

# ***Pseudomonas oryzae* bacteremia in a 36-year-old male with obstructive adenocarcinoma of the rectosigmoid junction and metastatic disease to the liver: A Case Report**

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## **Abstract**

Human infections by *Pseudomonas oryzae* are extremely rare, and most of the cases are bacteremias associated with external devices in immunocompromised patients. We present a case of an immunocompromised oncologic patient who had a positive blood culture for this organism. This report shows the relevance that this bacterium is generating as a nosocomial pathogen in immunocompromised patients.

## **INTRODUCTION**

*Pseudomonas oryzae* was reported for the first time in rice paddies in 1985 by Kodama et al(1), and it was described as a gram-negative, oxidase-negative, non-spore-forming, flagellated, rod-shaped organism with a strict aerobic metabolism. Although rare, human infection could occur in immunocompromised patients with indwelling catheters(2), commonly presenting with bacteremia(3). It is also associated with community-acquired infections involving the soft-tissue(4) or infections from external devices like synthetic bath sponges(5). This case report aims to discuss the isolation of *Pseudomonas oryzae* from a bloodstream infection in an immunocompromised patient with obstructive adenocarcinoma of the rectosigmoid junction and metastatic disease to the liver.

*Pseudomonas oryzae*, formerly known as *Flavimonas oryzae*, is not a usual pathogen associated with severe infections; however, it can take advantage of individuals who have multiple comorbidities or are immunocompromised, usually by causing bacteremia, peritonitis, endophthalmitis, and septicemia. These gram-negative, rod-shaped, oxidase-negative, non-fermenting bacteria not only can be found environmentally like soil and rice paddies but have also been identified in cultures from catheters in patients receiving peritoneal dialysis. It survives well in moist environments, including the hospital setting. ( ) It has also been reported as a cause of septicemia in children ( ) There is scant literature on this rare bacterial isolate, and only a few cases have been documented in more than a decade. This case report aims to discuss the isolation of *Pseudomonas oryzae* from bloodstream infection in an immunocompromised patient with obstructive adenocarcinoma of the rectosigmoid junction and metastatic disease to the liver.

## **CLINICAL CASE**

A 36-year-old Colombian male with a past medical history significant for rectosigmoid cancer diagnosed one month prior to admission was referred to the hospital by the Oncology

team for further evaluation and management. He has a history of rectal bleeding for ten months, postprandial abdominal pain for six months, and a new-onset change in bowel habits. According to the patient, he intentionally lost 50-pound secondary to a gluten-free diet. Upon admission, CT scan of the abdomen and pelvis showed an irregular rectosigmoid mass, multiple hypoattenuating with two dominant hepatic lesions likely consistent with metastasis, ill-defined thickening of bladder dome adjacent to sigmoid, and left hydronephrosis with ureteral encasement by the rectosigmoid mass. Colonoscopy revealed a 20 cm rectosigmoid mass, and the pathology report was consistent with adenocarcinoma. Laboratory findings revealed a CEA level of 11 ng/ml.

The next day, the Surgery team performed a diagnostic laparoscopy and confirmed a malignant rectosigmoid bowel obstruction, abdominal wall and peritoneal metastasis, liver metastasis to both right and left lobes, and a frozen pelvis. A loop transverse colostomy was successfully done in order to manage this patient's malignant bowel obstruction. The Urology team attempted a bilateral double-J ureteral stent placement; however, they could only place a right ureteral stent. On postoperative day 3, the patient presented with gross hematuria, and urinalysis revealed the presence of red blood cells. Subsequently, urine and blood cultures were obtained. On postoperative day 4, complete blood count was consistent with an elevated white blood cell count of  $15.05 \times 10^9/L$ . Later on, the right ureteral stent was removed, and he had a fever of 102 F and heart rate of 104 bpm in the postanesthesia care unit so intravenous ceftriaxone 1 g daily was started and no other episodes of fever were reported. One day later, the patient underwent a right external jugular vein port-a-cath placement for chemotherapy as per Oncology's recommendations. Urine culture revealed no growth in 72 hours and blood cultures (2/2) grew *Pseudomonas oryzihabitans*. Based on antimicrobial susceptibility testing results (Table 1), ceftriaxone was discontinued, and the patient was started on intravenous piperacillin/tazobactam 4.5 mg four times a day. His subsequent condition was stable, he remained afebrile for the rest of his stay, and his white blood cell count was  $6.43 \times 10^9/L$  on the day of discharge. After 48 hours of clinical improvement, the patient was discharged on levofloxacin 750 mg PO daily.

The patient was using a colostomy bag and received five cycles of CAPOX regimen as outpatient tolerating the first one, but presenting with gastrointestinal side effects during the rest of the cycles. A *C. difficile* infection was noted for which he received vancomycin for ten days. He did not resume chemotherapy at the hospital.

Table 1. Antimicrobial susceptibility testing

SUSCEPTIBILITY	MIC	INTERPRETATION
Cefepime	$\leq 1$	S
Levofloxacin	$\leq 0.5$	S
Meropenem	$\leq 0.5$	S
Ceftazidime	$\leq 2$	S
Ceftriaxone	2	S
Ciprofloxacin	$\leq 0.25$	S

Gentamicin	<=2	S
Piperacillin/Tazobactam	4/4	S
Tobramycin	<=2	S
Aztreonam	>16	R

## Discussion

*Pseudomonas oryzihabitans* remains a rare cause of human infections, although it has been considered a potential nosocomial pathogen.(6) It has been associated with co-infections, meningitis, endocarditis, diabetes mellitus, and immunocompromised state.(7) On the other hand, its role as laboratory contaminant has also been suggested due to an infection reported in an immunocompetent patient.(8) Other factors such as length of stay, indwelling central catheters, ambulatory peritoneal dialysis catheters, port-a-caths, and prolonged use of respiratory equipment, seem to be related to the infection as well(2).

Only a few cases of bacteremia by this pathogen have been reported, as it is most commonly associated with sepsis, endocarditis, meningitis, and co-infection with other organisms, especially in immunocompromised ( ) Even though *P. oryzihabitans* is not considered highly contagious and its pathogenicity remains unclear, its isolation from the blood of immunocompromised individuals such as our patient suggests that this population is more at risk to develop an infection from this organism. Although cases of infection in immunocompetent individuals have been reported, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3703216/#ref10> evidence shows that patients are likely to have a compromised immune system, an underlying disease, or both, and proposes a relationship with the length of stay during hospitalization. <https://bjl.copernicus.org/articles/1/54/2016/bjl-1-54-2016.pdf>

As an opportunist, it was first described as a human pathogen after a case of bacteremia was reported in 1977(9) According to Lejbkovicz et al., patients with implanted prosthetic material such as indwelling central catheters, ambulatory peritoneal dialysis catheters, and port-a-caths, or that have consistent contact with contaminated respiratory equipment have been reportedly infected with this pathogen. <https://pubmed.ncbi.nlm.nih.gov/12953957/> A case of *P. oryzihabitans* bacteremia was reported in a child with peripheral T-cell lymphoma receiving chemotherapy through a Hickman catheter(10) which suggests that this organism mostly causes hospital-acquired infections due to contaminated medical equipment. Table 2 displays several cases of *P. oryzihabitans* bacteremia in cancer patients. Even though this pathogen is more likely to cause nosocomial infections, two cases of community-acquired soft-tissue infection have been recently reported(4).

<b>Table 2. <i>Pseudomonas oryzihabitans</i> bacteremia in cancer patient</b>			
<b>Case report</b>	<b>Age (years)</b>	<b>Gender</b>	<b>Neoplasia</b>
Decker et al(3)	40	Female	Chronic Myelocytic Leukemia
Takahito et al(11)	60	Male	Angioimmunoblastic T-cell lymphoma

	4	Male	Precursor B-cell-related acute lymphoid leukemia
Fumihiro et al(10)	12	Female	Peripheral T-cell lymphoma
Our case	36	Male	Rectosigmoid adenocarcinoma

Infections associated with *P. oryzihabitans* usually have a good prognosis and most patients are treated successfully with antimicrobial therapy, usually achieving a rapid clinical improvement(3). Most isolates of this organism are susceptible to piperacillin, third-generation cephalosporins (except moxalactam), aminoglycosides, and quinolones with limited susceptibility to aztreonam(12) whereas occasional resistance has been reported to ampicillin, amoxicillin-clavulanic acid, and cefazolin(2). Although treating an infection with the appropriate antimicrobial therapy is often effective, if the patient has implanted prosthetic material, it is usually deemed necessary to remove it to eradicate the infection(13).

While *P. oryzihabitans* has been mostly isolated from abscesses, ulcers, and wounds, it has also been associated with catheter-related bloodstream infections(3). Nevertheless, in our case report, blood cultures were collected two days before the patient underwent a right external jugular vein port-a-cath placement for chemotherapy as per the Oncology team's recommendations for the treatment of obstructive adenocarcinoma of the rectosigmoid junction and metastatic disease to the liver. Thus, the port-a-cath insertion cannot be considered as the source of this patient's bacteremia. Noncatheter-related bacteremias are rare and the source of infection in the majority of cases remains unknown(14). However, the patient underwent a surgical procedure three days prior to obtaining the blood cultures and this could constitute a possible cause of infection, as this pathogen can spread through contaminated fluids and unsterilized medical tools(15). In addition, his immunocompromised state at the time should also be considered as a contributing factor. In regards to treatment, the patient had a good outcome after being medically managed with intravenous piperacillin/tazobactam and susceptibility patterns of the isolates were similar to those previously reported in the literature.

## Conclusions

The isolation of this environmental organism in clinical samples must be interpreted according to clinical data, as they can be the cause of infection in immunocompromised hosts that have undergone surgical procedures. *P. oryzihabitans* is a clinically significant nosocomial pathogen, particularly for immunocompromised or critically ill patients. Appropriate antimicrobial therapy is usually successful in treating infections caused by this microorganism, given its low virulence. However, immediate removal of foreign bodies such as indwelling catheters is highly recommended [under clinical criteria](#).

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