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Burkholderia gladioli bacteremia in a patient with chronic obstructive pulmonary disease: An unusual clinical scenario

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ABSTRACT

Burkholderia gladioli (B. gladioli), once recognized as a plant pathogen, is increasingly linked to infections in immunocompromised patients. We report a case of *B. gladioli* bacteremia in a 57-year-old male with chronic obstructive pulmonary disease and diabetes mellitus. He presented with fever, dyspnea, and cough. A chest X-ray revealed a left lower zone consolidation. Blood cultures identified *B. gladioli* using matrix-assisted laser desorption ionization-time of flight and VITEK 2 automated identification systems. The isolate was sensitive to piperacillin-tazobactam and trimethoprim-sulfamethoxazole, leading to complete recovery. This case highlights the emerging role of *B. gladioli* as an opportunistic pathogen and the importance of early diagnosis and treatment.

Introduction

Burkholderia spp. are a genus of gram-negative, aerobic bacteria found in water, soil, and plants, comprising over 60 species. Burkholderia gladioli *(B. gladioli)*, initially identified as a plant pathogen (1), was recognized as a human pathogen in 1995 (2). Though rare, it is now considered an opportunistic pathogen, particularly in individuals with cystic fibrosis, chronic granulomatous disease, or immunocompromised states (1). It has been linked to respiratory tract colonization and, less commonly, systemic infections. This case report highlights the unusual isolation of *B. gladioli* from blood samples, emphasizing its emerging clinical significance. Elderly and immunocompromised patients, especially those with underlying conditions like chronic obstructive pulmonary disease (COPD), are at increased risk. Prompt identification and appropriate antimicrobial therapy are crucial for management, underscoring the need for greater awareness among clinicians about this evolving pathogen.

Case Presentation

A 57-year-old man was admitted to the emergency department with progressive breathlessness for three days, productive cough for two days, and low-grade fever in the last 24 hours. His medical history was remarkable for type 2 diabetes

mellitus and COPD which had been managed with intermittent prednisolone. His breathlessness was of sudden onset and severe at rest, accompanied by wheezing, especially at night and early morning. The cough was scanty, mucoid, and non-bloody.

On his physical examination, the patient was alert and oriented. Arterial blood pressure was 110/80 mmHg, pulse rate was 110/min, body temperature was 99 °F, respiratory rate was 37 breaths/min, and SpO_2 was 90% with no supplement. Auscultation revealed bilateral suprascapular crepitations and diffuse rhonchi. Grade 1 clubbing was also detected. A chest X-ray showed left lower zone consolidation (Figure 1A). *B. gladioli* was isolated from blood cultures, and sputum culture showed normal oropharyngeal flora. Table 1 summarizes the laboratory findings.

The patient received piperacillin-tazobactam (4.5 g three times daily for 10 days) and oral trimethoprim-sulfamethoxazole (TMP-SMZ) (160/800 mg twice daily for five days), along with supportive care including bronchodilators, antacids, and steroids. The treatment was well-tolerated, with no adverse effects reported.

Microbiological evaluation

Blood samples were collected under sterile conditions and cultured in a BacT/ALERT® aerobic culture media bottle (bioMérieux, France). A bottle flagged as positive from the BacT/ALERT system prompted a subculture onto 5% sheep blood agar and MacConkey agar (HiMedia, Mumbai, India) using the streak plate method, followed by incubation at 37 °C for 24 to 48 hours.

Gram staining revealed rod-shaped, gram-negative bacilli (Figure 2A). Growth on 5% sheep blood agar showed round, moist, non-hemolytic colonies (Figure 2B). On MacConkey agar, pale, irregular, non-lactose fermenting colonies were observed (Figure 2C). Both catalase and oxidase tests returned positive results. Biochemical testing further indicated that arginine was not dehydrolyzed, and neither lysine nor ornithine was decarboxylated.

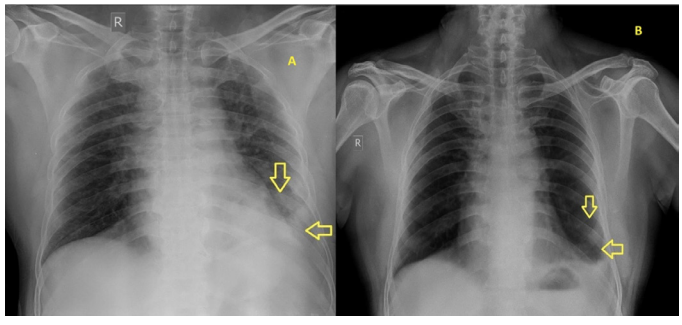

Figure 1. (A) Chest X-ray showed left lower zone consolidation. (B) Follow-up chest X-rays revealed resolution of the left lower zone consolidation and pulmonary infiltrates

The isolated bacteria were identified as *B. gladioli* with 99% probability using the VITEK 2 compact system with the gram-negative identification card (bioMérieux, Marcy L'Etoile, France) and the matrix-assisted laser desorption/ionization-time of flight (MALDI-ToF) system (bioMérieux, France).

Antibiotic susceptibility testing was performed using the automated turbidimetric VITEK 2 system (bioMérieux, France). The susceptibility cards were inoculated, and the minimum inhibitory concentrations in µg/mL were interpreted based on Clinical and Laboratory Standards Institute guidelines (3). The antibiotic susceptibility profile of the isolated bacteria showed resistance to aztreonam (≥64) but sensitivity to amoxicillin-clavulanate (≤2), piperacillin/tazobactam (≤4), ceftazidime (8), cefoperazone/sulbactam (≤8), cefepime (8), imipenem (≤0.5), meropenem (1), amikacin (≤1), gentamicin (≤1), ciprofloxacin (0.5), levofloxacin (1), minocycline (2), and TMP-SMZ (≤20).

The patient demonstrated significant clinical improvement within one week of antibiotic therapy, which included intravenous piperacillin-tazobactam (4.5 g every eight hours for 10 days) and oral TMP-SMZ (160/800 mg twice daily for five days). Symptoms such as cough and fever subsided, and laboratory results normalized, including a decrease in leukocyte count (9,184 cells/mm^3), erythrocyte sedimentation rate (13 mm/hr), and C-reactive protein (0.3 mg/L), indicating the resolution of infection and inflammation. Liver enzyme levels also returned to normal [serum glutamic-oxaloacetic transaminase (SGOT): 27 U/L, serum glutamic-pyruvate transaminase (SGPT): 31 U/L]. Follow-up chest X-rays revealed resolution of the left lower zone consolidation and pulmonary infiltrates (Figure 1B). Repeat blood cultures showed no growth. After a 12-day hospital stay, the patient was discharged in a stable condition. On subsequent follow-up visits, he reported no recurrence of breathlessness, fever, or cough.

Discussion

B. gladioli is primarily a plant pathogen but has been rarely linked to human infections. Infections in healthy individuals, typically neutralized by human serum or complement factors, are exceptionally rare (2,4). Most cases occur in individuals with underlying conditions such as diabetes, acquired immunodeficiency syndrome, cystic fibrosis, chronic granulomatous disease, or organ transplant recipients (2,5). The present report involves a patient with a history of pneumonia, commonly associated with *B. gladioli* infections, highlighting its role as an opportunistic pathogen.

The limited evidence on *B. gladioli* and its antibiotic resistance highlights the potential for complicated clinical outcomes. Reported complications include pneumonia, mediastinal abscess, bacteremia, osteomyelitis, maxillary sinusitis, and early neonatal or nosocomial sepsis. Notably, no evidence of person-to-person transmission has been documented (5).

Table 1. Blood parameters recorded during admission day

Tests	Observed value	Unit	Reference range	Inference
Hemoglobin	11.8	g/dL	13.0-17.0	Low
Total leucocyte count	23.350	cells/mm^3	4000.0-10000.0	Raised
Neutrophils	83.9	%	40.0-80.0	Raised
Lymphocytes	8.9	%	20.0-40.0	Low
Monocytes	7	%	2.0-10.0	Normal
Erythrocyte sedimentation rate	22	mm/hr	0.0-14.0	Raised
Platelet count	200.000	cells/mm^3	1.5x10^5-4.1x10^5	Normal
A/G ratio	1.36		1.0-2.1	Normal
Bilirubin total	0.72	mg/dL	0.2-1.3	Normal
Bilirubin, direct	0.25	mg/dL	0.0-0.4	Normal
Bilirubin, indirect	0.47	mg/dL	0.0-0.75	Normal
SGOT	77	U/L	5.0-30.0	Raised
SGPT	68	U/L	4.0-36.0	Raised
Alkaline phosphatase	60	U/L	38.0-126.0	Normal
Blood urea	53	mg/dL	16.6-48.5	Raised
Creatinine	1.4	mg/dL	0.7-1.4	Normal

SGOT: Serum glutamic-oxaloacetic transaminase, SGPT: Serum glutamic-pyruvate transaminase

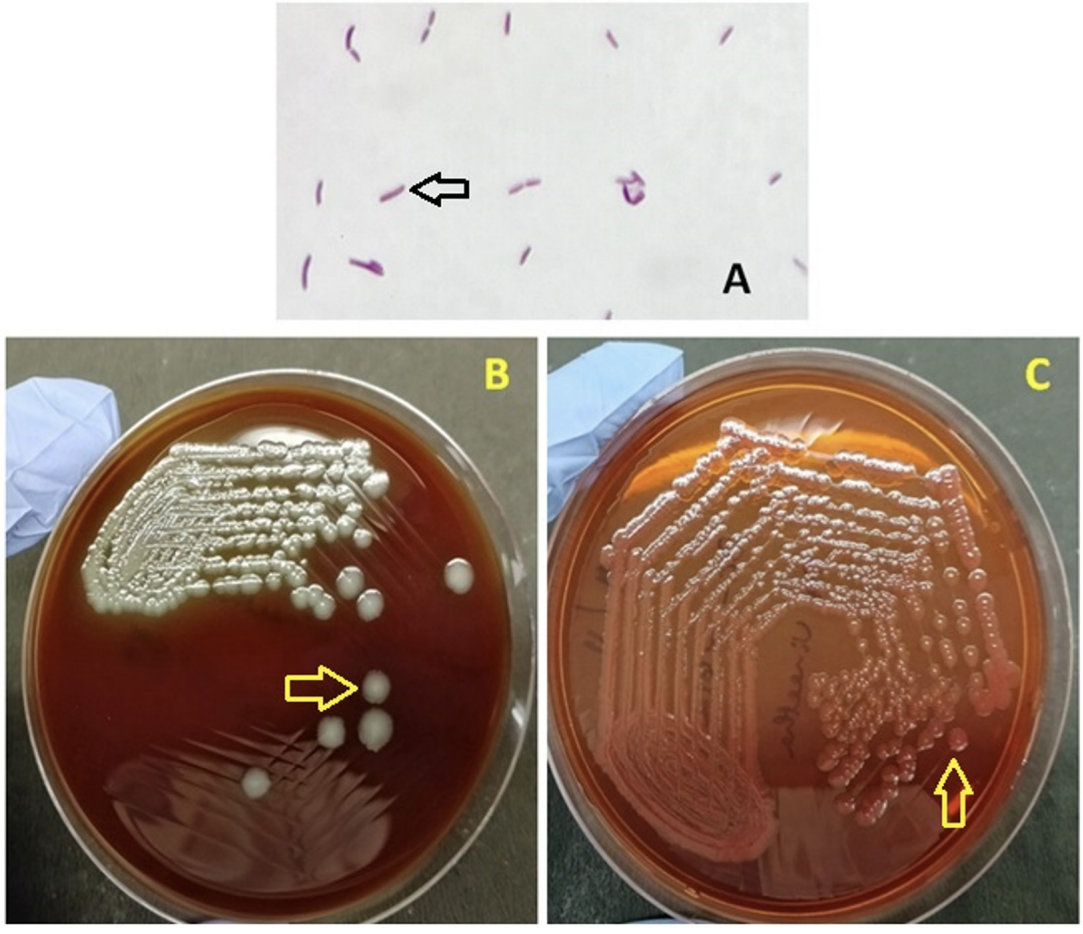

Figure 2. (A) Gram staining revealed rod-shaped, gram-negative bacilli. (B) Growth on 5% sheep blood agar showed round, moist, non-hemolytic colonies. (C) On MacConkey agar, pale, irregular, non-lactose fermenting colonies were observed

B. gladioli is underreported due to its fastidious nature and lack of standardized identification methods (4). Accurate identification is critical for effective treatment. Our laboratory addressed these challenges by utilizing an integrated approach that combines an automated microbial identification system, MALDI-ToF, and the VITEK 2 compact system, ensuring reliable and timely pathogen detection.

Treating *B. gladioli* infections can be challenging due to various antibiotic resistance mechanisms, including beta-lactamase production, plasmid-mediated resistance, and biofilm formation (6). In our case, the bacterium was not multidrug-resistant, and the patient responded well to a combination of piperacillin-tazobactam and TMP-SMZ.

Patients with *B. gladioli* infections have been treated with regimens like meropenem and TMP-SMZ, with favorable outcomes. However, discrepancies between in vitro sensitivity and in vivo effectiveness, and host-pathogen complexities can lead to treatment failure. Quon et al. (7) reported cases of clinical deterioration or death despite TMP-SMZ and meropenem therapy. Other authors suggested levofloxacin, cefazolin, and gentamicin as potential options (2). Treatment decisions should consider clinical presentation, underlying conditions, and susceptibility profile rather than relying solely on specific antibiotics to optimize the outcomes.

Conclusion

The present case report adds to the existing literature on *B. gladioli* isolated from blood samples in immunocompromised elderly patients, highlighting its emerging role as an opportunistic pathogen. It also emphasizes the importance of timely identification and management to optimize patient outcomes.

Ethics

Informed Consent: Consent was granted by the patient's next of kin.

Footnotes

Authorship Contributions

Consept: A.A.A., V.K.K., Design: A.A.A., V.K.K., Data Collection or Processing: A.A.A., V.T., Analysis or Interpretation: A.A.A., V.K.K., V.T., Literature Search: A.A.A., V.K.K., V.T., Writing: A.A.A., V.T.

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