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Pantoea species sepsis associated with sickle cell crisis in a pregnant woman with a history of pica

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Summary

Background: Bacteria in the *Pantoea* genus are plant and soil associated Gram-negative rods described as nosocomial pathogens and as rare causes of community-acquired infections. The latter have been classically associated with gardening and plant thorn injuries and immunocompromised states are additional risk factors. We report a patient with pica and geophagia, *Pantoea* sepsis, and sickle cell crisis, associations not previously described.

Case Report: A 23-year-old pregnant female presented to the emergency department with sickle cell pain crisis. On the third day of hospitalization the patient developed fever subsequently determined to be caused by *Pantoea* bacteremia and sepsis. She was successfully treated with a two-week course of ceftriaxone. The patient admitted to a habit of frequently eating large amounts of soil and this geophagia had increased since she became pregnant. She had marked clinical improvement with treatment and she was counseled to stop eating soil.

Conclusions: This is the first reported case of *Pantoea* infection possibly associated with geophagia and the first reported case of *Pantoea* bacteremia and sepsis related to an episode of sickle cell crisis.

key words: ***Pantoea*** • **pica** • **anemia** • **sickle cell** • **pregnancy**

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Background

Pantoea sp is a plant and soil associated Gram-negative rod originally assigned to the Erwinia genus and later designated as *Enterobacter agglomerans*. Infections due to injury with plant thorns, gardening, and as a hazard of farming are considered classic associations [1,2]. Catheter-associated infections are well-described, including central venous and ambulatory peritoneal dialysis catheters [3,4],liver abscess [5], synovitis [6], osteomyelitis [7], and endophalmitis [8]. Immunocompromised states and intravenous drug use are additional risk factors [9]. Nosocomial infections due to contaminated intravenous fluids, blood products, and medications have also been documented [10–13]. Bacterial translocation from the gut during gastroenteritis has also been postulated [14].

Case Report

A 23-year-old, G3P0A2, African-American female with sickle cell disease presented at 21 weeks of gestation to the emergency department with a four-day history of sharp, shooting pain in the legs, abdomen, back, and chest. Her past medical history was remarkable for numerous episodes of painful sickle cell crises. Her last crisis was two months prior. She had suffered from eight to ten crises per year in the past. She had her first episode of sickle cell crisis at the age of two years. The latest presentation was typical for her. Upon admission, she denied fever, headache, shortness of breath, nausea, vomiting, diarrhea, contractions, vaginal bleeding or discharge, and she reported good fetal movement. On physical examination, she appeared uncomfortable, and she rated her pain as 8–9 on the one-to-ten pain scale. She was afebrile with a pulse rate of 98 beats per minute, respiratory rate of 18 respirations per minute, and blood pressure was 121/64 mmHg. She was not in labor and did not have any contractions on the monitor. Other than severe tenderness to palpation in the legs, back, and abdomen, her physical examination was unremarkable. Her breath sounds were clear bilaterally, her heart rate was regular. No murmurs or gallops were heard. The abdomen was soft and non-tender with normal bowel sounds. Her uterus was at the level of the umbilicus and was non-tender. A vaginal exam was not performed since the patient had no obstetric complaints at the time of presentation. Laboratory values were as follows: leukocyte 19.9 K/μL, hemoglobin 7 g/dL, hemactocrit 22%, platelets 87 K/μL, reticulocyte 17.2% and absolute count of 423, neutrophils 52%, bands 7%, lymphocytes 33%, monocytes 7%. The peripheral smear showed a nucleated red cell count of 11/hpf, atypical lymphocytes 1/hpf, polychormasia 2/hpf, poikilocytosis 1/hpf, anisocytosis 2/hpf, and sickle cells 1/hpf. A complete metabolic panel showed: sodium 137 mEq/L, potassium 3.5 mEq/L, chloride 108 mEq/L, CO2 20 mEq/L, glucose 84 mg/dL, BUN 4 mg/dL, creatinine 0.36 mg/dL, calcium 9 mg/dL, albumin 3.4 g/dL, total bilirubin 2.8 mg/dL, alkaline phosphatase 156 units/L, ALT 45 units/L, and AST 75 units/L. Urinalysis by clean catch technique showed 2+ leukocyte esterase and occasional bacteria and was negative for protein, glucose, ketones, blood, and nitrite. The urine sample had less than 1/hpf squamous epithelial cells. The urine culture was negative. She was admitted with a diagnosis of sickle cell anemia pain crisis. A single view chest x-ray was obtained after placement of a peripherally inserted central catheter (PICC) line and showed increased markings within the lung fields particularly in the lower lung fields, with the left greater than the right and no effusion.

In the hospital the patient received intravenous fluid hydration, oral and intravenous pain control, and transfusion of two units of packed red blood cells with moderate improvement in her pain to 6–7.

On the third day of admission, she developed fever to 102.9°F. At that time her heart rate was 111 beats per minutes, respiration rate 20 breath per minute, oxygen saturation was 99% on 2 Liters of oxygen by mask, and her blood pressure was 133/72 mmHg. Her physical exam was unchanged from admission. Repeat lab testing showed a leukocyte count of 20.4 K/μL (neutrophils 90%, bands 3%, and lymphocytes 4%), hemoglobin 10.3 g/dL, hematocrit 29.4%, platelets 94 K/μL. Urine culture was repeated and two blood cultures were obtained one hour apart, and intravenous ceftriaxone 2 grams daily was begun and a single 360 mg dose of tobramycin was administered. At 24 hours of incubation both blood cultures were positive for Gram-negative bacilli, subsequently identified as *Pantoea sp* species sensitive to ceftriaxone, aztreonam, cefepime, cefazolin, ciprofloxacin, gentamicin, meropenem, piperacillin/tazobactam, and trimethoprim/sulfamethoxazole and resistant to ampicillin, with intermediate susceptibility to ampicillin/sulbactam. The intravenous catheter was not removed and ceftriaxone was continued. Two blood cultures were repeated on day eight to document sterility of the line and blood. At this time the patient was much improved and had been afebrile for two days. *Pantoea sp* was not isolated; however, *Pseudomonas oryzihabitans* was isolated from both samples. Antibiotic therapy was changed to doripenem 500 mg every 8 hours for three doses until susceptibilities were known. The isolate was susceptible to ceftriaxone, cefepime, ciprofloxacin, gentamicin, meropenem, and piperacillin/tazobactam. Treatment was changed back to ceftriaxone alone. The PICC was replaced on day 12 of admission, and culture of the catheter tip was negative. Two more blood cultures were repeated on day 15 and coagulase-negative staphylococcus was isolated from one tube and was considered a contaminant.

The patient became afebrile on the second day of antibiotic therapy. She was discharged after 17 days of hospitalization and completed a total course of 14 days of antibiotics. At discharge the patient was afebrile and back to her usual state of health.

In our assessment of potential exposures to sources of *Pantoea sp*, the patient denied gardening or plant thorn injury. She had no association with farming or crop harvesting. However, she admitted to a habit of eating large amounts of potting soil since the age of 3 years. She owned numerous houseplants, and her pica nearly always involved potting soil. It was common for her to ingest as much as a cup or more of potting soil in a sitting. In the past she would bake the soil in the oven prior to ingestion, however, she quit baking the soil a week or more before this admission. Her last soil ingestion occurred 3–4 days prior to admission. Her geophagia had increased in frequency and amount when she became pregnant. The patient was counseled to stop eating soil.

Discussion

This is a case of *Pantoea sp* sepsis in a pregnant patient with sickle cell anemia and pain crisis. Our patient has several factors that could have led to her *Pantoea sp* sepsis. It is tempting to speculate that as a compromised host with sickle cell disease, functional asplenia, and pregnancy, she was at increased risk for serious infection in general, and she became heavily colonized with *Pantoea sp* secondarily to her prodigious potting soil ingestion and house plant exposure. Her pica may have been driven by emotional factors or chronic anemia [15,16].The organism may have attained bloodstream access by gut translocation or by cutaneous contamination of her central catheter during hospitalization. Both of these mechanisms have been previously described [13,14]. The fact that her fever began at day 4 of admission also suggests a possible nosocomial mechanism. *Pantoea sp* contaminated intravenous fluids or blood products may have played a role, although no other cases of *Pantoea sp* sepsis were reported at the hospital in the in the months before and after her sepsis episode.

The *P. oryzihabitants* blood isolate occurred very late in the hospitalization of our patient and while she was on antibiotics to which the isolate was highly sensitive. This combined with the fact that the patient was asymptomatic is strongly suggestive that this isolate represented nosocomial contamination of the PICC line. *P. oryzihabitants* is associated with water sources and no cases of infection with this organism had been described secondary to soil exposure.

Pantoea sp infections have been described in pregnancy as causing chorioamnionitis and vertical transmission to the newborn infant or resulting in horizontal transmission to the infants in nursery setting [11,12].We are not aware of any previous reports of *Pantoea sp* sepsis in a pregnant woman or in a patient with sickle cell anemia.

Conclusions

This is the first reported case of *Pantoea sp* infection possibly associated with geophagia and the first reported case of *Pantoea sp* bacteremia and sepsis related to an episode of sickle cell crisis. Our sickle cell anemia patient presented with long-standing pica since childhood of a specific substance, namely soil and most recently potting soil in particular, which may have increased her risk of infection due to this soil related organism. One may speculate that repeated exposure to soil increases the potential for heavy *Pantoea sp* colonization and catheter associated sepsis in the immunocompromised host. Chronic soil contact and ingestion may be yet another epidemiologic risk factor for *Pantoea sp* infection and sepsis.

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