

Chryseobacterium gleum Bloodstream Infection: First Reported Case in Morocco

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Abstract

Introduction: *Chryseobacterium gleum* is a rare non-fermenting Gram-negative bacillus increasingly recognized as an opportunistic healthcare-associated pathogen. It is mainly associated with bacteremia, ventilator-associated pneumonia, urinary tract infections, and catheter-related infections, particularly in patients with prolonged hospitalization and significant comorbidities. Reports of *C. gleum* bacteremia remain uncommon worldwide.

Case Report: We report the case of a 44-year-old Moroccan man admitted to the intensive care unit for severe heart failure. During a prolonged hospital stay, he developed persistent fever, marked inflammatory syndrome, and hemodynamic instability. Two blood cultures collected on separate days became positive after 14 and 16 hours of incubation and yielded *Chryseobacterium gleum*, identified by matrix-assisted laser desorption ionization–time of flight mass spectrometry (MALDI-TOF MS). Antimicrobial susceptibility testing revealed resistance to β -lactams and carbapenems, while susceptibility to amikacin, fluoroquinolones, trimethoprim-sulfamethoxazole, tigecycline, and colistin was preserved. The diagnosis of true bacteremia was supported by the positivity of multiple blood cultures, a short time to positivity, and a clinical presentation consistent with severe sepsis. Despite targeted antimicrobial therapy, the patient died from refractory cardiogenic and septic shock.

Conclusion: This report describes, to our knowledge, the first documented case of *Chryseobacterium gleum* bacteremia in Morocco. It highlights the importance of considering this emerging opportunistic pathogen in critically ill patients with prolonged hospitalization. Rapid identification by MALDI-TOF MS and appropriate antimicrobial susceptibility testing are essential for accurate diagnosis and optimal therapeutic management.

Keywords: *Chryseobacterium gleum*; Bacteremia; Bloodstream Infection; MALDI-TOF MS; Antimicrobial Resistance; Intensive Care Unit; Case Report

Introduction

Chryseobacterium gleum (*C. gleum*) is a Gram-negative, non-fermenting, strictly aerobic bacillus that is catalase- and oxidase-positive and is rarely implicated in human disease [1]. The first human isolates were described in 1984 [2], but its recognition as an opportunistic pathogen was established worldwide through the SENTRY Antimicrobial Surveillance Program [3]. This opportunistic microorganism is primarily associated with healthcare-associated infections, particularly in patients with indwelling medical devices or underlying immunosuppression.

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Cases reported in the literature mainly include bacteremia, ventilator-associated pneumonia, urinary tract infections, and catheter-related infections. We report a case of *C. gleum* bacteremia in a Moroccan patient admitted to an intensive care unit and discuss the diagnostic challenges, antimicrobial resistance profile, and clinical implications of this emerging pathogen.

Case Report

We report the case of a 44-year-old Moroccan man with no significant past medical history who was admitted to the intensive care unit for severe heart failure.

During hospitalization, the patient developed an initial infectious episode characterized by leukocytosis, elevated C-reactive protein (CRP, 192 mg/L), and a procalcitonin level of 0.49 ng/mL. Initial microbiological investigations, including urine culture, sputum culture, and blood cultures, were negative. The infection was attributed to phlebitis associated with gluteal erythema. Empirical treatment with ceftriaxone and gentamicin was initiated, resulting in transient clinical improvement.

Hospitalization was prolonged beyond 21 days because of persistent hemodynamic instability requiring close monitoring while awaiting potential valvular surgery. During this period, the patient's condition deteriorated, with persistent fever, a marked inflammatory response (CRP 200 mg/L), and worsening hemodynamic instability.

Two blood cultures collected on separate days yielded positive results after 14 and 16 hours of incubation, respectively. Both cultures grew *Chryseobacterium gleum*, which was identified by matrix-assisted laser desorption ionization–time of flight mass spectrometry (MALDI-TOF MS). Culture on blood agar revealed smooth, shiny, non-hemolytic colonies. Gram staining demonstrated Gram-negative bacilli that were catalase- and oxidase-positive.

Antimicrobial susceptibility testing was performed on both isolates according to the European Committee on Antimicrobial Susceptibility Testing (EUCAST) recommendations for non-fermenting Gram-negative bacilli using Mueller–Hinton agar. Minimum inhibitory concentrations (MICs) were determined using the automated Phoenix™ system (BD). Both isolates exhibited an identical susceptibility profile, showing susceptibility to amikacin, fluoroquinolones, and trimethoprim-sulfamethoxazole, while resistance to beta-lactams and carbapenems was observed (Table 1).

Antibiotic	MIC (mg/l)	Interpretation
Ampicillin	>16	R
Ticarcillin	>16	R
Amoxicillin/Clavulanic Acid	>32/2	R
Ticarcillin/ Clavulanic Acid	>16	R
Piperacillin/Tazobactam	>16	R
Ceftazidime	>8	R
Ceftriaxone	>4	R
Cefixime	>4	R
Cefipime	>8	R
Imipenem	>4	R
Ertapenem	>2	R
Meropenem	>8	R
Amikacin	<16	S
Tobramycin	<2	S

Trimethoprim /Sulfamethoxazol	≤2/38	S
Ciprofloxacin	≤0.5	S
Tigecycline	2	S
Colistin	<2	S

Table 1: Antimicrobial susceptibility profile of the *Chryseobacterium gleum* isolate.

Despite the initiation of targeted antimicrobial therapy, the patient died in the setting of refractory cardiogenic and septic shock.

Discussion

Chryseobacterium gleum was initially described in 1983 as *Flavobacterium gleum* and was subsequently reclassified into the genus *Chryseobacterium* in 1994. It belongs to the family Flavobacteriaceae [1]. The first human clinical isolates were reported in 1984 by Holmes, *et al.* from vaginal specimens [2]. However, *C. gleum* was not recognized as a significant human pathogen until the SENTRY Antimicrobial Surveillance Program (1997-2001) highlighted its clinical relevance. Despite this recognition, *C. gleum* remains an uncommon pathogen, accounting for only 4% of *Chryseobacterium* isolates collected worldwide [3].

Cases of *C. gleum* infection have been reported across several regions, including Africa (Senegal) [4], Asia (India) [5,6], Europe (Croatia) [7], the Mediterranean region (Qatar and Saudi Arabia) [8,9], and North America (United States) [10]. To the best of our knowledge, this represents the first documented case of *C. gleum* septicemia in Morocco.

C. gleum is an opportunistic pathogen associated with a variety of infections, including respiratory tract infections, urinary tract infections, septicemia, meningitis, wound infections, and peritonitis [1,7]. It is widely distributed in the environment, including soil, water, and plants, as well as on hospital surfaces and medical devices. Its ability to form biofilms, combined with resistance to chlorination, promotes adherence to indwelling devices and likely contributes to its involvement in healthcare-associated infections [11].

This organism primarily affects elderly, debilitated, or immunocompromised individuals. Predisposing factors include smoking, which has been associated with increased susceptibility to bacterial infections [12], chronic underlying diseases, prolonged hospitalization, and prior antibiotic exposure exceeding 14 days [1,4,13].

A retrospective study comparing *C. gleum* and *Chryseobacterium indologenes* based on 126 isolates demonstrated that most infected patients had at least one comorbidity, with cardiovascular diseases being the most common. Furthermore, more than half of the *C. gleum* isolates were recovered from blood cultures, supporting its apparent predilection for bloodstream infections [14]. These findings are consistent with our case, in which the patient had severe heart failure and prolonged hospitalization complicated by an initial infectious episode and persistent hemodynamic instability. Several cases of *C. gleum* septicemia have been reported to date, the first involving an immunocompromised adult in Croatia [7], while the most recent case described a 2-year-old child with recurrent fever following COVID-19 infection in Italy [15].

In the present case, *C. gleum* was isolated from both blood culture sets submitted to the microbiology laboratory. Phlebitis associated with gluteal erythema may have represented the portal of entry, although this hypothesis remains speculative in the absence of microbiological sampling from the skin lesion. Nevertheless, the overall clinical and microbiological findings strongly suggest a healthcare-associated infection, consistent with the epidemiological profile of an opportunistic nosocomial pathogen.

From a microbiological perspective, *C. gleum* is a non-fermenting, strictly aerobic, non-motile Gram-negative bacillus measuring approximately 2 - 3 µm in length, with rounded ends. Colonies are typically circular, smooth, mucoid, yellow-pigmented, and non-

hemolytic on horse blood agar. The organism is catalase-, oxidase-, and indole-positive and grows at temperatures ranging from 20°C to 42°C but not at 5°C [2]. These characteristics were largely consistent with those observed in our isolate.

Accurate identification of *C. gleum* cannot rely solely on phenotypic or biochemical characteristics, as confusion with *C. indologenes* is common. Conventional commercial identification systems have demonstrated limited reliability and frequently misidentify these species, potentially leading to underestimation of their true involvement in invasive infections. Definitive identification requires either 16S rRNA gene sequencing or MALDI-TOF mass spectrometry [16]. In our case, MALDI-TOF MS enabled rapid and reliable identification of the organism from both blood culture isolates.

Several findings support the diagnosis of true bacteremia rather than contamination, including the positivity of two blood cultures collected on different days, the short time to positivity, the presence of severe sepsis with hemodynamic instability, and the absence of any alternative pathogen isolated during the clinical course.

From a therapeutic standpoint, *C. gleum* exhibits intrinsic resistance to β -lactam antibiotics and carbapenems, including piperacillin-tazobactam, whereas susceptibility to aminoglycosides, fluoroquinolones, and trimethoprim-sulfamethoxazole is generally preserved [7,15,17,18]. This susceptibility profile is consistent with the findings observed in our isolate.

Resistance mechanisms are mainly attributed to the production of metallo- β -lactamases, which confer resistance to carbapenems and other β -lactam antibiotics. Similar mechanisms have been demonstrated through whole-genome sequencing studies of *C. indologenes*, a species closely related to *C. gleum* [17].

Current evidence suggests that fluoroquinolones, amikacin, and trimethoprim-sulfamethoxazole remain the most reliable therapeutic options for *C. gleum* infections [15,18]. The susceptibility profile of our isolate supports the potential effectiveness of these agents while emphasizing the importance of continuous surveillance for emerging antimicrobial resistance.

In our patient, the unfavorable outcome occurred in the context of severe heart failure complicated by refractory cardiogenic and septic shock. This case illustrates the potential severity of *C. gleum* infections in critically ill patients with significant comorbidities. As the first reported Moroccan case of *C. gleum* septicemia, it highlights the emergence of this opportunistic pathogen and underscores the importance of accurate microbiological identification and appropriate management of healthcare-associated infections in high-risk patients.

Conclusion

Chryseobacterium gleum is a rare but potentially severe opportunistic pathogen, particularly in immunocompromised or medically fragile patients. Prolonged hospitalization and the presence of invasive medical devices appear to be important risk factors for *C. gleum* bacteremia. Given its intrinsic resistance to β -lactam antibiotics, rapid identification using MALDI-TOF MS, combined with comprehensive antimicrobial susceptibility testing, is essential to guide appropriate antimicrobial therapy. This case highlights the need for increased awareness of emerging non-fermenting Gram-negative bacilli in healthcare settings and emphasizes the importance of continued microbiological surveillance.

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