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Rare case of urinary tract infection caused by *Cedecea lapagei* in a 93-year-old patient in southern Italy

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SUMMARY

Cedecea lapagei is a rare Gram-negative bacterium that has been infrequently associated with human infections. It is a non-encapsulated, facultative anaerobic organism that grows well in nonselective laboratory media and exhibits variable resistance patterns. Although *Cedecea lapagei* has been identified as a pathogen since 2006, reports of its clinical significance remain scarce, particularly in Europe. Here, we present the case of a 93-year-old male from Southern Italy, with multiple comorbidities and a history of urinary catheterization, who developed a urinary tract infection (UTI) caused by *Cedecea lapagei*. The patient was successfully treated with ciprofloxacin and fosfomycin, achieving clinical and microbiological healing. This report examines the substantial challenges associated with rare pathogens in clinical practice, focusing on the critical need for prompt and precise identification alongside tailored treatment strategies. Additionally, it highlights the pathogen's alarming multidrug resistance capabilities, underscoring the urgent need for robust antimicrobial stewardship programs and comprehensive research into its epidemiological behavior and resistance mechanisms. Incorporating rare pathogens into differential diagnoses, particularly for elderly patients with recurrent UTIs, could improve patient outcomes significantly. Finally, these findings expand the limited existing data on *Cedecea lapagei* infections, providing valuable insights into more precise diagnostic methodologies and tailored therapeutic approaches.

Keywords: Cedecea lapagei, urinary tract infection, rare pathogens, elderly patients, antimicrobial susceptibility.

INTRODUCTION

Cedecea lapagei is a Gram-negative bacterium classified within the *Enterobacteriaceae* family. It is non-encapsulated, facultatively anaerobic, non-spore-forming, catalase-positive, and incapable of lactose fermentation. First identified in 1981, the *Cedecea* genus comprises five species: *Cedecea davisae*, *Cedecea neteri*, *Cedecea lapagei*, and two unnamed species [1, 2]. Members of this genus are typically motile and exhibit good growth on non-selective laboratory media, producing convex colonies at 37°C. What distinguishes *Cedecea lapagei* from other species is its ability to grow in media lacking thiamine, a trait that may reflect unique metabolic adaptations. Despite being discovered over 40 years ago, *Cedecea lapagei* was only designated as a human pathogen in 2006, and documented cases worldwide remain rare [3].

The rarity of *Cedecea lapagei* infections presents unique challenges for clinicians and microbiol-

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ogists alike. Infections caused by this pathogen are often misdiagnosed or underreported due to a lack of familiarity and limited availability of advanced diagnostic tools in many settings. The bacterium's ability to persist in the environment and colonize medical devices highlights its potential role as an emerging nosocomial pathogen. Reports suggest that infections are more common in immunocompromised patients or those with indwelling medical devices, yet its true epidemiological footprint remains largely unknown [4, 5].

Although the precise virulence factors of *Cedecea* species remain poorly understood, their pathogenicity is likely influenced by key traits such as motility, facilitated by peritrichous flagella, which aids in host tissue colonization [4]. Additionally, quorum sensing (QS), a bacterial communication system that regulates virulence factors like biofilm formation, may also play a role in the pathogenicity of *Cedecea lapagei*. These bacteria can form biofilms on indwelling medical devices, such as catheters, enhancing their resistance to antimicrobial treatments. Such biofilm formation could contribute to persistent infections, particularly in hospital settings [5].

Since its identification as a human pathogen, infections caused by *Cedecea lapagei* have been primarily documented in immunocompromised patients or those with medical devices in situ [6]. The few cases reported in the literature suggest that *Cedecea lapagei* is an opportunistic pathogen capable of causing a wide range of infections, including pneumonia, sepsis, and urinary tract infections. Most infections have been documented in regions such as Asia and the Americas, but data from Europe, particularly Southern Italy, remain exceedingly limited [7]. Infections caused by *Cedecea lapagei* often exhibit multidrug resistance, complicating treatment and necessitating the use of targeted therapy guided by susceptibility testing [8].

This case report highlights the clinical presentation, management, and outcome of *Cedecea lapagei*-associated UTI in an elderly patient from Naples, Campania. By highlighting the clinical course and successful treatment of this infection, our report aims to provide valuable insights into the diagnosis and management of infections caused by this emerging pathogen. Furthermore, we emphasize the importance of increased surveillance, research, and awareness among healthcare providers to address the growing challenge posed by rare multidrug-resistant pathogens.

CASE REPORT

A 93-year-old male presented to the emergency department with urinary urgency, dysuria and burning sensation during micturition one month after resolving a prior UTI caused by *Escherichia coli*. The patient's medical history included type II diabetes mellitus, arterial hypertension, Parkinson's disease, and benign prostatic hyperplasia (BPH) managed with silodosin. Twenty years earlier, he had undergone a transurethral resection of the bladder (TURB).

Upon further investigation, it was revealed that the patient had a history of recurrent UTIs, contributing to his vulnerability to further infections. In October 2024, the patient developed a UTI caused by *E. coli*, treated with piperacillin-tazobactam (2.25 g, intravenously twice daily for 7 days). During this period, a urinary catheter was inserted, later removed upon infection resolution, restoring normal voiding. However, within a month, he presented with recurrent symptoms.

On admission, his vital signs showed a temperature of 36°C, heart rate of 68 beats/minute, blood pressure of 110/80 mm Hg and oxygen saturation of 97%. Laboratory results showed hemoglobin 11.8 g/dL, leukocytes 9.5 $x10^3$/m, platelets 200 $x10^3$/m, and C-reactive Protein (CRP 25 mg/L).

Examination of the external genitalia revealed no abnormalities, while digital rectal examination showed signs of prostatic congestion without any suspicious nodules.

Ultrasound examination revealed no bilateral hydronephrosis, a distended bladder with sediment at the base, and a suspected bladder neoplasm on the right lateral wall.

Urinalysis revealed significant pyuria, and urine culture identified *Cedecea lapagei* as the causative organism. The pathogen's identification was confirmed using the VITEK 2 automated microbiology system (bioMérieux, France). Antibiotic susceptibility testing indicated sensitivity to ciprofloxacin and fosfomycin (Table 1). The strain was resistant to ceftazidime, cefixime, cephalexin, cefepime, cefotaxime, ertapenem, gentamicin, tobramycin, amoxicillin/clavulanate and ampicillin. The isolate was screened for the production of extended-spectrum beta-lactamases (ESBLs) using the double-disk synergy test (DDST). The results were negative, indicating that the isolate did not produce ESBLs.

Table 1 - Antimicrobial susceptibility of Cedecea lapagei.

Antibiotic	*MIC (µg/mL)*	*Interpretation*
Ampicillin	>8	Resistant
Amoxicillin/clavulanate	>32/2	Resistant
Piperacillin/tazobactam	≤4/4	Sensitive
Ceftazidime	>8	Resistant
Cefixime	>2	Resistant
Cephalexin	>16	Resistant
Cefepime	>8	Resistant
Cefotaxime	>4	Resistant
Imipenem	2	Sensitive
Ertapenem	>1	Resistant
Gentamicin	>4	Resistant
Tobramycin	>4	Resistant
Trimethoprim/ sulfamethoxazole	≤1/19	Sensitive
Fosfomycin	32	Sensitive
Ciprofloxacin	<0.25	Sensitive

MIC = minimum inhibitory concentration.

Treatment with ciprofloxacin (500 mg orally twice daily for 7 days) and fosfomycin (3 g orally once daily for two days) was initiated.
The patient reported symptomatic improvement within 72 hours of initiating therapy. He remained hospitalized for four days to ensure clinical stability and monitor for any signs of relapse. The patient was subsequently discharged with no further symptoms and advised on preventive measures to reduce the risk of future UTIs. A follow-up urine culture performed seven days after completing antibiotics confirmed the infection's eradication.

DISCUSSION

Cedecea lapagei infections remain rare globally, with most cases reported in immunocompromised patients or those exposed to invasive medical devices. The geographic spread of *Cedecea lapagei* has been poorly documented in Europe, with this case representing the first report from Southern Italy. The literature indicates a significant number of cases (44%) reported in Asia and the Americas (39%), highlighting the need for increased awareness and surveillance in these regions [7, 8].
The diversity of clinical presentations underscores the challenges in diagnosing *Cedecea lapagei* infections [8]. While fever was the most common symptom (75%), manifestations ranged from pneumonia (45%) and sepsis (20%) to septic shock (15%) and even extrapulmonary involvement such as skin infections (19%) and osteomyelitis (5%). This emphasizes the importance of considering *Cedecea lapagei* in the differential diagnosis for a wide range of infectious presentations, particularly in patients with risk factors such as immunosuppression or underlying medical conditions [9, 10].
Cedecea lapagei belongs to the normal gastrointestinal and urinary microbiota and can grow in both acidic and alkaline environments (pH 4–10). Its versatility in environmental adaptability is a significant factor in its survival and pathogenic potential. Its transmission mechanisms remain poorly understood but may involve environmental exposure, hospital settings or use of invasive devices. The bacterium is also suspected of forming biofilms, which could enhance its pathogenicity and persistence in medical devices such as catheters [11, 12].
Notably, *Cedecea lapagei* infections in the urinary tract are exceedingly uncommon, as highlighted in the systematic review by Al-Kassab-Cordova *et al.*, where only one case of UTI was reported among the 20 cases analyzed [2]. This suggests that our case is among the first documented cases of *C. lapagei* UTI in Naples, further emphasizing its rarity in this region. It is essential to highlight the need for reporting such cases to help refine our understanding of the bacterium's geographic distribution and clinical impact. Its rarity in European regions, particularly Italy, also underscores the importance of reporting and surveillance to better understand its geographic distribution.
Antibiotic susceptibility patterns revealed a concerning trend of resistance to commonly used antibiotics such as ampicillin (100%) and cephalothin (100%). While most isolates retained susceptibility to levofloxacin (87.5%), ciprofloxacin (81.3%), and other agents, the emergence of resistance underscores the importance of judicious antibiotic use and ongoing surveillance to guide empirical treatment choices [8]. The resistance profile of *C. lapagei* aligns with findings from other rare Gram-negative pathogens, emphasizing the critical need for individualized antimicrobial susceptibility testing to optimize therapeutic strategies.
Reviewing the literature, most *Cedecea lapagei* iso-

lates exhibit variable antibiotic resistance profiles, necessitating individualized therapy guided by susceptibility testing. The frequent use of ciprofloxacin (25%) as the initial treatment modality reflects current clinical practice [2]. However, the observed resistance to ciprofloxacin in a subset of isolates highlights the need for careful consideration of alternative agents, particularly in cases with risk factors for resistance or when clinical response is suboptimal [13-16].

From a broader perspective, our findings add to the growing evidence that *Cedecea lapagei* may be an underestimated opportunistic pathogen, particularly in hospitalized or immunocompromised patients. Its association with biofilm formation, as observed in related species, suggests that infections involving medical devices such as urinary catheters may represent an important route of colonization.

In this case, the pathogen's susceptibility to ciprofloxacin and fosfomycin allowed for effective treatment. However, resistance to beta-lactams and some carbapenems has been reported in other cases, often mediated by beta-lactamase enzymes such as blaNDM-1 or blaCTX-M [17]. This underscores the need for accurate diagnostic methods, including molecular typing, to identify resistance mechanisms and guide therapy [18].

These findings provide valuable insights into the epidemiology, clinical characteristics, and antimicrobial susceptibility patterns of *Cedecea lapagei* infections. Further research is warranted to elucidate the pathogenesis, optimize treatment strategies, and improve outcomes in patients infected with this emerging pathogen. In addition, educational initiatives targeting healthcare professionals may help bridge the knowledge gap regarding this rare bacterium, ensuring timely and appropriate diagnosis and treatment.

Given the increasing prevalence of multidrug-resistant pathogens in healthcare settings, the identification and reporting of cases like ours are critical. This case not only enriches the limited literature on *Cedecea lapagei* but also serves as a reminder of the importance of considering uncommon pathogens in the differential diagnosis of UTIs.

CONCLUSION

This case highlights the critical need to consider uncommon pathogens such as *Cedecea lapagei* when evaluating recurrent UTIs, particularly in elderly patients with multiple comorbidities and risk factors. The patient's favorable outcome after targeted therapy underscores the importance of personalized treatment based on antimicrobial susceptibility testing. Prompt and accurate identification of the pathogen, supported by comprehensive microbiological testing, is crucial to achieving timely and favorable clinical outcomes. The wide variability in antimicrobial resistance patterns observed in this case further emphasizes the importance of performing targeted susceptibility testing. This ensures the use of appropriate and effective therapies, particularly when dealing with multidrug-resistant strains. The emergence of resistance in such a rare pathogen necessitates vigilance from clinicians and microbiologists alike.

Given the limited number of reported cases worldwide, it is of utmost importance for microbiology laboratories to remain alert and capable of identifying rare and unusual organisms, especially in hospitalized or immunocompromised patients. The growing threat posed by multidrug-resistant pathogens highlights the need for healthcare facilities to implement robust antimicrobial stewardship programs.

Further research and detailed case reporting are essential to enhance our understanding of the epidemiology, virulence factors, and resistance mechanisms of *Cedecea lapagei*. Such efforts are necessary to develop effective diagnostic and treatment protocols, as well as to improve the clinical management of infections caused by this rare organism. Additionally, the broader implications of emerging pathogens like *Cedecea lapagei* underscore the importance of continued surveillance and education within the medical community to combat the increasing challenges of multidrug resistance.

Author contribution statement

All authors listed have significantly contributed to the investigation, development and writing of this article.

Conflicts of interest

None to declare.

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