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Florence Nightingale

Case Report

A rare cause of prosthetic joint infection: *Pantoea agglomerans*

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ABSTRACT

In some cases, unusual microorganisms may be identified as the causative agents in bone and joint infections. *Pantoea agglomerans (P. agglomerans),* an environmental pathogen, is rarely found in human infections but can be encountered, particularly in injuries related to plants. In this case report, we aimed to present a 77-year-old female patient with a late prosthetic joint infection caused by *P. agglomerans*.

Keywords: Pantoea agglomerans, prosthetic joint infection, rare pathogen.

Pantoea genus is a non-capsulated, non-spore-forming, straight rod-shaped Gram-negative bacterium belonging to the Enterobacteriaceae family. This pathogen is a member of the normal flora of the gastrointestinal system in humans and can be found in water, wastewater, plant, and fruit/vegetable-based foods, as well as soil.[1] In fact, *Pantoea* species are primarily known as plant pathogens and are also used as biopesticides in the agricultural industry. *Pantoea* spp. closely resemble *Enterobacter* spp. and were previously classified as members of the *Enterobacter agglomerans*.[1-3] The Pantoea genus comprises more than 20 subtypes, including *P. eucalyptii, P. agglomerans, P. vagans, P. conspicua, P. deleyi, P. anthophila, P. brenneri, P. ananatis, P. allii, P. stewartii, P. cypripedii, P. calida, P. gavinae, P. dispersa, P. septica, P. wallisii, P. eucrina, P. rodasii, P. rwandensis*, and *Pectobacterium carotovorum*.[3] *Pantoea agglomerans* (formerly *Enterobacter agglomerans)* is one of the known species capable of causing human infections.[2,3] While it rarely causes infections in humans, it is most commonly associated with post-traumatic soft tissue and bone-joint infections and, rarely, opportunistic systemic infections in immunosuppressed individuals (such as pneumonia, urinary system infections, bacteremia, surgical site infections, catheter-related bloodstream infections, sepsis, and peritonitis).[2] In this case report, we aimed to present a case of late prosthetic joint infection caused by *P. agglomerans*.

CASE REPORT

A 77-year-old female patient, residing in a rural area, with known diagnoses of diabetes mellitus and hypertension, had undergone total knee arthroplasty in her right knee three years ago. She presented to the hospital complaining of discharge around the prosthesis joint area for the past five months. It was found that she had previously sought medical attention during the initial onset of the discharge, and a reoperation was planned. However, due to the coronavirus disease 2019 pandemic conditions, the surgery had to be postponed. Upon her current visit, the patient was observed to have seropurulent discharge at the site of the wound. She did not have any additional complaints, and her vital signs

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were normal.

During the physical examination, it was observed that the prosthesis material in the knee was protruding through the skin as shown in Figure 1. The area around the wound appeared reddened, and there was seropurulent discharge coming from the wound. It was suspected that the discharge was draining from a prosthetic-related sinus tract. Laboratory tests revealed the following results: C-reactive protein: 1.3 mg/dL (normal: 0-0.5 mg/dL), white blood cell count: 6.7×10^3/µL, platelet count: 316×10^3/µL, and creatinine: 1.21 mg/dL. In the patient's magnetic resonance imaging (MRI) evaluation of the knee, widespread lytic lesions were observed in the distal femur and proximal tibia, along with findings consistent with prosthetic-related sinus tract and periosteal reaction. The described areas were interpreted as osteomyelitis. After hospital admission, the patient underwent a revision total knee arthroplasty on the right knee. During the surgery, three tissue samples were sent for intraoperative culture. Growth was observed in two of the cultures in thioglycolate broth. In the passages obtained from sheep blood agar, a single type of Gram-negative bacillus was isolated as shown in Figure 2. Bacterial identification and antimicrobial susceptibility testing were performed using the BD Phoenix automated system and BD Phoenix NMIC/ID panel. The results indicated *P. agglomerans*. The antibiogram was evaluated and reported based on The European Committee on Antimicrobial Susceptibility Testing clinical breakpoint table (v 11.0) for the *Enterobacterales* order.

The isolates were found to be susceptible to antibiotics other than cephalosporins and colistin. The patient was diagnosed with a late prosthetic joint infection and received 14 days of intravenous ciprofloxacin 2×400 mg treatment. Following this, the patient showed improvement in laboratory values and clinical condition. The patient was discharged with a plan for sequential oral ciprofloxacin therapy, with a total treatment duration of 6-8 weeks, and was scheduled for regular follow-up appointments. During the outpatient visits, no issues were encountered.

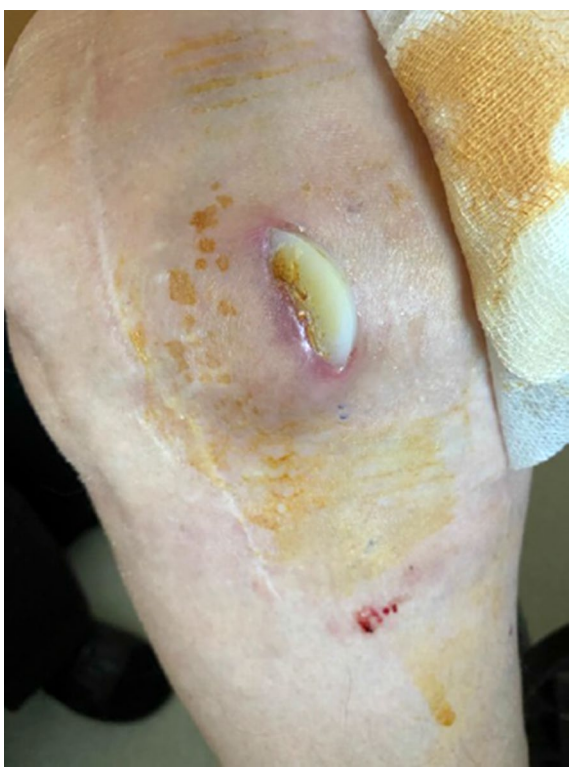

Figure 1. Picture of the prosthesis material protruding through the skin of the knee.

DISCUSSION

Orthopedic prosthesis infections are challenging to manage infections. To ensure appropriate treatment of these infections, it is crucial to obtain microbiological cultures.[4] With

Figure 2. Growth of sheep blood agar passages.

the advancements in microbiological identification methods, a wide range of pathogens can now be isolated. In this case, we aimed to contribute to the literature by presenting a rare case of prosthesis infection caused by *P. agglomerans* as the causative agent. In orthopedic prosthesis infections, the causative microorganism can reach the prosthesis through perioperative contamination (during or immediately after surgical procedures or wound care), hematogenous spread (from a distant infectious focus through blood or lymph circulation), or local spread (from an open wound or through dissemination from a neighboring area, such as osteomyelitis or soft tissue infection).[4] In the presented case, the exact route of transmission of this pathogen to the prosthesis could not be determined. The patient's medical history did not indicate any potential risk factors for contamination. As there were no fever or systemic symptoms, a blood culture was not taken. The patient's knee MRI also revealed findings suggestive of osteomyelitis.

Hischebeth et al.[5] reported a case of late prosthetic joint infection caused by *P. agglomerans*, while Rave et al.[6] described a case of foreign body-related septic arthritis. Vaiman et al.[7] reported nine cases of foreign body-related wound infections. In these cases, small plant-origin foreign bodies were identified, and the wounds healed within 2-3 days after surgical revision. In our case, due to the presence of the fistula tract and osteomyelitis in the MRI, we completed the post-surgical revision treatment in eight weeks. Olmos-Alpiste et al.[8] also reported a case of wound infection following a plant-related injury. In this case, *P. agglomerans* was isolated from both wound culture and skin biopsy cultures. Similarly, in our case, we were able to isolate this pathogen from the three preoperative cultures taken. The presented case lived in a rural area with a risk of environmental exposure, but there was no history of trauma described by the patient. The etiology of this rare microorganism in human infections is not well understood, and there is no clear consensus on its treatment.[3] Antibiotic therapy along with the removal of foreign bodies seems to be the most effective approach for achieving complete recovery.[6-8] In our presented case, the prosthesis was removed. Olmos-Alpiste et al.[8] reported a patient treated with cotrimoxazole. In our case, we recommended ciprofloxacin treatment based on the culture antibiogram result. After a total of eight weeks of treatment, the patient did not experience any problems.

In conclusion, in late prosthetic joint infections, *P. agglomerans* is a rare causative pathogen that can be easily treated with appropriate antibiotic therapy and surgical intervention. However, if various resistance mechanisms develop, especially in immunosuppressed patients, it can become a challenging and potentially high-mortality infectious agent. It should be kept in mind.

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Data Sharing Statement: The data that support the findings of this study are available from the corresponding author upon reasonable request.

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