and proper treatment should be provided to all susceptible pediatric patients.

Key words: *Kocuria rhizophila*, pediatrics, Gentamycin; respiratory distress.

Introduction

Kocuria rhizophila is a Gram-positive coccus that relates to the family Micrococcaceae in the order Actinomycetales (1). It was found in the rhizosphere of a narrow leaf cattail (*Typha angustifolia*) and chicken meat treated with oxalic acid; also, in contaminated dust, fresh water and food (2). It lives on healthy skin and mucous membranes of humans and animals (3). Moreover, it can cause infection in immunocompromised patients with severe underlying diseases. Infection by *K. rhizophila* is underestimated and its clinical pathogenic potency is still doubtful (4).

Here, we present a case of bloodstream infection caused by *Kocuria rhizophila*. Because of its ability to cause severe infection and increased antibiotics resistance in hospitalized patients it should not be ignored as a contaminant.

Case Report

On October 28th, 2018, a 30-day old boy presented to the Maternity & Children's Hospital, Abha City, Saudi Arabia. The baby boy, who had been previously medically free, presented to our hospital with cough, shortness of breathing for two days followed by one episode of cessation of breathing associated with cyanosis on the day of presentation. He had a history of diarrhea and vomiting one day before admission associated with decreased oral intake and activity.

The patient was a product of a late preterm pregnancy through normal spontaneous vaginal delivery with no neonatal intensive care unit admission. He received his birth vaccines and was fed by breast and bottle. Parents are non-consanguineous, with four healthy siblings.

Initially, the patient was conscious, sick-looking, with moderate respiratory distress and severe dehydration. Vital signs assessment revealed temperature: 37.3˚C, heart rate: 240 beats/min, blood pressure: 83/47 mmHg, respiratory rate: 50 breaths/ minute, oxygen saturation: 82-86% in room air, with delayed capillary refill time.

The patient was connected to oxygen through nasal prongs and maintained with 2L oxygen, normal saline bolus was given, and adenosine was received. Infection workup was performed including blood culture. Antibiotics (Ampicillin and Cefotaxime) were started. The patient was admitted to PICU as a case of controlled supraventricular tachycardia (SVT) with compensated septic shock.

Regarding investigations: Complete blood count (CBC): White blood counts: 14.19×109/L mainly neutrophils (59.5%), hemoglobin: 18.5 gm/dL, hematocrit: 52.6%, platelets: 184,000 platelets per microliter), renal function tests: (urea: 23 mg/dL, creatinine: 0.34 mg/dL, calcium: 8.4 mg/dL, phosphorus: 3.1 mg/dL, magnesium: 1.8 mg/dL, sodium: 137 mEq/dL, potassium: 4.5 mEq/dL), C-reactive protein: 1.6 mg/dl.

Blood culture revealed *Kocuria rhizophila,* sensitive to Gentamicin, Moxifloxacin and Erythromycin. The VITEK 2 system (BioMérieux, Inc, Hazelwood, Mo.) was used to confirm the identity of the bacteria. Chest x-ray and electrocardiogram were normal. Cerebrospinal fluid study was refused by the family.

Four days after admission, the patient developed respiratory distress and was connected to BiPAP and antibiotics were upgraded to Meropenem and Linezolid, with no significant improvement in his clinical condition.

On the next day, Gentamicin was added, based on results of previous blood culture. On the second day of starting gentamicin, the patient showed dramatic response with normalization of respiratory rate and discontinuation of BiPAP. Repeated blood cultures showed no growth. Then the patient was shifted to the pediatric medical ward. A Holter monitor was connected, with no more episodes of SVT. Our patient completed the course of antibiotics for seven days then was discharged in a good condition.

Discussion

To the best of our knowledge, the current case is the first bloodstream infection with *Kocuria rhizophila* to be reported in Saudi Arabia. *K. rhizophila* bacteria were considered as contaminants, and were rarely associated with infection. Nevertheless, recently, the incidence of infections caused by *Kocuria* spp. has increased, with subsequent consumption of patient's health and medical resources (1, 2, 4-6).

Kocuria rhizoplila is one of several species of *Kocuria*. It is a Gram-positive coccus in the phylum Actinobacteria, class *Actinobacteria*, order *Actinomycetales*, suborder *Micrococcinae* and family *Micrococcaceae* (1). Interestingly, chicken meat treated with oxalic acid can be used as a medium for growing the organism (3, 4). Contact with contaminated meat and dust is considered as a source of infection (4). The possibility of invasive devices used in hospitalized patients, especially the central venous catheter line, as a portal of entry, was also considered (4). Meningitis, brain abscess, bacteremia, urinary tract infection, cholecystitis, peritonitis, and endocarditis are infections that can be caused by *Kocuria rhizophila* (6-9).

The risk factors predisposing to infection by *Kocuria* spp. include gastrointestinal abnormalities (e.g., short bowel syndrome), chronic catheterization (in cases of total parenteral nutrition), malignancies (e.g., acute myelogenous leukemia, non-Hodgkin's disease) and patients on peritoneal dialysis secondary to end-stage renal disease (6-9).

There are few reported cases of *K. rhizophila.* The first case of *K. rhizophila* infection was reported in an eight-year-old boy with methylmalonic aciduria with subcutaneous implantable vascular access port. He suffered from multiple sepsis episodes for more than two years and port-A-cath was represented as a source of infection (4). They used

16s rRNA gene sequence analysis to confirm the presence of *K. rhizophila* (4). Also, they covered the patient with antibiotics in each time of sepsis, but he showed response and recovery from sepsis after they changed the port-A-cath (4).

Moissenet et al. reported a case of *K. rhizophila*, who presented as persistent bloodstream infection associated with a damaged central catheter in a 3-year-old girl with Hirschsprung's disease (5).

Our 30-day old case presented with apnea, supraventricular tachycardia, and sepsis. Blood culture showed *Kocuria rhizophila* identified by using the VITEK 2 system. It was sensitive to Gentamicin, Moxifloxacin, and Erythromycin. After starting treatment with Gentamicin, the patient showed dramatic improvement.

The identification of *Kocuria* is still difficult due to the high cost and unavailability of molecular typing with the need for specialized laboratory services. Moreover, the misidentification of coagulase-negative staphylococcus as *Kocuria* species mandates use of molecular methodology (10).

Nonhoff et al. (11) reported that the Vitek 2 system identified 95% of isolates correctly, detected oxacillin resistance with a sensitivity of 99% and a specificity of 96%, with acceptable accuracy for antimicrobial susceptibility testing. The median time for reporting results was less than 3 hours for identification and seven hours for susceptibility tests.

Pathogenic *Kocuria* species are highly susceptible to broad-spectrum antibiotics, like: amoxicillin/clavulanate, ceftriaxone, cefuroxime, doxycycline, and amikacin as a first-line therapy against micrococcal pathologies (12). Duration of treatment should be correlated with the type of infection (12, 13). Catheter removal in patients with central line-related infection is the mainstay of treatment (12, 13).

In our case, we used only the VITEK 2 system to confirm the identity of bacteria and the lack of molecular typing of this pathogen represented as one of the limitations in our report.

In conclusion, not all *Kocuria rihzophila* are contaminants. We should try to correlate the clinical condition of the patient with positive blood culture for this organism, especially in pediatric immunocompromised patients, with intravenous catheters. Further studies regarding the organism, its virulence, pathogenic potency, risk factors, and antimicrobial susceptibility patterns of *Kocuria* spp. are needed.

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