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CASE REPORT

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Investigation of a Multidrug-Resistant *Raoultella Planticola* (Formerly *Klebsiella Planticola*) Isolate from a Urine Culture: A Case Report

Christina Seitopoulou[1,2], Antonia Mourtzikou[2]* and Maria Kimouli[2]

[1]Microbiology Laboratory, Health Center Nikaia, 2nd YPE, Greece

[2]Microbiology Laboratory, GHNP "Agios Panteleimon", Piraeus, Greece

ABSTRACT

We report a case of Urinary Tract Infection (UTI) caused by a multidrug-resistant (MDR) *Raoultella planticola* isolate recovered from a 65-year-old male with multiple comorbidities and recurrent UTIs. Laboratory identification was performed using RAPID REMEL® systems and conventional culture on blood Columbia agar, MacConkey agar and Sabouraud Dextrose agar. Antimicrobial susceptibility testing followed the Kirby-Bauer disk diffusion method and interpretation according to EUCAST 2025 criteria. The isolate exhibited resistance to multiple antimicrobial classes, necessitating referral for inpatient intravenous therapy. We discuss the clinical significance, possible environmental exposure related to gardening activities, and the importance of early recognition and appropriate antimicrobial stewardship for emerging *Raoultella* infections.

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Introduction

Members of the genus *Klebsiella* and phylogenetically related species have long been recognized as important causes of healthcare-associated and community-acquired infections, including urinary tract infections, respiratory infections, bacteremia and sepsis. Several *Klebsiella*-related taxa colonize plants and soil and may act as nitrogen-fixing bacteria in crops such as wheat, rice and maize. *Raoultella planticola* (previously classified as *Klebsiella* planticola) has emerged as an occasional human pathogen, reported in urinary tract infections, wound infections, pneumonia and bloodstream infections, and importantly has demonstrated the capacity to acquire multidrug resistance and carbapenemase genes in some isolates [1-3]. Several case reports and retrospective series suggest that although infections are uncommon, they can be severe in patients with comorbidities or immunocompromise [4-7].

Aim of the Study

The aim of this case report was to identify and characterize *Raoultella planticola* recovered from a urine culture in a primary care setting, to perform antimicrobial susceptibility testing according to current EUCAST 2025 criteria, and to raise clinical awareness of this emerging organism in urinary tract infections.

Case Presentation and Patient History

A 65-year-old male retired seafarer presented for routine urinalysis and urine culture. His past medical history included type 2 diabetes mellitus, arterial hypertension, hypercholesterolemia, chronic hepatitis B infection, and prostate cancer (grade 8) under hormonal therapy, radiotherapy and chemotherapy. He reported recurrent urinary tract infections three episodes over the preceding four months. He received empirical antimicrobial treatment for recurrent urinary tract infections, his condition improved, but the infection was not eliminated. He is a former smoker and described frequent gardening activity during the summer months at his daughter's countryside home, handling cacti and other plants imported from abroad (Latin America).

Material and Methods

Urinalysis was performed using a 10 parameter Multistix reagent strip. Midstream urine was plated onto Columbia blood agar, MacConkey agar and Sabouraud Dextrose agar and incubated at 37°C for 24 hours. Colony morphology was inspected: lactose-fermenting colonies on MacConkey appeared mucoid and pink, consistent with a capsulated Enterobacteriaceae species. Primary identification was performed using the RAPID REMEL® identification system according to manufacturer instructions. Antimicrobial susceptibility testing was carried out using the Kirby-Bauer disk diffusion method and interpreted with EUCAST antimicrobial susceptibility testing criteria 2025.

Contact Antonia Mourtzikou, Microbiology Laboratory, GHNP "Agios Panteleimon", Piraeus, Greece.

Laboratory workflow followed standard biosafety and quality control procedures. For colony description, MacConkey agar was used as a selective and differential medium; lactose fermentation producing acid results in uptake of neutral red and pink colony appearance, while the mucoid phenotype suggests prominent capsular production, often observed in *Klebsiella* and *Raoultella isolates*.

Results

Urinalysis demonstrated numerous pyuria cells and abundant bacteria (Table 1). Laboratory findings reveal elevated hepatic enzymes (SGOT, SGPT, G-GT), increased LDH, CPK, ALP, and CRP, along with anemia and thrombocytopenia on hematological testing (Table 1). Culture yielded a predominating mucoid lactose-fermenting gram-negative bacillus identified as *Raoultella planticola* by RAPID REMEL®, (Figures 1, 2 and 3). The isolate was multidrug-resistant, showing resistance to multiple commonly used oral and parenteral agents (detailed susceptibility profile available in hospital records), (Table 2). Given the MDR profile and the patient's comorbid state with recurrent UTIs, he was referred for inpatient management and intravenous antimicrobial therapy.

Table 1: Laboratory Testing

SGOT	↑61
SGPT	↑54
GGT	↑100
ALP	↑290
LDH	↑322
CPK	↑287
CRP	↑98
Complete blood count	• Polycytosis • Anisocytosis • Microcytosis • HCT: 29,7% • HGB:10,1g/dL→Anemia • PLT:91x10^3/µL→Thrombocytopenia
Red Blood Cell SR	↑89
Ferritine	↑1.876
PT-INR	↑1,87
General urine test	Proteinuria + Pyuria, Hematuria, Microbiauria/ Bacteriauria
Cultivation of urine	MONOCULTURE *Klebsiella planticola* >105CFU/ml

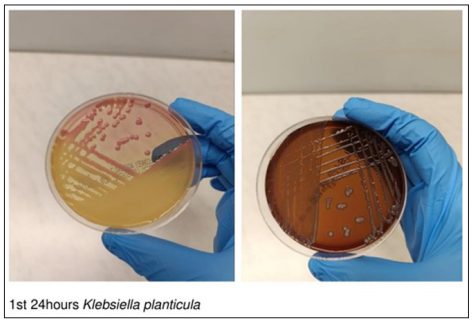

Figure 1: Urine Culture 1st Day (24hours)

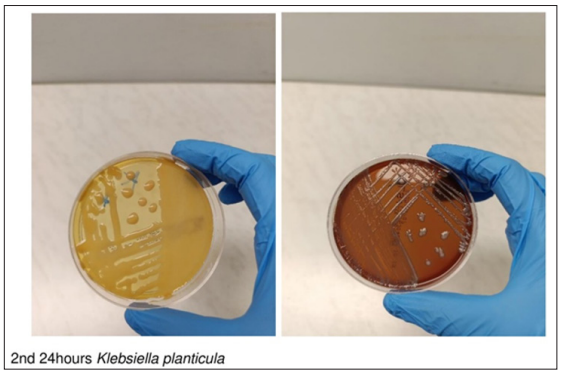

Figure 2: Urine Culture 2nd Day (24hours)

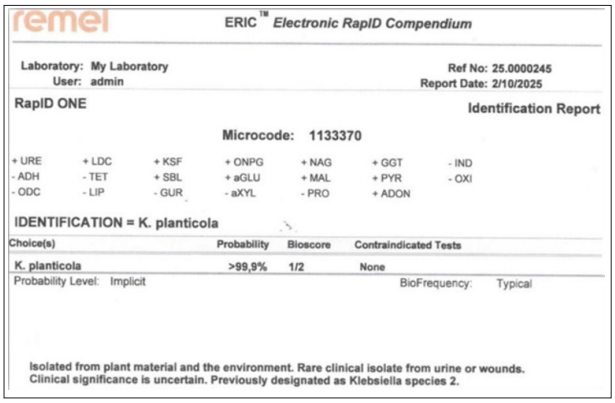

Figure 3: Identification of K. Planticola by RAPID REMEL® System

Table 2: Urine Culture Antibiogram

Sensitive	Resistant
1. Carbapenemes (Ertapenem or Meropenem)	1. Aminoglycosides (Kanamycin, Tobramycin, Gentamicin)
2. Colistin	2. Fluoroquinolones (Ciprofloxacin, Norfloxacin)
	3. Nitrofurantoin
	4. Ampicillin
	5. Cotrimoxazole
	6. Tetracyclines
	7. Cephalosporins (such as Cefazolin, Cefuroxime, Ceftriaxone)

Discussion

Raoultella planticola is an environmental organism closely related to *Klebsiella* species and has been isolated in both environmental and clinical settings. Although uncommon, R. planticola has been increasingly reported as a cause of urinary tract infections and systemic infections, particularly in patients with underlying conditions or prior healthcare exposure [4-6]. A 5-year retrospective series documented cases of Raoultella bacteriuria and underlined variable clinical presentations and antibiotic susceptibilities [5]. Single case reports have described postoperative UTI and community-associated infections in otherwise healthy adults [4,8].

The Patient in our Report Had Multiple Risk Factors for Complicated UTI: diabetes mellitus, recurrent prior UTIs, prostate cancer with current oncologic treatment, and probable intermittent exposure to soil and plant materials through gardening. Environmental exposure has been previously suggested as a possible route for human acquisition of R. planticola, particularly when handling plants or soil where the organism may be naturally present [6]. The presence of imported cacti handled by the patient provides a plausible, though not proven, exposure pathway.

The Microbiological Features Observed are Consistent with Descriptions in the Literature.

Mucoid, lactose-fermenting colonies on MacConkey agar due to capsular polysaccharide production and lactose fermentation that lowers pH and results in neutral red uptake by colonies. The laboratory identification using a commercial biochemical/typing system provided species-level identification; however, advanced molecular typing may be required in some settings to confirm species or to detect resistance determinants [1,2].

Of particular concern is antimicrobial resistance. Reports document isolates of R. planticola harboring carbapenemases and other resistance mechanisms, including resistance to tigecycline in rare cases, emphasizing the capacity of this species to acquire and disseminate clinically important resistance genes [1-3]. The clinical management of infections due to MDR Raoultella requires individualized antimicrobial selection guided by susceptibility testing and often inpatient intravenous therapy when oral options are limited [2,9]. Our decision to refer the patient for hospital based intravenous therapy reflected the combination of the isolate's MDR phenotype and the patient's clinical risk factors.

Published case series and reviews recommend vigilance for Raoultella spp. in both community and hospital settings and highlight the importance of accurate laboratory identification and antimicrobial stewardship to guide therapy and prevent spread [6,7]. Hypervirulent lineages similar to those described for *Klebsiella* pneumoniae may not be common in Raoultella, but the potential for severe disease in susceptible hosts is documented [8,10].

Limitations of this report include the absence of molecular characterization of resistance genes and the inability to definitively link the infection to environmental exposure. Nonetheless, the case illustrates the clinical relevance of *Raoultella planticola* as an emerging, sometimes multidrug resistant, uropathogen in patients with multiple comorbidities.

Conclusion

Raoultella planticola can cause urinary tract infections and may present as a multidrug resistant pathogen, particularly in patients with underlying comorbidities and possible environmental exposures. Early recognition, species level identification and susceptibility guided therapy are essential. Increased awareness among clinicians and microbiology laboratories, along with prudent antimicrobial stewardship, are critical to mitigate the risks associated with emerging MDR organisms.

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Authors' Contribution

All authors conceived and designed the study, analyzed and interpreted the data, drafted the article, and finally approved the version to be submitted.

Declaration of Competing Interests

All authors declare no conflict of interests

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