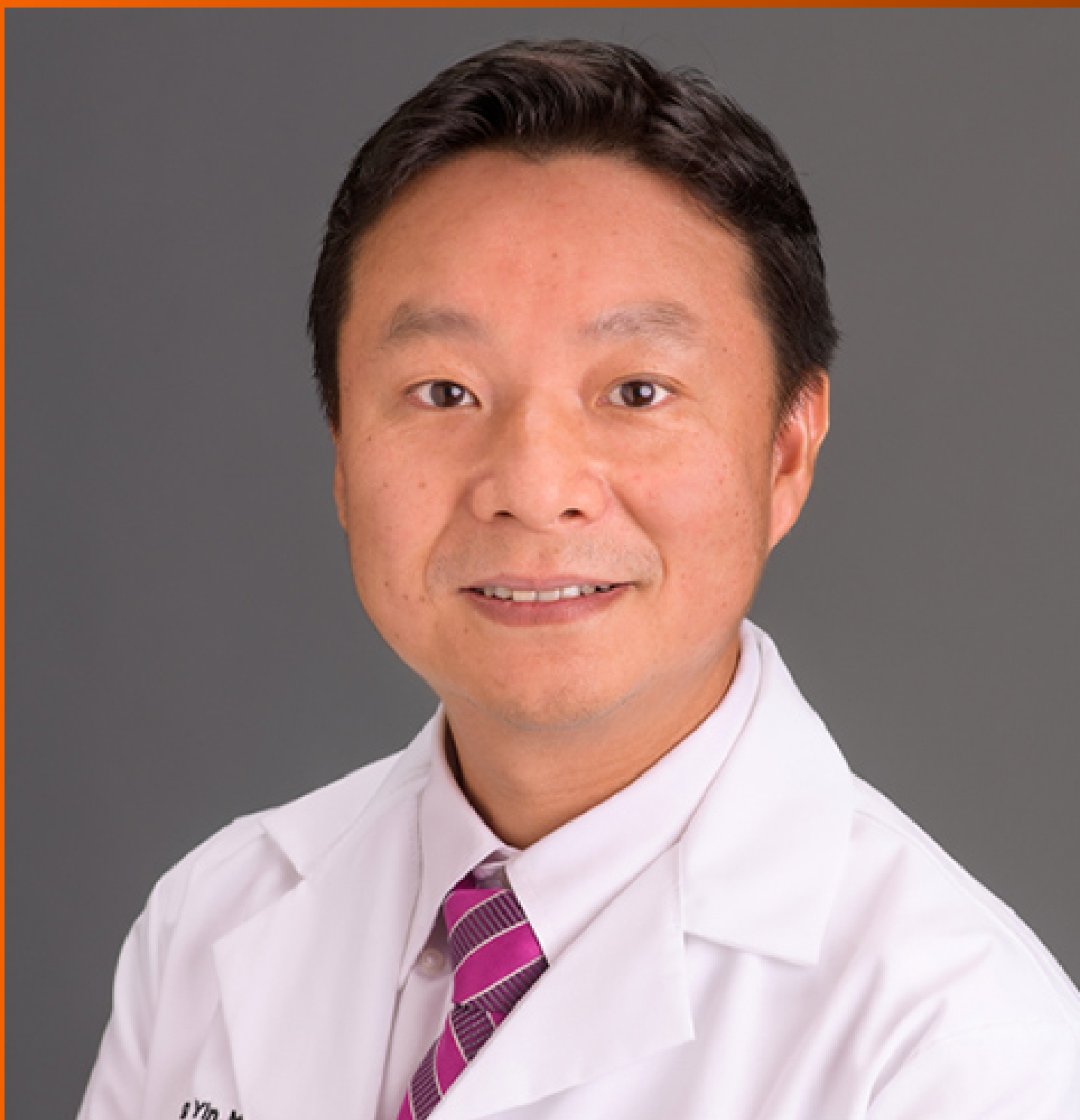


World Journal of *Clinical Cases*

World J Clin Cases 2022 March 6; 10(7): 2053-2362



Contents

Thrice Monthly Volume 10 Number 7 March 6, 2022

FIELD OF VISION

- 2053** Personalized treatment - which interaction ingredients should be focused to capture the unconscious
Steinmair D, Löffler-Stastka H

MINIREVIEWS

- 2063** Patterns of liver profile disturbance in patients with COVID-19
Shousha HI, Ramadan A, Lithy R, El-Kassas M

ORIGINAL ARTICLE

Clinical and Translational Research

- 2072** Prognostic and biological role of the N-Myc downstream-regulated gene family in hepatocellular carcinoma
Yin X, Yu H, He XK, Yan SX

Case Control Study

- 2087** Usefulness of the acromioclavicular joint cross-sectional area as a diagnostic image parameter of acromioclavicular osteoarthritis
Joo Y, Moon JY, Han JY, Bang YS, Kang KN, Lim YS, Choi YS, Kim YU
- 2095** Correlation between betatrophin/angiogenin-likeprotein3/lipoprotein lipase pathway and severity of coronary artery disease in Kazakh patients with coronary heart disease
Qin L, Rehemuding R, Ainiwaer A, Ma X

Retrospective Study

- 2106** Postoperative adverse cardiac events in acute myocardial infarction with high thrombus load and best time for stent implantation
Zhuo MF, Zhang KL, Shen XB, Lin WC, Hu B, Cai HP, Huang G
- 2115** Develop a nomogram to predict overall survival of patients with borderline ovarian tumors
Gong XQ, Zhang Y

Clinical Trials Study

- 2127** Diagnostic performance of Neutrophil CD64 index, procalcitonin, and C-reactive protein for early sepsis in hematological patients
Shang YX, Zheng Z, Wang M, Guo HX, Chen YJ, Wu Y, Li X, Li Q, Cui JY, Ren XX, Wang LR
- 2138** Previously unexplored etiology for femoral head necrosis: Metagenomics detects no pathogens in necrotic femoral head tissue
Liu C, Li W, Zhang C, Pang F, Wang DW

Observational Study

- 2147** Association of types of diabetes and insulin dependency on birth outcomes
Xaverius PK, Howard SW, Kiel D, Thurman JE, Wankum E, Carter C, Fang C, Carriere R
- 2159** Pathological pattern of endometrial abnormalities in postmenopausal women with bleeding or thickened endometrium
Xue H, Shen WJ, Zhang Y
- 2166** *In vitro* maturation of human oocytes maintaining good development potential for rescue intracytoplasmic sperm injection with fresh sperm
Dong YQ, Chen CQ, Huang YQ, Liu D, Zhang XQ, Liu FH
- 2174** Ultrasound-guided paravertebral nerve block anesthesia on the stress response and hemodynamics among lung cancer patients
Zhen SQ, Jin M, Chen YX, Li JH, Wang H, Chen HX

META-ANALYSIS

- 2184** Prognostic value of YKL-40 in colorectal carcinoma patients: A meta-analysis
Wang J, Qi S, Zhu YB, Ding L
- 2194** Prognostic value of neutrophil/lymphocyte, platelet/lymphocyte, lymphocyte/monocyte ratios and Glasgow prognostic score in osteosarcoma: A meta-analysis
Peng LP, Li J, Li XF

CASE REPORT

- 2206** Endovascular stent-graft treatment for aortoesophageal fistula induced by an esophageal fishbone: Two cases report
Gong H, Wei W, Huang Z, Hu Y, Liu XL, Hu Z
- 2216** Quetiapine-related acute lung injury: A case report
Huang YX, He GX, Zhang WJ, Li BW, Weng HX, Luo WC
- 2222** Primary hepatic neuroendocrine neoplasm diagnosed by somatostatin receptor scintigraphy: A case report
Akabane M, Kobayashi Y, Kinowaki K, Okubo S, Shindoh J, Hashimoto M
- 2229** Multidisciplinary non-surgical treatment of advanced periodontitis: A case report
Li LJ, Yan X, Yu Q, Yan FH, Tan BC
- 2247** Flip-over of blood vessel intima caused by vascular closure device: A case report
Sun LX, Yang XS, Zhang DW, Zhao B, Li LL, Zhang Q, Hao QZ
- 2253** Huge gastric plexiform fibromyxoma presenting as pyemia by rupture of tumor: A case report
Zhang R, Xia LG, Huang KB, Chen ND
- 2261** Intestinal intussusception caused by intestinal duplication and ectopic pancreas: A case report and review of literature
Wang TL, Gong XS, Wang J, Long CY

- 2268** Mixed neuroendocrine-nonneuroendocrine neoplasm of the ampulla: Four case reports
Wang Y, Zhang Z, Wang C, Xi SH, Wang XM
- 2275** Y-shaped shunt for the treatment of Dandy-Walker malformation combined with giant arachnoid cysts: A case report
Dong ZQ, Jia YF, Gao ZS, Li Q, Niu L, Yang Q, Pan YW, Li Q
- 2281** Posterior reversible encephalopathy syndrome in a patient with metastatic breast cancer: A case report
Song CH, Lee SJ, Jeon HR
- 2286** Multiple skin abscesses associated with bacteremia caused by *Burkholderia gladioli*: A case report
Wang YT, Li XW, Xu PY, Yang C, Xu JC
- 2294** Giant infected hepatic cyst causing exclusion pancreatitis: A case report
Kenzaka T, Sato Y, Nishisaki H
- 2301** Cutaneous leishmaniasis presenting with painless ulcer on the right forearm: A case report
Zhuang L, Su J, Tu P
- 2307** Gastrointestinal amyloidosis in a patient with smoldering multiple myeloma: A case report
Liu AL, Ding XL, Liu H, Zhao WJ, Jing X, Zhou X, Mao T, Tian ZB, Wu J
- 2315** Breast and dorsal spine relapse of granulocytic sarcoma after allogeneic stem cell transplantation for acute myelomonocytic leukemia: A case report
Li Y, Xie YD, He SJ, Hu JM, Li ZS, Qu SH
- 2322** Synchronous but separate neuroendocrine tumor and high-grade dysplasia/adenoma of the gall bladder: A case report
Hsiao TH, Wu CC, Tseng HH, Chen JH
- 2330** Novel mutations of the Alström syndrome 1 gene in an infant with dilated cardiomyopathy: A case report
Jiang P, Xiao L, Guo Y, Hu R, Zhang BY, He Y
- 2336** Acute esophageal obstruction after ingestion of psyllium seed husk powder: A case report
Shin S, Kim JH, Mun YH, Chung HS
- 2341** Spontaneous dissection of proximal left main coronary artery in a healthy adolescent presenting with syncope: A case report
Liu SF, Zhao YN, Jia CW, Ma TY, Cai SD, Gao F
- 2351** Relationship between treatment types and blood-brain barrier disruption in patients with acute ischemic stroke: Two case reports
Seo Y, Kim J, Chang MC, Huh H, Lee EH
- 2357** Ultrasound-guided rectus sheath block for anterior cutaneous nerve entrapment syndrome after laparoscopic surgery: A case report
Sawada R, Watanabe K, Tokumine J, Lefor AK, Ando T, Yoroze T

ABOUT COVER

Editorial Board Member of *World Journal of Clinical Cases*, Feng Yin, MD, PhD, Assistant Professor, Department of Pathology and Anatomic Sciences, University of Missouri, Columbia, MO 65212, United States.
fengyin@health.missouri.edu

AIMS AND SCOPE

The primary aim of *World Journal of Clinical Cases* (WJCC, *World J Clin Cases*) is to provide scholars and readers from various fields of clinical medicine with a platform to publish high-quality clinical research articles and communicate their research findings online.

WJCC mainly publishes articles reporting research results and findings obtained in the field of clinical medicine and covering a wide range of topics, including case control studies, retrospective cohort studies, retrospective studies, clinical trials studies, observational studies, prospective studies, randomized controlled trials, randomized clinical trials, systematic reviews, meta-analysis, and case reports.

INDEXING/ABSTRACTING

The WJCC is now indexed in Science Citation Index Expanded (also known as SciSearch®), Journal Citation Reports/Science Edition, Scopus, PubMed, and PubMed Central. The 2021 Edition of Journal Citation Reports® cites the 2020 impact factor (IF) for WJCC as 1.337; IF without journal self cites: 1.301; 5-year IF: 1.742; Journal Citation Indicator: 0.33; Ranking: 119 among 169 journals in medicine, general and internal; and Quartile category: Q3. The WJCC's CiteScore for 2020 is 0.8 and Scopus CiteScore rank 2020: General Medicine is 493/793.

RESPONSIBLE EDITORS FOR THIS ISSUE

Production Editor: Lin-YuTong Wang; Production Department Director: Xiang Li; Editorial Office Director: Jin-Lai Wang.

NAME OF JOURNAL

World Journal of Clinical Cases

ISSN

ISSN 2307-8960 (online)

LAUNCH DATE

April 16, 2013

FREQUENCY

Thrice Monthly

EDITORS-IN-CHIEF

Bao-Gan Peng, Jerzy Tadeusz Chudek, George Kontogeorgos, Maurizio Serati, Ja Hyeon Ku

EDITORIAL BOARD MEMBERS

<https://www.wjgnet.com/2307-8960/editorialboard.htm>

PUBLICATION DATE

March 6, 2022

COPYRIGHT

© 2022 Baishideng Publishing Group Inc

INSTRUCTIONS TO AUTHORS

<https://www.wjgnet.com/bpg/gerinfo/204>

GUIDELINES FOR ETHICS DOCUMENTS

<https://www.wjgnet.com/bpg/GerInfo/287>

GUIDELINES FOR NON-NATIVE SPEAKERS OF ENGLISH

<https://www.wjgnet.com/bpg/gerinfo/240>

PUBLICATION ETHICS

<https://www.wjgnet.com/bpg/GerInfo/288>

PUBLICATION MISCONDUCT

<https://www.wjgnet.com/bpg/gerinfo/208>

ARTICLE PROCESSING CHARGE

<https://www.wjgnet.com/bpg/gerinfo/242>

STEPS FOR SUBMITTING MANUSCRIPTS

<https://www.wjgnet.com/bpg/GerInfo/239>

ONLINE SUBMISSION

<https://www.f6publishing.com>



Multiple skin abscesses associated with bacteremia caused by *Burkholderia gladioli*: A case report

Yi-Ting Wang, Xue-Wen Li, Pan-Yang Xu, Chun Yang, Jian-Cheng Xu

Specialty type: Medical laboratory technology

Provenance and peer review: Unsolicited article; externally peer reviewed.

Peer-review model: Single blind

Peer-review report's scientific quality classification

Grade A (Excellent): 0
Grade B (Very good): B
Grade C (Good): C
Grade D (Fair): 0
Grade E (Poor): 0

P-Reviewer: Kung WM, Meng M

Received: September 13, 2021

Peer-review started: September 13, 2021

First decision: November 22, 2021

Revised: November 24, 2021

Accepted: January 22, 2022

Article in press: January 22, 2022

Published online: March 6, 2022



Yi-Ting Wang, Xue-Wen Li, Pan-Yang Xu, Chun Yang, Jian-Cheng Xu, The First Hospital of Jilin University, Laboratory Medicine, Changchun 130021, Jilin Province, China

Corresponding author: Jian-Cheng Xu, PhD, Chief Doctor, Deputy Director, Professor, The First Hospital of Jilin University, Laboratory Medicine, No. 1 Xinmin Street, Changchun 130021, Jilin Province, China. xjc@jlu.edu.cn

Abstract

BACKGROUND

Burkholderia gladioli (*B. gladioli*) is regarded as a rare opportunistic pathogen. Only a few patients with abscesses caused by *B. gladioli* infections have been reported, and these are usually abscesses at the incision caused by traumatic surgery.

CASE SUMMARY

A 74-year-old male patient with abscesses and pain throughout his body for 1 mo was admitted to our hospital. Some of the abscesses had ruptured with purulent secretions on admission. Color Doppler ultrasound examination of the body surface masses showed mixed masses 75 mm × 19 mm, 58 mm × 17 mm, 17 mm × 7 mm, and 33 mm × 17 mm in size in the muscle tissues of both the right and left forearms, the posterior area of the right knee and the left leg, respectively. Abscess secretions and blood cultures grew *B. gladioli*. The following 3 methods were used to jointly identify the bacterium: an automatic microbial identification system, matrix-assisted laser desorption/ionization time-of-flight mass spectrometry, and full-length 16S rDNA sequencing. After 27 d of treatment with meropenem, etimicin, trimethoprim-sulfamethoxazole and other antibiotics, most of his skin abscesses were flat and he was discharged without any symptoms.

CONCLUSION

This is the first reported case of multiple skin abscesses associated with bacteremia caused by *B. gladioli*. Our study provides important reference values for the clinical diagnosis and treatment of *B. gladioli* infections.

Key Words: *Burkholderia gladioli*; Multiple skin abscesses; Bacteremia; Matrix-assisted laser desorption/ionization time-of-flight mass spectrometry; Case report

©The Author(s) 2022. Published by Baishideng Publishing Group Inc. All rights reserved.

Core Tip: *Burkholderia gladioli* (*B. gladioli*) is a rare opportunistic pathogen. We report the first case of multiple skin abscesses caused by infection due to *B. gladioli*, and the relevant biological information, identification, and sensitivity to drugs, are also described in detail. The following three methods including an automatic microbial identification system, matrix-assisted laser desorption/ionization time-of-flight mass spectrometry, and full-length 16S rDNA sequencing were jointly used to identify this bacterium. Therefore, the results obtained using the combination of these methods, were more accurate and reliable. This case provides a solid basis for the future clinical diagnosis and treatment of *B. gladioli* infections.

Citation: Wang YT, Li XW, Xu PY, Yang C, Xu JC. Multiple skin abscesses associated with bacteremia caused by *Burkholderia gladioli*: A case report. *World J Clin Cases* 2022; 10(7): 2286-2293

URL: <https://www.wjgnet.com/2307-8960/full/v10/i7/2286.htm>

DOI: <https://dx.doi.org/10.12998/wjcc.v10.i7.2286>

INTRODUCTION

Burkholderia gladioli (*B. gladioli*) belongs to the genus *Burkholderia*, which is a group of Gram-negative, aerobic, and non-fermentative bacteria. They were originally identified as plant pathogens in gladiolus and other flowers, and most of them were isolated from soil or water samples. In general, *B. gladioli* is an uncommon opportunist pathogen in clinical infections. In 1989, Christenson *et al*[1] identified a strain that was similar to *Burkholderia cepacia*, in sputum samples from 11 patients suffering from cystic fibrosis. This bacterium did not cause disease and was considered to be able to colonize the respiratory tract, and was identified as *B. gladioli* for the first time in 1995, and showed certain pathogenic ability[2]. *B. gladioli* was cultured from abscess secretions and blood from our patient with multiple skin abscesses and bacteremia in June 2021. The automatic microbial identification system, matrix-assisted laser desorption/ionization time-of-flight mass spectrometry (MALDI-TOF MS), and full-length 16S rDNA sequencing were used to jointly identify *B. gladioli*, based on bacterial morphology, physiology, and biochemical indicator levels, as well as gene and protein levels. To date, this is the first case of multiple skin abscesses associated with bacteremia caused by *B. gladioli* infection. Following treatment with multiple antibiotics, the patient recovered and was discharged from hospital. In this case report, the clinical characteristics and biological characteristics of *B. gladioli* are reported in detail, and previous case reports of patients infected with *B. gladioli* were analyzed retrospectively.

CASE PRESENTATION

Chief complaints

A 74-year-old male patient suffering from abscesses and pain throughout his body for 1 mo was admitted to the First Hospital of Jilin University on June 3, 2021.

History of present illness

The patient did not have a fever, cough, or abdominal pain during the disease. On admission, the skin on his left anterior chest, abdomen, and limbs showed red abscesses, which ranged in size from a broad bean to that of an egg. Some of the abscesses had ruptured with purulent secretions and obvious tenderness. Deep ulcers the size of 3 eggs were observed on his right upper limb and left lower limb. Furthermore, the ulcers in his right forearm even reached the muscular layer. Petechiae the size of millet grains or beans, were scattered around his lower limbs, with no signs of fading.

History of past illness

The patient suffered from left mandibular lymph node enlargement and underwent surgical incision and drainage 4 mo ago. The patient was hospitalized due to pneumonia 3 years ago.

Personal and family history

The patient had no relevant personal and family history.

Physical examination

Physical examination showed the following: Body temperature was 36.5°C, pulse rate was 70 bpm, respiratory rate was 20 breaths/min, and blood pressure was 115/54 mmHg.

Laboratory examinations

The initial laboratory examinations on admission showed the following levels: white blood cell (WBC) count was $41.96 \times 10^9/L$, neutrophil absolute value (NE) was $37.64 \times 10^9/L$, monocyte absolute value was $2.16 \times 10^9/L$, red blood cell count was $2.93 \times 10^{12}/L$, hemoglobin was 80 g/L, hematocrit was 0.266 L/L, red blood cell distribution width was 24.8%, and high-sensitivity C-reactive protein was 170.26 mg/L.

Imaging examinations

Color Doppler ultrasound examinations of the body surface masses on admission showed mixed masses 75 mm \times 19 mm, 58 mm \times 17 mm, 17 mm \times 7 mm, and 33 mm \times 17 mm in size in the muscle tissues of both the right and left forearms, the posterior area of the right knee and the left leg, respectively.

MICROBIOLOGICAL IDENTIFICATION OF THE CAUSATIVE AGENT

The patient's abscess secretions on admission day 2 and 5 were collected and cultured for general bacteria/fungi at 35°C with 5% CO₂. The bacterial culture showed positive results after 24 h, and no fungi were identified even after 72 h. The bacteria were inoculated into sheep blood and MacConkey agar plates at 37°C. After 36 h, yellowish, round, smooth, moist, slightly raised, and neatly edged colonies appeared on the plates. The bacteria showed a short-rod shape, arranged singly or in pairs under the microscope, and were identified as Gram-negative bacteria based on Gram staining results. Biochemical analysis showed positive results for catalase and dynamic tests, and negative for oxidase and H₂S tests. On admission day 2 and 9, the patient's blood was added to BACT/ALERT FN Plus Aerobic/F and Anaerobic/F media, respectively, and was cultured in a BACT/ALERT VIRTUO automatic blood culture system. The results of Aerobic/F blood cultures were positive after 36 h, and the colony characteristics, microscopic morphology, and biochemical reactions of this bacterium were consistent with the result of pus cultures, and the results of Anaerobic/F blood cultures were negative. Blood cultures were performed again on admission day 26. The results of Aerobic/F and Anaerobic/F blood cultures were negative after 72 h. The colony and microscopic morphology of *B. gladioli* are shown in Figure 1A.

In addition, the following 3 methods were used to jointly identify the bacterium in abscess secretions and blood: (1) The VITEK 2 GN cards in the VITEK 2 XL automatic microbial identification system were used for identification (98% probability), and after 4.78 h of analysis, *B. gladioli* was identified; (2) VITEK MS mass spectrometry (99.9% probability) and MALDI-TOF-MS technology were used to identify the bacterium as *B. gladioli*, and relevant results of the mass spectrogram are shown in Figure 1B; and (3) Full-length 16S rDNA sequencing was also used to identify this bacterium, and the primers 7F 1540R and 27F 1492R were used for the amplification of 16S rRNA. The PCR products were purified using the SK8255 Ezup column bacterial genomic DNA extraction kit and the sequence was determined by the Applied Biosystems 3730XL sequencer. The Ribosomal Database Project database was applied for similarity alignment against the sequence of this bacterium (NCBI Accession No. DQ513513). The sequence determination results were as follows: the length of the sequence was 1441 bp, the sequence similarity was 99% between this bacterium and *B. gladioli*. The detailed sequence was as follows: TGTTTGATCCTGGCTCAGATTGAACGCTGGCGGCATGCCTTACACATGCAAGTCGAACG-GCAGCACGGGTGCTTGACCTGGTGGCGAGTGGCGAACGGGTGAGTAATACATCGGAACAT-GTCCTGTAGTGGGGGATAGCCCGGCGAAAGCCGGATTAATACCGCATAACGATCTACGGAT-GAAAGCGGGGACCTTCGGGCCTCGCGCTATAGGGTTGGCCGATGGCTGATTAGCTAGTTGGT-GGGGTAAAGGCCACCAAGGCGACGATCAGTAGCTGGTCTGAGAGGACGACCGACCGACCT-GGGACTGAGACACGGCCAGACTCCTACGGGAGGCAGCAGTGGGGAATTTGGACAATGG-GCGAAAGCCTGATCCAGCAATGCCGCGTGTTGTAAGAAGGCCCTTCGGGT-TGTAAAGCACTTTTGTCCGGAAGAAATCCTGAGGGCTAATATCCTTCGGGGATGACGGTAC-CGGAAGAATAAGCACCGGCTAACTACGTGCCAGCAGCCGCGGTAATACGTAGGGTGC-GAGCGTTAATCGGAATTACTGGGCGTAAAGCGTGCGCAGGCGGTTTGTAAAGACCGATGT-GAAATCCCCGGGCTCAACCTGGGAAGTGCATTGGTGAAGTGGCAAGCTAGAGTATGGCA-GAGGGGGGTAGAATTCCACGTGTAGCAGTGAAATGCGTAGAGATGTGGAGGAATACCGATG-GCGAAGGCAGCCCCCTGGGCCAATACTGACGCTCATGCACGAAAGCGTGGGGAGCAAACAG-GATTAGATACCCTGGTAGTCCACGCCCTAAACGATGTCAACTAGTTGTTGGGGATTCAATTCCT-TAGTAACGTAGCTAACGCGTGAAGTTGACCGCCTGGGGAGTACGGTCGCAAGATTAAACT-CAAAGGAATTGACGGGGACCCGCACAAGCGGTGGATGATGTGGATTAAATTCGAT-GCAACGCGAAAAACCTTACCTACCCTTGACATGGTGGGAATCCTGGAGAGATCTGGGAGT-GCTCGAAGAGAACCGATAACACAGGTGCTGCATGGCTGTCGTCAGCTCGTGTCTGTCGTAGTGT-TGGGTTAAGTCCCGCAACGAGCGCAACCCCTTGCTCCTAGTTGCTACGCAAGAGCACTATAGG-GAGACTGCCGGTGACAAACCGGAGGAAGTGGGGATGACGTCAAGTCCTCATGGCCCTTAT-GGGTAGGGCTTCACACGTCATACAATGGTTCGGAACAGAGGGTCGCCAACCCGCGAGGGG-GAGCTAATCCAGAAAACCGATCGTAGTCCGGATTGCACTCTGCAACTCGAGTGCATGAAGCT-GGAATCGCTAGTAATCGCGGATCAGCATGCCGCGGTGAATACGTTCCCGGGTCTGTACACAC-

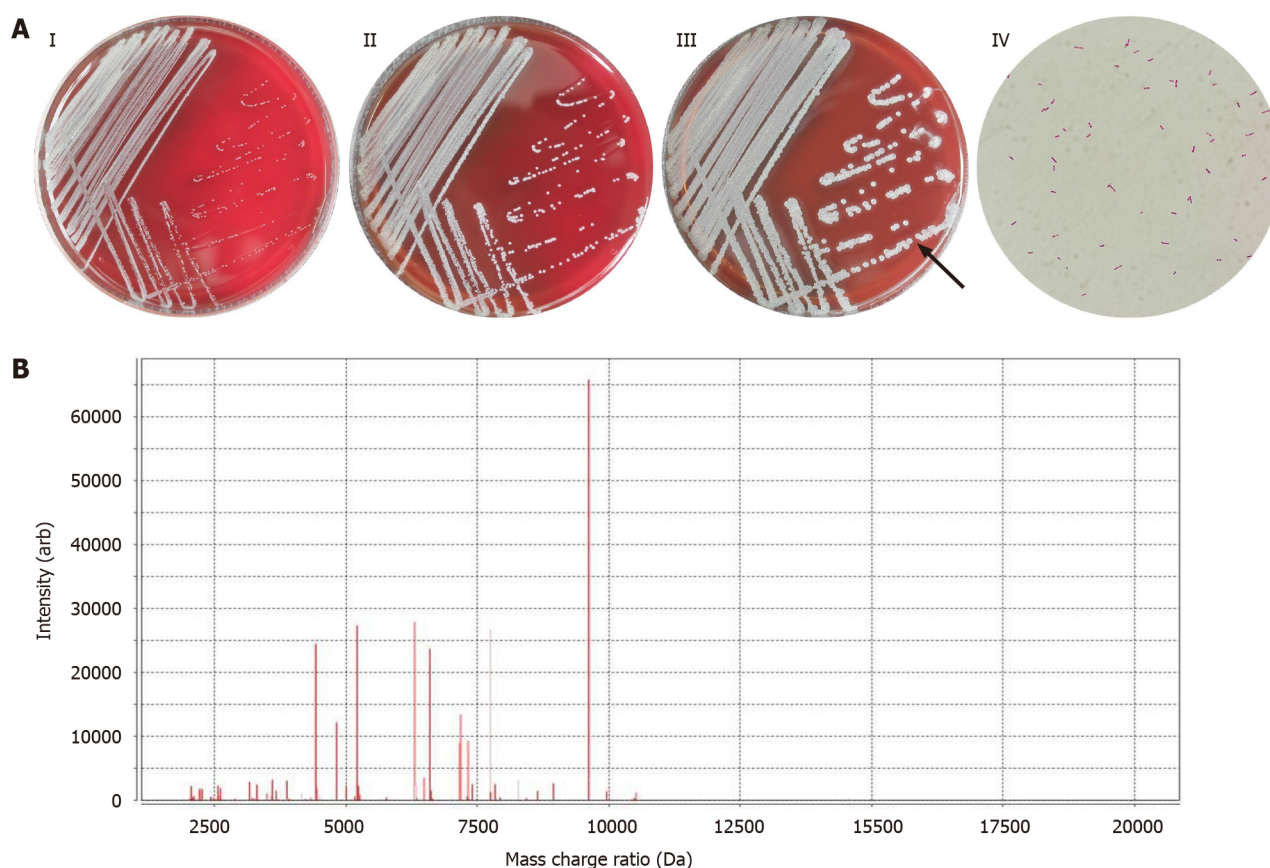


Figure 1 The colony and microscopic morphology of *Burkholderia gladioli* and the mass spectrogram. A: The colony and microscopic morphology of *B. gladioli*; I: Colony growth on a blood agar plate on the first day; II: Colony growth on a blood agar plate on the second day; III: Colony growth on a blood agar plate on the third day, the arrow indicates a single colony; IV: The morphology of the colony was observed under the microscope, microscope magnification: 1000 \times ; B: The mass spectrogram of the strain by matrix-assisted laser desorption/ionization time-of-flight mass technology.

CGCCCGTCACACCATGGGAGTGGGTTTTACCAGAAGTGGCTAGTCTAACCGCAAGGAGGA. The above three methods were combined to identify the bacterium as *B. gladioli*. The instruments and reagents used in full-length 16S rDNA sequencing were from Sangon Biotech Shanghai Co., Ltd. Instruments and reagents used in other methods were derived from BioMérieux (Lyon, France).

The Kirby-Bauer method was used to determine the drug sensitivity of the bacterium in abscess secretions and blood. Several colonies were picked and prepared into bacterial suspensions of 0.5 McFarland standard, and then the suspensions were spread on Mueller-Hinton agar plates. The sensitive strips of trimethoprim-sulfamethoxazole (TMP-SMZ), meropenem, and minocycline from Thermo Fisher Scientific were placed on the plates. The plates were inverted after 15 min and incubated at 35°C for 18 h. The diameters of the bacteriostatic zones were measured. The above procedures were in line with the Clinical and Laboratory Standards Institute (CLSI) operating standards. The results of four drug sensitivity tests of abscess secretions and blood cultures are shown in Table 1.

FINAL DIAGNOSIS

The final diagnosis of the presented case was multiple skin abscesses associated with bacteremia due to *B. gladioli*.

TREATMENT

The patient underwent 27 d of treatment, and the medications administered during hospitalization are shown in Figure 2.

Table 1 Results of four sensitivity tests by the Kirby-Bauer method

Diameter of inhibition zone (mm)	Abscess secretion culture (first)	Abscess secretion culture (second)	Aerobic blood culture (first)	Aerobic blood culture (second)
TMP-SMZ	36	36	30	26
Meropenem	28	27	22	25
Minocycline	26	27	22	26

TMP-SMZ: Trimethoprim-sulfamethoxazole.

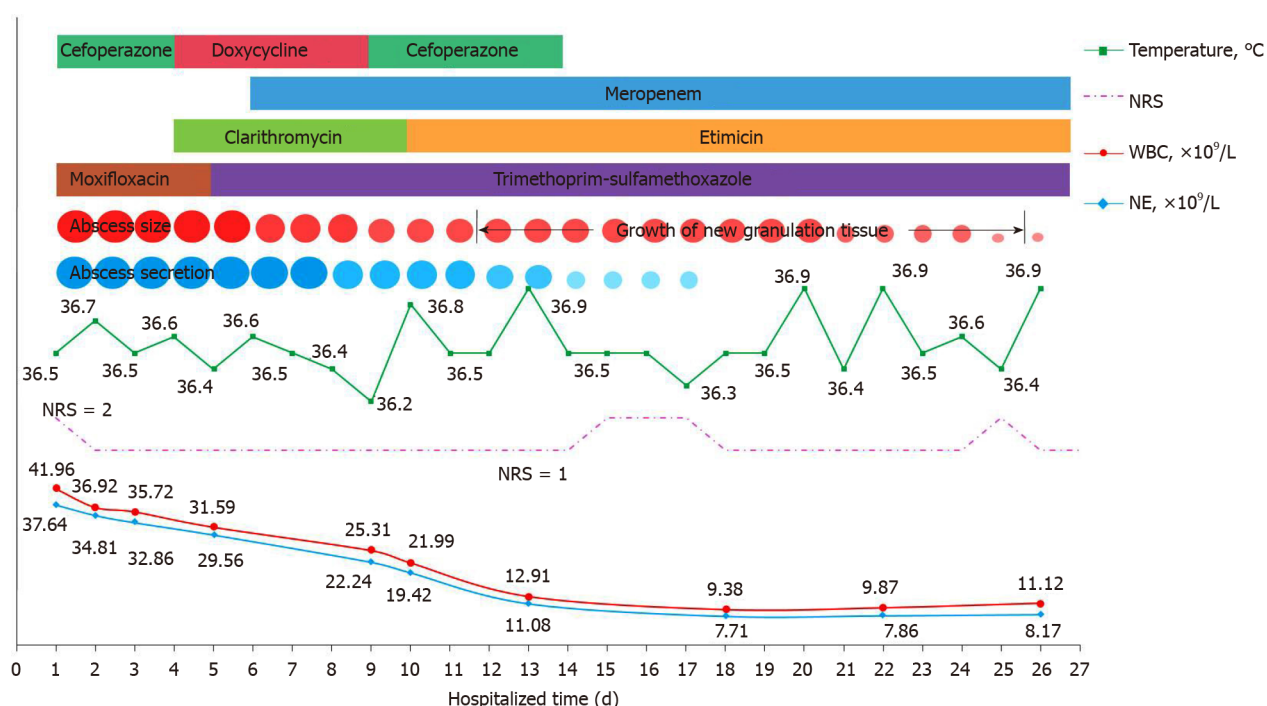


Figure 2 The changes in various indicators during hospitalization of this patient. Abscess size: the size of the circle represents the size of the abscess, the larger the circle is, the larger the abscess is, the five sizes of the circles represent 4 cm, 3 cm, 2 cm, 1 cm and 2 mm, respectively; Abscess secretion: the size of the circle represents the amount of abscess secretion, the larger the circle is, the more abscess secretion; NRS: Numerical rating scale, this is a numerical scale for pain, in which the number 0-10 is used to indicate the degree of pain; WBC: White blood count; NE: Neutrophil absolute value.

OUTCOME AND FOLLOW-UP

The patient's multiple deep ulcers became shallower and a large amount of new granulation tissue was observed on admission day 12. On admission day 18, his skin abscesses were significantly reduced, and there were no secretions after extrusions. Auxiliary examinations showed that the absolute values of WBC and NE were normal. The changes in various indicators during hospitalization of this patient are shown in Figure 2. Most of the skin abscesses were flat on admission day 27 and the patient was discharged. He was instructed to pay attention to wound care and hygiene after discharge. He was asked to take 0.5 g meropenem intravenously 3 times/d, 0.3 g etimicin intravenously once/d, and TMP-SMZ orally twice/d (two tablets each time).

DISCUSSION

In previous studies, all patients with abscesses caused by *B. gladioli* infections were local[2-12], but multiple skin abscesses associated with bacteremia caused by *B. gladioli* were reported for the first time. Basic information of published cases and this case is shown in Table 2. *B. gladioli* is easily neutralized by human serum or complement factors; thus, healthy people are rarely infected with this bacterium[13, 14]. This patient had a history of pneumonia, which provided the same pathological background as in the reported cases of *B. gladioli* infections, most of which were patients with cystic fibrosis and chronic granuloma diseases, suggesting that people with underlying diseases are more susceptible to *B. gladioli*.

Table 2 Summary of cases with abscesses caused by *Burkholderia gladioli* infections

Ref.	Age/gender	Basic diseases	Clinical features	Medical therapy	Outcome
Ross <i>et al</i> [2], 1995	34 yr/M	CGD	Facial abscess and left otitis externa abscess	TMP-SMZ and amoxicillin/clavulanate	Recovery
Hoare <i>et al</i> [3], 1996	5 yr/M	CGD	Necrotic abscess, bacteremia and multiple hemorrhages	TMP-SMZ, ciprofloxacin and gentamicin	Recovery
Boyanton <i>et al</i> [4], 2005	6 yr/M	CGD	Left fourth metatarsal bone abscess	Ciprofloxacin, intravenous ticarcillin/clavulanate and gentamicin	Recovery
Marom <i>et al</i> [5], 2018	13 mo/not given	CGD	Facial abscess	Cefazolin, clindamycin and cephalexin	Recovery
Khan <i>et al</i> [6], 1996	22 yr/M	CF	Chest wall abscess, empyema and bacteremia	Imipenem	Death
Jones <i>et al</i> [7], 2001	17 yr/M	CF	Recurrent abscess	Piperacillin, tazocin, TMP-SMZ, meropenem, imipenem, tobramycin and ceftazidime	Death
Brizendine <i>et al</i> [8], 2012	39 yr/M	CF	Lung abscess, bacteremia, necrotizing pneumonia and empyema	TMP-SMZ, piperacillin/tazobactam	Death
Church <i>et al</i> [9], 2009	41 yr/M	CF	Mediastinal abscess	TMP-SMZ, meropenem, and ceftazidime	Recovery
Kennedy <i>et al</i> [10], 2007	Not given	CF	Mediastinal abscess	Not given	Recovery
Waseem <i>et al</i> [11], 2008	17 yr/M	Type 1 diabetes	Right-sided waist abscess and diabetic ketoacidosis	Levofloxacin	Recovery
Choi <i>et al</i> [12], 2014	55 yr/F	No	Cystic neck abscess and silicone granulomas	Not given	Recovery
Present report: Wang YT, <i>et al</i>	74 yr/M	Pneumonia	Multiple skin abscesses and bacteremia	Cefoperazone, clarithromycin, doxycycline, meropenem, moxifloxacin, TMP-SMZ, and etilmicin	Recovery

M: Male; F: Female; CGD: Chronic granulomatous disease; CF: Cystic fibrosis.

In addition, *B. gladioli* can also easily infect newborns with low immune functions[15]. Consistent with some reports[3,6,8], *B. gladioli* was obtained from the blood and abscess secretions of the patients. It has also been reported that *B. gladioli* was detected in lymph nodes[13], cornea[14], and sputum[16]; therefore, it is possible to improve the detection rates of the bacterium by simultaneously examining the blood, sputum, as well as various other secretions in patients. The patient in this report had no other clinical manifestations except for skin abscesses during hospitalization, which was different from previous cases who had a fever, cough, and other symptoms[8]. Previous studies showed that commercial tests such as the API[7] or VITEK[13] bacterial identification system could mistakenly identify *B. gladioli* as *B. cepacia*. Other studies used cell fatty acid analysis[2] or partial gene sequencing of 16S-23S rRNA[16] to identify *B. gladioli*, but the risks of misidentification always exist. In the clinical laboratory, it is important to timely and accurately identify the bacterium, which is closely related to clinical diagnosis and treatment, and carelessness may delay the diagnosis of diseases. In our laboratory, an automatic microbial identification system, MALDI-TOF MS, and full-length 16S rDNA sequencing were used to jointly identify the bacterium, which overcame the difficulties in the identification process and ensured the accuracy of the identification results.

Drug sensitivity tests were carried out using the Kirby-Bauer method in our laboratory. However, it was difficult for the microbiology laboratory to issue the drug sensitivity reports as the CLSI did not provide the *B. gladioli* drug sensitivity standards. In previous reports, the microtiter dilution method[6] and the E-test method[14] were used to test the drug sensitivity of *B. gladioli*. The results showed that *B. gladioli* was sensitive to TMP-SMZ or meropenem. In some hospitals, patients with *B. gladioli* infections were treated with the above two drugs, and the prognoses were good[2,3]. After treatment with TMP-SMZ and meropenem, combined with other antibacterial agents, the abscesses in our patient were reduced and finally disappeared, and the condition was well controlled. The patient has now recovered and was discharged from hospital. However, due to the differences between *in vitro* and *in vivo* environments, as well as the differences between drug sensitivity tests *in vitro* and drug efficacies *in vivo*, there will be antimicrobial drug failures and ineffective treatments. As reported by Quon *et al*[17], patients infected with *B. gladioli* can still deteriorate and die, even after treatment with TMP-SMZ and meropenem. It has also been reported that levofloxacin[11], cefazolin and gentamicin[18] were effective in the treatment of patients with *B. gladioli* infections. The above studies suggested that the treatment of

B. gladioli was not limited to certain drugs, and multiple factors should be considered in patients with different clinical symptoms. Nevertheless, at least five people have died due to *B. gladioli* infections[6,8,16,17,19].

Following a literature review, it was found that the symptoms, identification methods, drug treatments, and outcomes of patients with *B. gladioli* infections were not the same. The reasons for these differences can be summarized as follows: (1) There were differences in defenses, immune functions, and autologous flora among different populations; (2) There were also differences in the routes and quantity of bacterial invasions; (3) There were differences in the instruments and reagents for the detection and identification of bacteria; and (4) There were differences in the judgment criteria of drug sensitivity used in different laboratories.

CONCLUSION

This paper reports the first case of multiple skin abscesses associated with bacteremia caused by *B. gladioli*, including the clinical features, laboratory examinations, medications, and outcome. All patients with abscesses caused by *B. gladioli* infections were analyzed retrospectively. The sensitivity and accuracy of *B. gladioli* identification results were improved by the combined applications of three identification methods, including an automatic microbial identification system, MALDI-TOF MS, and full-length 16S rDNA sequencing. Our study provides important reference values for the clinical diagnosis and treatment of *B. gladioli* infections, and is beneficial for the rehabilitation of patients.

FOOTNOTES

Author contributions: Wang YT, Li XW, Xu PY, Yang C, and Xu JC performed the literature review, collected all the data related to the case report; Wang YT wrote the first draft of the manuscript and all authors commented on previous versions of the manuscript; all authors have read and approved the final manuscript.

Supported by Jilin Science and Technology Development Program, No. 20190304110YY.

Informed consent statement: Informed written consent was obtained from the patient for publication of this report and any accompanying images.

Conflict-of-interest statement: The authors declare that they have no conflict of interest.

CARE Checklist (2016) statement: The authors have read the CARE Checklist (2016), and the manuscript was prepared and revised according to the CARE Checklist (2016).

Open-Access: This article is an open-access article that was selected by an in-house editor and fully peer-reviewed by external reviewers. It is distributed in accordance with the Creative Commons Attribution NonCommercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited and the use is non-commercial. See: <https://creativecommons.org/licenses/by-nc/4.0/>

Country/Territory of origin: China

ORCID number: Yi-Ting Wang 0000-0001-5977-5407; Xue-Wen Li 0000-0001-9880-571X; Pan-Yang Xu 0000-0002-2895-9112; Chun Yang 0000-0002-6179-5260; Jian-Cheng Xu 0000-0001-8796-271X.

S-Editor: Liu JH

L-Editor: Webster JR

P-Editor: Liu JH

REFERENCES

- 1 Christenson JC, Welch DF, Mukwaya G, Muszynski MJ, Weaver RE, Brenner DJ. Recovery of *Pseudomonas gladioli* from respiratory tract specimens of patients with cystic fibrosis. *J Clin Microbiol* 1989; **27**: 270-273 [PMID: 2915020 DOI: 10.1128/jcm.27.2.270-273.1989]
- 2 Ross JP, Holland SM, Gill VJ, DeCarlo ES, Gallin JI. Severe *Burkholderia* (*Pseudomonas*) *gladioli* infection in chronic granulomatous disease: report of two successfully treated cases. *Clin Infect Dis* 1995; **21**: 1291-1293 [PMID: 8589158 DOI: 10.1093/clinids/21.5.1291]
- 3 Hoare S, Cant AJ. Chronic granulomatous disease presenting as severe sepsis due to *Burkholderia gladioli*. *Clin Infect Dis* 1996; **23**: 411 [PMID: 8842296 DOI: 10.1093/clinids/23.2.411]
- 4 Boyanton BL Jr, Noroski LM, Reddy H, Dishop MK, Hicks MJ, Versalovic J, Moylett EH. *Burkholderia gladioli*

- osteomyelitis in association with chronic granulomatous disease: case report and review. *Pediatr Infect Dis J* 2005; **24**: 837-839 [PMID: 16148855 DOI: 10.1097/01.inf.0000177285.44374.dc]
- 5 **Marom A**, Miron D, Wolach B, Gavrieli R, Rottem M. Burkholderia gladioli-associated facial pustulosis as a first sign of chronic granulomatous disease in a child - Case report and review. *Pediatr Allergy Immunol* 2018; **29**: 451-453 [PMID: 29509962 DOI: 10.1111/pai.12884]
 - 6 **Khan SU**, Gordon SM, Stillwell PC, Kirby TJ, Arroliga AC. Empyema and bloodstream infection caused by Burkholderia gladioli in a patient with cystic fibrosis after lung transplantation. *Pediatr Infect Dis J* 1996; **15**: 637-639 [PMID: 8823866 DOI: 10.1097/00006454-199607000-00020]
 - 7 **Jones AM**, Stanbridge TN, Isalska BJ, Dodd ME, Webb AK. Burkholderia gladioli: recurrent abscesses in a patient with cystic fibrosis. *J Infect* 2001; **42**: 69-71 [PMID: 11243758 DOI: 10.1053/jinf.2000.0770]
 - 8 **Brizendine KD**, Baddley JW, Pappas PG, Leon KJ, Rodriguez JM. Fatal Burkholderia gladioli infection misidentified as Empedobacter brevis in a lung transplant recipient with cystic fibrosis. *Transpl Infect Dis* 2012; **14**: E13-E18 [PMID: 22429703 DOI: 10.1111/j.1399-3062.2012.00726.x]
 - 9 **Church AC**, Sivasothy P, Parmer J, Foweraker J. Mediastinal abscess after lung transplantation secondary to Burkholderia gladioli infection. *J Heart Lung Transplant* 2009; **28**: 511-514 [PMID: 19416783 DOI: 10.1016/j.healun.2009.01.019]
 - 10 **Kennedy MP**, Coakley RD, Donaldson SH, Aris RM, Hohnaker K, Wedd JP, Knowles MR, Gilligan PH, Yankaskas JR. Burkholderia gladioli: five year experience in a cystic fibrosis and lung transplantation center. *J Cyst Fibros* 2007; **6**: 267-273 [PMID: 17137846 DOI: 10.1016/j.jcf.2006.10.007]
 - 11 **Waseem M**, Al-Sherbeeni S, Al-Malki MH, Al-Ghamdi MS. Burkholderia gladioli associated abscess in a type 1 diabetic patient. *Saudi Med J* 2008; **29**: 1048-1050 [PMID: 18626540]
 - 12 **Choi HJ**. Pseudocyst of the neck after facial augmentation with liquid silicone injection. *J Craniofac Surg* 2014; **25**: e474-e475 [PMID: 25148641 DOI: 10.1097/SCS.0000000000001125]
 - 13 **Graves M**, Robin T, Chipman AM, Wong J, Khashe S, Janda JM. Four additional cases of Burkholderia gladioli infection with microbiological correlates and review. *Clin Infect Dis* 1997; **25**: 838-842 [PMID: 9356798 DOI: 10.1086/515551]
 - 14 **Lestin F**, Kraak R, Podbielski A. Two cases of keratitis and corneal ulcers caused by Burkholderia gladioli. *J Clin Microbiol* 2008; **46**: 2445-2449 [PMID: 18434558 DOI: 10.1128/JCM.02442-07]
 - 15 **Zhou F**, Ning H, Chen F, Wu W, Chen A, Zhang J. Burkholderia gladioli infection isolated from the blood cultures of newborns in the neonatal intensive care unit. *Eur J Clin Microbiol Infect Dis* 2015; **34**: 1533-1537 [PMID: 25926303 DOI: 10.1007/s10096-015-2382-1]
 - 16 **Wilsher ML**, Kolbe J, Morris AJ, Welch DF. Nosocomial acquisition of Burkholderia gladioli in patients with cystic fibrosis. *Am J Respir Crit Care Med* 1997; **155**: 1436-1440 [PMID: 9105090 DOI: 10.1164/ajrccm.155.4.9105090]
 - 17 **Quon BS**, Reid JD, Wong P, Wilcox PG, Javer A, Wilson JM, Levy RD. Burkholderia gladioli - a predictor of poor outcome in cystic fibrosis patients who receive lung transplants? *Can Respir J* 2011; **18**: e64-e65 [PMID: 22059186 DOI: 10.1155/2011/304179]
 - 18 **Tong Y**, Dou L, Wang C. Peritonitis due to Burkholderia gladioli. *Diagn Microbiol Infect Dis* 2013; **77**: 174-175 [PMID: 23886791 DOI: 10.1016/j.diagmicrobio.2013.06.010]
 - 19 **Dursun A**, Zenciroglu A, Karagol BS, Hakan N, Okumus N, Gol N, Tanir G. Burkholderia gladioli sepsis in newborns. *Eur J Pediatr* 2012; **171**: 1503-1509 [PMID: 22648018 DOI: 10.1007/s00431-012-1756-y]



Published by **Baishideng Publishing Group Inc**
7041 Koll Center Parkway, Suite 160, Pleasanton, CA 94566, USA

Telephone: +1-925-3991568

E-mail: bpgoffice@wjgnet.com

Help Desk: <https://www.f6publishing.com/helpdesk>

<https://www.wjgnet.com>

