

## Case report

**Brevibacterium Luteolum** bacteremia: A case report and literature review

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## ABSTRACT

*Brevibacterium* species are to be opportunistic pathogens. Although rare, several case reports have mentioned infections ranging from cutaneous infections to bacteremia. Here, we present a case report describing a 64-year-old male pancreatic cancer patient diagnosed with *B. luteolum* bacteremia.

## Introduction

*Brevibacterium* genus is a heterogeneous group of bacteria that are coryneform, diphtheroid, aerobic growing, gram-positive, and non-motile. *Brevibacterium* Colonies are whitish and grey and have a characteristic cheese-like odor. Additionally, it appears as V-in Y-shaped arrangements or in clumps that resemble Chinese letters.

Until now, 50 different *Brevibacterium* (*B*) species have been discovered [1]. However, 9 of those species are isolated from human samples, which are *B. linens*, *B. casei*, *B. epidermidis*, *B. iodinum*, *B. mcbrellneri*, *B. otitis*, *B. paucivorans*, *B. sanguinis*, and *B. massiliense* [2]. The most common organism is *B. casei*, reported in 9 out of 20 cases since the first case was discovered in 1991 [3]. In this case report, *B. luteolum* has been highlighted in an immunocompromised patient.

## Case presentation

A 64-year-old non-smoker male known to have type 2 diabetes mellitus (DM) was first diagnosed fifteen years ago on oral hypoglycemic agents and basal insulin with poor compliance. Additionally, he was recently diagnosed with hypothyroidism on levothyroxine replacement therapy. He has bilateral nephrolithiasis with moderate hydronephrosis and mild benign prostatic hyperplasia. The patient is known to have advanced pancreatic ductal adenocarcinoma, diagnosed five months

before his presentation. He received five cycles of paclitaxel and gemcitabine starting three months before his presentation. His last chemotherapy cycle was three weeks before his presentation. He had no central line inserted as he received his chemotherapy via peripheral lines. He presented to the emergency department (ED) complaining of five days history of generalized body aches, chills, and poor appetite, which was associated with a fever of 39 °C documented at home, which he could control with acetaminophen. He had a history of chronic dysuria while denying any flank pain. He denied any neurological, respiratory, or gastrointestinal symptoms. He also denied any recent travels or contact with sick patients, but he admitted contact with camels and a history of raw milk ingestion.

Physical examination at ED showed blood pressure was 110/70 mmHg, heart rate 101 beats per minute, respiratory rate was 19 breaths per minute, the temperature was 38.2 °C, and oxygen saturation was 100% on room air. Basic laboratory screening was also unremarkable other than normocytic normochromic anemia with hemoglobin of 10 g/dL and mild lymphopenia of  $0.93 \times 10^9$  cells/L. Other investigations showed an elevated erythrocyte sedimentation rate (ESR) of 78 mm/hr, C-reactive protein (CRP) of 133.0 mg/L, and lactate dehydrogenase (LDH) level of 272 U/L. The patient tested negative for COVID-19, and his urinalysis was unremarkable (Table 1). A septic screen, including blood, urine, and respiratory cultures, was performed. His chest radiograph was unremarkable (Fig. 1). The patient was discharged home on

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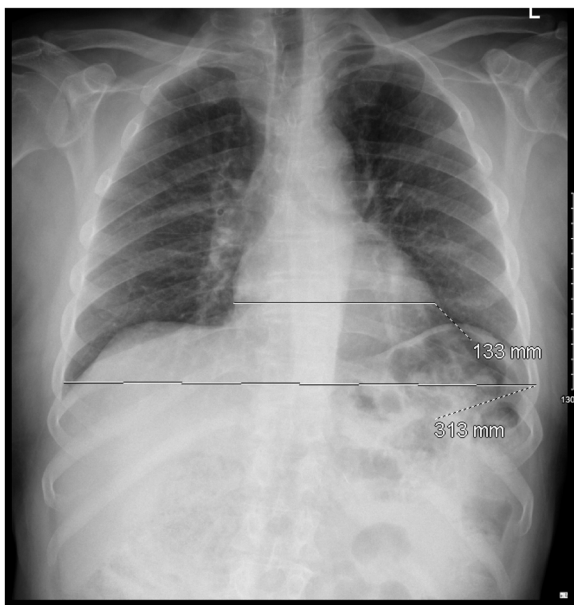
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**Table 1**  
Laboratory investigation of the patient upon initial presentation.

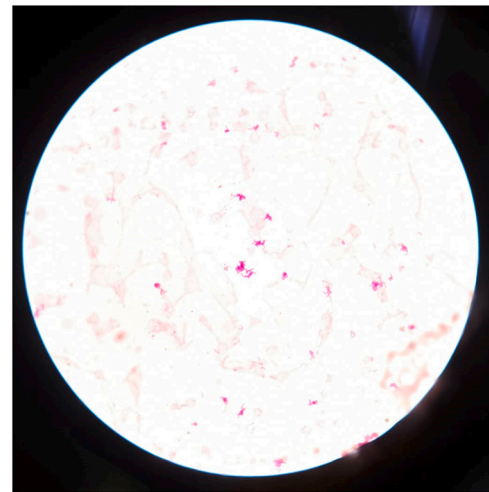
Parameter	Value	Reference range
Hemoglobin	10.0	13.0 – 18.0 g/dL
WBC	8.1	4.0 – 11.0 × 10 <sup>9</sup> /L
Neutrophil count	5.97	2.0 – 7.5 × 10 <sup>9</sup> /L
Platelet count	452	150 – 450 × 10 <sup>9</sup> /L
Lymphocyte count	0.93	1.5 – 4.0 × 10 <sup>9</sup> /L
Potassium	4.4	3.5 – 4.9 mmol/L
Sodium	133	135 – 144 mmol/L
LDH	272	100 – 217 U/L
Creatine Kinase (CK)	27	45 – 200 IU/L
High Sensitivity Troponin I	2.00	1.9 – 15.6 pg/mL
Creatinine	68	65 – 112 µmol/L
Blood Urea Nitrogen (BUN)	3.3	2.8 – 7.4 mmol/L
Direct Bilirubin	2.8	0 – 9 µmol/L
Total Bilirubin	5.3	3.4 – 22.1
Total Protein	51	66 – 83 g/L
Albumin	29	39 – 50 g/L
Glutamine Aminohydrolase (GGT)	22	11 – 68 IU/L
Aspartate Aminotransferase (AST)	13	5 – 34 IU/L
Alanine Transaminase (ALT)	12	7 – 44 U/L
Alkaline phosphatase	58	39 – 114 U/L
INR	1.1	0.8 – 1.2
Procalcitonin	0.07	< 0.25 µg/L
CRP (JD)	133.0	0 – 5 mg/L
ESR	78	0 – 15 mm/hr
COVID-19 PCR	Negative	
Brucella IgM	Negative	
Brucella IgG	Negative	
Urinalysis		
Nitrite	Negative	
Leukocyte Esterase	Negative	



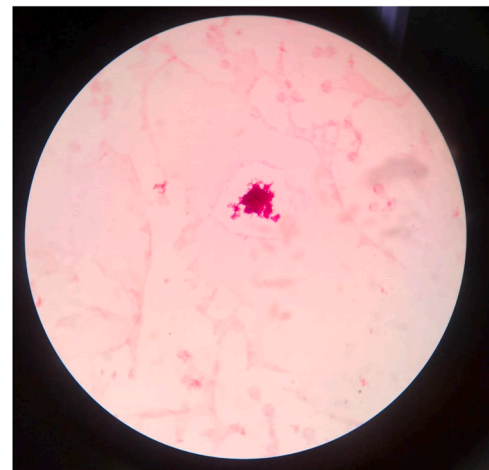
**Fig. 1.** Chest x ray of the patient, which was unremarkable.

ciprofloxacin 500 mg twice daily for presumed urinary tract infection (UTI).

Later, the patient was called back to the ED as his blood culture was positive for *B. luteolum* after three days of incubation, identified by using Matrix-assisted laser desorption/ionization-time of flight (MALDI-TOF). The gram stain smear from the culture plate showed short gram-positive bacilli (Fig. 2) and gram-positive bacilli with diphtheroid morphology (Fig. 3). On the other hand, his urine culture was negative. After returning to the hospital, he reported no improvement in his symptoms while on ciprofloxacin, and his fever would return whenever he did not



**Fig. 2.** Gram stain from blood culture showing short gram positive bacilli.



**Fig. 3.** Gram stain from the blood culture showing gram positive bacilli with diphtheroid morphology.

take acetaminophen. Upon further assessment, he was found to be febrile (38 °C); otherwise, the rest of his vitals were unremarkable. The patient was admitted to the hospital and started on intravenous vancomycin as monotherapy. The sensitivity was reported later; the organism was sensitive to vancomycin. However, it was resistant to penicillin and clindamycin. Two days later, the fever subsided, and repeated blood culture after 48 h from starting vancomycin revealed negative results. Additional work-up of the patient revealed negative brucella serology and a negative test for Q-fever. An echocardiogram was negative for any vegetations. The patient stayed in the hospital for 14 days, completed his 14 days of vancomycin, and was discharged home in good health.

## Discussion

*Brevibacterium* is mainly found in habitat that has high salt concentration [4]. Also, it contributes to the aroma and color of the dairy product, body, human microbiota, and animals [5,6]. Furthermore, *Brevibacterium* was considered to be a contaminant, non-pathogenic bacterium. Nowadays, it is possibly emerged to be an opportunistic pathogen with rising numbers of reported cases. *Brevibacterium* needs comprehensive chemical testing to be identified as it should be differentiated from other coryneform pathogens. The most helpful technique is Matrix-assisted laser desorption/ionization-time of flight (MALDI-TOF), which was used in our case. A different method is API Coryne

System (bioMérieux, USA), but it has inaccurate results [3].

To expand on the cases of the studies related to *Brevibacterium* infection among the 20 reported cases, *Brevibacterium* was found to be participating in patients with multiple comorbidities and immunocompromised patients such as patients with hematological malignancy including acute lymphoblastic leukemia (ALL), chronic lymphocytic leukemia (CLL), and non-Hodgkin lymphoma [7]. Prostatic choriocarcinoma and breast cancer have been associated with *Brevibacterium* [9, 10]. Acquired immunodeficiency syndrome (AIDS) was reported as well, in addition to the patients with an implanted foreign body like an indwelling catheter and prosthetic valve [11,12].

Although *Brevibacterium* is considered a low pathogeny skin flora, literature has shown that it participates in septicemia. Of all twenty reported cases, fourteen were reported as bacteremia, part of which ten patients had an indwelling catheter. The catheter contributed to arbitrating skin integrity, which is the main part of the pathogen resulting in catheter-related bloodstream infection (CR-BSI) [13]. Dass et al. reported a patient with endocarditis with a prosthetic heart valve. Thus, any incriminated foreign body should be considered a risk that may contribute to infection [12]. The elimination of the foreign body must be part of the patient's management [12]. On the other hand, Cannon et al. reported a case that presented with pericardial effusion [14]. The *Brevibacterium* was found to be pyogenic as Kumar et al. reported a patient who presented with neurological symptoms and was found to have a brain abscess [8]. Moreover, Hossain et al. reported a case presented with bacteremia, and with further investigation, a liver abscess was discovered [15]. Furthermore, Eidensohn et al. report a patient with osteomyelitis [3].

*Brevibacterium* showed a preferable prognosis as most reported cases improved 48–72 h after the treatment [5]. Our patient presented with febrile illness and improved 2–3 days after starting appropriate management. Most of the reported cases were treated with broad-spectrum antibiotics, such as vancomycin, teicoplanin, aminoglycosides, beta-lactamase, and fluoroquinolones [13]. However, despite the adequate treatment, 6 out of 20 cases report a recurrent infection of *Brevibacterium* [15]. Some reported patients had implanted catheters, where removing the implanted foreign body was impossible as it was critical to their underlying disease. Using vancomycin as a lock therapy was shown to be effective in combination with intravenous vancomycin. This assists in clearing uncomplicated bacteremia as well, as it may be used to keep the precious implanted foreign body in place [4–8].

In conclusion, through literature, only 20 cases of *Brevibacterium* infection were reported worldwide. It is important for physicians and microbiologists to be aware that *Brevibacterium* is an uncommon but essential agent that can cause opportunistic infections in patients with immunocompetent and immunocompromised conditions. In this report, we describe a case in which *Brevibacterium luteolum* bacteremia was successfully treated only with intravenous vancomycin for fourteen days, with the patient stabilized and discharged in good medical health.

#### Ethical approval

N/A.

#### Funding

None.

#### Consent

The patient provided verbal and written consent for publication.

#### CRedit authorship contribution statement

**Sahar Baloush, Kawlah Samarin:** Care of patient, writing, and editing manuscript. **Abdulfatah Al-Amri:** Care of the patient, Editing of the manuscript. **Abulhakeem Althaqafi:** Care of patient and review of the manuscript. **Adeeb Munshi, Asim Alsaedi:** Care of patient, writing, editing, submitting, and revising manuscript.

#### Declaration of Competing Interest

The authors report no declarations of interest.

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