



A Rare Case of *Raoultella planticola* Pneumonia: An Emerging Pathogen



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ABSTRACT

Raoultella planticola (*R. planticola*), considered an environmental organism, is a gram negative, motile, bacillus with phenotypic similarities to the genus *Klebsiella*. The organism remains a rare cause of human infection with a few cases reported in the literature. However, since its description in 1981 there have been increasing rates of infections caused by *R. planticola* with reports of conjunctivitis, liver abscess, cholangitis, pancreatitis, and necrotizing fasciitis. More concerning are reports of carbapenemase-producing isolates which have led to the only 2 mortalities associated with *R. planticola* infections. To our knowledge, we report the third case of *R. planticola* pneumonia in an immunocompromised patient with no known direct exposure to the reported risk factors.

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1. Introduction

Raoultella planticola (*R. planticola*) is an aerobic, gram-negative, non-capsulated, motile bacillus that until recently was once a species of the genus *Klebsiella*, and is now distinguished into its own genera. It is a rare opportunistic pathogen primarily described in immunocompromised patients [1]. Although only a few cases of human infection have been reported, a growing body of literature demonstrates *R. planticola*'s pathogenicity in its ability to infect various organs such as the pancreas, skin, liver, prostate, conjunctiva, and gallbladder [2–6]. To our knowledge we present the third reported case of *R. planticola* pneumonia in an immunocompromised patient with no direct history of attributable environmental exposure risks.

2. Case

A 36-year-old woman with a 20-pack year smoking history and medical history of invasive squamous cell carcinoma of the distal trachea with metastases to the lungs presented to our institution with complaints of shortness of breath, thick, purulent, and foul-smelling tracheal secretions. She had previously received

palliative radiation therapy to the trachea that left her tracheostomy dependent. Her past chemotherapy consisted of 2 cycles of 5-Fluorouracil. Her most recent cycle of chemotherapy, a new regimen of cisplatin/paclitaxel, was administered 10 days prior to presentation.

On admission, her vitals were as follows: Temperature of 36.9° Celsius, blood pressure 82/54, pulse 132, and respiratory rate of 23 breaths per minute. The oxygen saturation was 96% on room air. Blood count showed a white blood cell count (WBC) of 1400/mm³, a hemoglobin of 8.5 g/dL, and a platelet count of 153 000/mm³. Auscultation of her lungs revealed rales bilaterally. A plain chest radiograph was concerning for a right sided pleural effusion and a superimposed infectious process. An axial chest computed tomography (CT) showed evidence of right lower lobe infiltrates (Fig. 1).

An electrocardiogram did not reveal any changes suggestive of ischemia and her cardiac enzyme Troponin T was not elevated.

Given her immunocompromised status and recent hospitalization, our differential for her source of sepsis included bacterial, viral, or fungal pneumonia. We obtained a respiratory viral panel, blood, urine, fungal, and sputum cultures, and empirically started her on vancomycin and cefepime. A bronchoscopy revealed copious, mucopurulent, yellow, thin secretions in the right upper, middle, and lower lobe. Two days after admission her sputum culture revealed *R. planticola* with sensitivity to most antibiotics except for resistance to ampicillin and intermediate susceptibility to ciprofloxacin. The remainder of the cultures were negative. She

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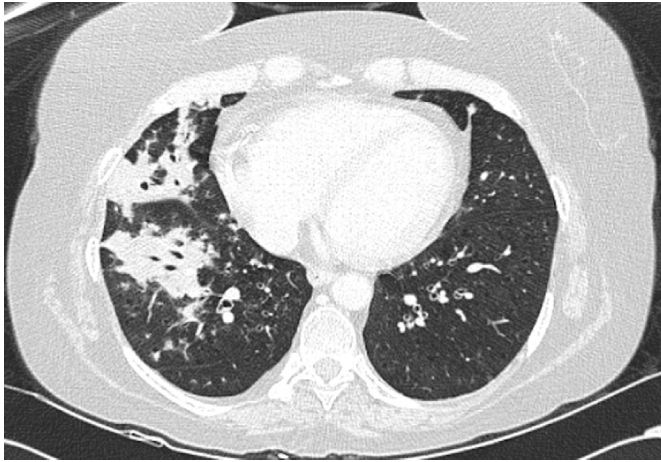


Fig. 1. Axial CT of the chest with contrast showing confluent consolidation within the right lower lobe.

was briefly transitioned to IV Ceftriaxone, but experienced clinical worsening with an increase in oxygen requirement. Repeat sputum cultures again grew *R. planticola* sensitive to ceftriaxone with no other isolates identified. Yet, she was transitioned back to IV piperacillin/tazobactam with clinical improvement and resolution of pneumonia after a 7-day total course. This may have been a coincidental outcome as other medical comorbidities were addressed with aggressive medical management.

3. Discussion

Identified in 1981 by Bagley et al., *R. planticola* has traditionally been considered a nonclinical, aquatic, botanical and soil organism initially considered a species of the genus *Klebsiella* [7]. Further phylogenetic analysis revealed major differential characteristics amongst the eight species of *Klebsiella*. These differences included utilization of L-sorbose as a carbon source and the ability to grow on 10° Centigrade which became the hallmark of the new genus *Raoultella*. This new genus included the three species, *Raoultella planticola*, *Raoultella ornithinolytica*, and *Raoultella terrigena* [1]. The new genus remained relatively uncommon, although, *R. planticola* may be more prevalent than once thought with colonization rates ranging from 9 to 19% [8,9].

Due to the rare occurrence of human infection, risk factors associated with *R. planticola* infection are largely deduced from the few reported cases. These include, an immunocompromised state, invasive medical procedures, seafood consumption and exposure to aquatic or soil contaminants. Interestingly, *R. planticola* contamination of non-bacterial liquid hand soap in the hospital setting have been reported [10]. Our patient worked at a local call center and lived with her mother, who had a small garden. She denied tending to the plants, but noted that her mother spent time in her garden daily. Furthermore, she reported no recent seafood consumption or exposure to aquatic environments.

Since its initial description in 1981, twenty-three cases of human infection with *R. planticola* have been reported, two of which have been fatal. The two fatalities were associated with a carbapenem resistant *R. planticola* with polymerase chain reaction (PCR) analysis detecting carbapenemase-encoding genes in the isolates [11].

Although there is growing concern of antibiotic resistant strains, most cases reported susceptibility to many antibiotics [12,13].

4. Conclusion

We report to our knowledge the third case of *R. planticola* pneumonia, an organism capable of infecting a wide range of hosts with multiple reported risk factors. Although our patient was not directly exposed to soil or aquatic contaminants, her mother with whom she lived, did spend time tending to her garden. Given that her sputum culture was only positive for *R. planticola*, it is likely that the isolate was the pathogenic cause of pneumonia rather than a colonizing organism. Though rarely a cause of infection, *R. planticola* has shown pathogenicity in many different organ systems. Currently, *R. planticola* remains widely susceptible to many antibiotics, but resistant strains causing significant mortality have been reported. Given the increasing reports concerning *R. planticola*, it would not be unreasonable to consider a future where this organism becomes a more prevalent pathogen in the healthcare setting. Practitioners should remain cognizant of the risk factors associated with acquiring an *R. planticola* infection, note the existence of carbapenemase resistant strains, and promptly diagnose and treat these potentially deadly infections.

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