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Case report

Melioidosis in a returned traveler: Case report and review of the imported cases in Oman

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ABSTRACT

Melioidosis is an emerging tropical infectious disease in travelers. We present a case of travel related melioidosis in a 65-year-old man with chronic obstructive pulmonary disease and end stage renal disease following a two-week business trip to Thailand and attendance of the Songkran festival. This case emphasizes that vigilance, heightened clinical suspicion, and use of appropriate microbiology diagnostic tools are of paramount importance for a timely diagnosis and successful management. With the ever-increasing global travel, infectious diseases specialists, microbiologists, and public health professionals are constantly challenged by unfamiliar infections in returned travelers.

1. Introduction

The scale and extent of today's global travel are unparalleled. In 2022, more than three billion people-approximately 40 % of the world population-traveled globally [1].

Melioidosis, first recognized in 1911 [2] is an emerging tropical infectious disease caused by *Burkholderia pseudomallei.* The disease is present in 79 countries albeit endemic in Southeast Asia and Northern Australia [3]. Because of the increase in international travel, the disease is now occurring in areas where *Burkholderia pseudomallei* is not endemic [4].

Burkholderia pseudomallei is an environmental, saprophytic, highly pathogenic Gram-negative bacterium, ubiquitous in water and soil in endemic areas [5]. Exposure to contaminated soil or water via direct inoculation, inhalation, or ingestion may predispose individuals to infection by *Burkholderia pseudomallei* and may thus develop melioidosis [4].

Norman F, et al. [6] performed a literature search for imported melioidosis for the period 2016–2022and identified 137 reports of melioidosis associated with travel. Most of the travel related melioidosis identified in this review occurred in males and was associated with exposure in Asia, mainly Thailand [6]. Although most afflicted travelers have chronic medical conditions, 27 % of them had no underlying co-morbidity [6].

Melioidosis can be difficult to diagnose due to its broad disease spectrum and the imprecision of the conventional bacterial identification methods [7]. Moreover, automated identification systems including Matrix-Assisted Laser Desorption/Ionization Time-of-Flight (MALDI--TOF) may still misidentify *Burkholderia pseudomallei* as another bacterium [7].

We herein present a case of travel related melioidosis which may have been acquired from exposure to potentially contaminated water source during Thailand's Songkran festival and review imported cases of melioidosis in Oman thus far.

2. Case presentation

A 65-year-old man with chronic obstructive airway disease and end stage renal disease presented with a seven-day history of fever, productive cough, and progressive shortness of breath starting two days prior to his return from a two-week business travel to Thailand. Ten days preceding his current illness, he was inadvertently exposed to repetitive water splashes to his face during Thailand's Songkran festival at Pattaya city in Eastern Thailand. The patient is a frequent business traveler to

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Thailand for more than 30 years with his most recent visit coinciding with Thailand's Songkran festival.

Physical examination revealed an ill-looking, toxic, and anxious patient with mild pallor, uremic fetor, asterixis, and signs of respiratory distress. He was febrile (temperature: 38.9^{0}C), tachycardic (pulse rate: 122/min) and tachypneic (respiratory rate: 30/min) with oxygen saturation of 85 % in ambient air. Blood pressure was 107/83 mmHg. No signs of meningeal irritation and no skin rash.

Examination of the chest revealed bilateral coarse inspiratory crackles and extensive bronchial breath sounds with dominance over the left infra-scapular region. Cardiac examination showed elevated jugular venous pressure with normal heart sounds. Examination of the abdomen was normal.

Initial investigations showed hemoglobin: 10.7 g/dL (normal: 11.5–15.5 g/dL), white cell count: 17.1 $\times$ 10^9/L (normal: 2.2–10.0 $\times 10^9$/L), absolute neutrophil count: 15.4 $\times$ 10^9/L (normal: 1.0–5.0 $\times 10^9$/L), platelet count: 224 $\times$ 10^9/L (normal: 150–450 $\times 10^9$/L). Biochemistry was noteworthy for C-reactive protein of 332 mg/L (normal: 0–5 mg/L), creatinine: 1127 μmol/L (normal: 59–105 μmol/L), urea: 47.4 mmol/L, bicarbonate: 7 mmol/L (normal: 22–29 mmol/L), anion gap: 27 mmol/L (normal: 5–13 mmol/L). The liver function test and coagulation panel were normal. BinaxNOW™ *S. pneumoniae* and *Legionella* urinary antigens were negative. Molecular testing for SARS-CoV-2 and influenza was likewise negative. Two sets of blood cultures were drawn, and sputum was collected for culture. A chest x-ray and a high-resolution computed tomography (HRCT) of the chest were performed (Fig. 1).

A diagnosis of severe community acquired pneumonia with acute on chronic renal failure was made. Piperacillin-tazobactam (dose: 2.25 g Q8 hourly intravenously) and azithromycin (dose: 500 mg Q24 hourly intravenously) were empirically started, non-invasive ventilation via a face mask with fraction of inspired oxygen (FiO2) of 60 % was initiated, intravenous bolus of 80 mg furosemide was administered, and urgent hemodialysis via a Permcath Quinton catheter inserted into the right internal jugular vein was begun.

Within four hours, the first blood culture set flagged positive from aerobic bottle (BD Bactec™) showing regular-sized Gram-negative bacilli with the characteristic bipolar staining (Fig. 2**A**) which was preliminarily identified by standard library MALDI-TOF Biotyper® (Bruker Daltonics) as *Burkholderia thailandensis* with a score of 1.81. Knowing that *Burkholderia pseudomallei* can be misidentified as *Burkholderia thailandensis* when using the standard library (MBT Compass 4.1) of MALDI-TOF, a suspicion of melioidosis was raised hence a presumptive diagnosis of travel related melioidosis with bacteremia and pneumonia was made and *Burkholderia pseudomallei* targeted antimicrobials with combination of hemodialysis-adjusted ceftazidime (dose: 1 g Q24 hours intravenously) and trimethoprim-sulfamethoxazole 160 mg-800 mg (dose: 10 mg/kg Q24 hours intravenously) were administered. Three hours later, the second set of blood culture flagged positive showing the same typical Gram-negative bacilli. Subculture plates of both sets of blood culture showed colonies that were shiny, wet, non-lactose fermenting, and growing well on all standard media (Fig. 2**B & C**).

A repeat MALDI-TOF from the colonies produced the highest score of 1.88 again for *Burkholderia thailandensis*. Subsequently, 16 S rRNA gene sequencing identified the organism as *Burkholderia pseudomallei* with a matching score of 99.8 %. Susceptibility testing using Etest® (Biomerieux) on Mueller-Hinton agar confirmed the isolate susceptibility to ceftazidime, amoxicillin-clavulanate, trimethoprim-sulfamethoxazole, and tetracycline. Meanwhile, the organism also grew from sputum culture and later from two repeat blood culture sets.

By the end of the first week of antimicrobial therapy, the patient had a full recovery with resolution of sepsis, cessation of supplemental oxygen, abatement of fever, normalization of inflammatory biomarkers, and negative sterility blood cultures. He was discharged after completion of two weeks of ceftazidime with a plan to continue intensive phase ceftazidime for two additional weeks to be given on the days of hemodialysis thrice weekly and to continue oral trimethoprim-sulfamethoxazole for eradication for 12 weeks.

3. Discussion

In today's global convergence, locally endemic pathogens such as *Burkholderia pseudomallei* have the capability to cross borders posing unprecedented challenges to clinicians, microbiologists, and public health personnel practicing in non-endemic regions. The case presented

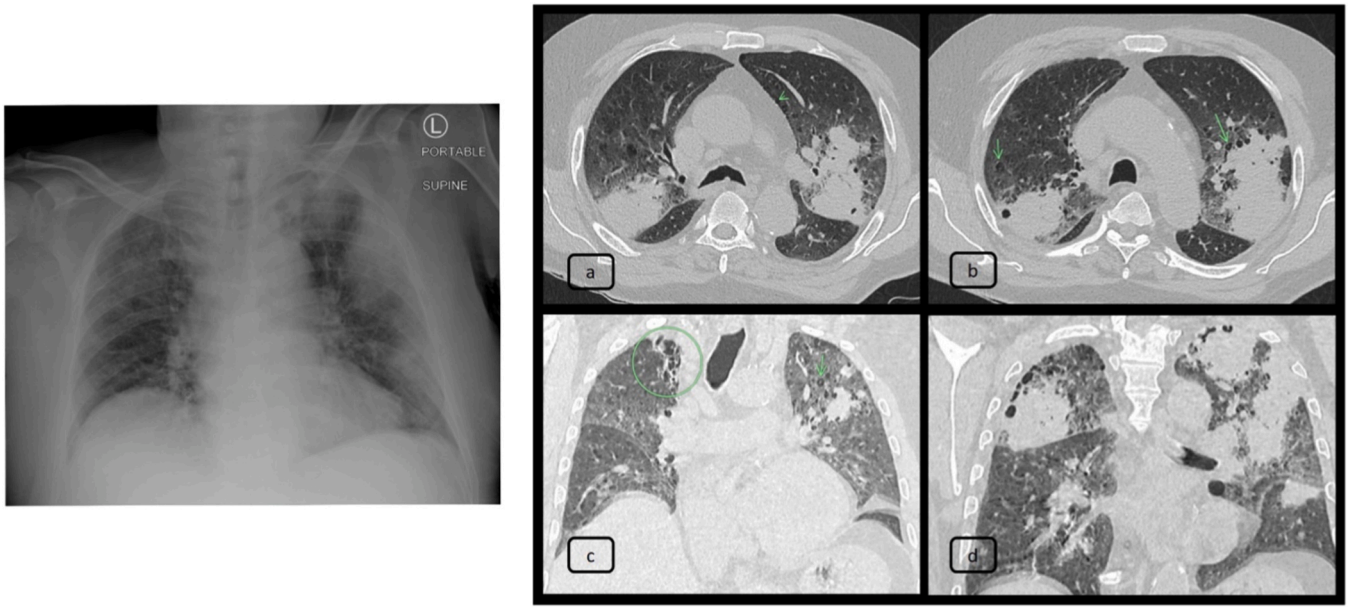

Fig. 1. Chest X-ray and high resolution computed tomography (HRCT) of the chest: Chest X-ray (left): multifocal confluent consolidations of the left upper and middle zones and faint consolidation in the right upper zone. HRCT of the chest (right): axial and coronal images of the chest showing bilateral multifocal confluent dense consolidations, generalized ground-glass density of the lung parenchyma on background of mild emphysema (images a, b, and c), and focal area of bronchiectasis at the right apex (image d).

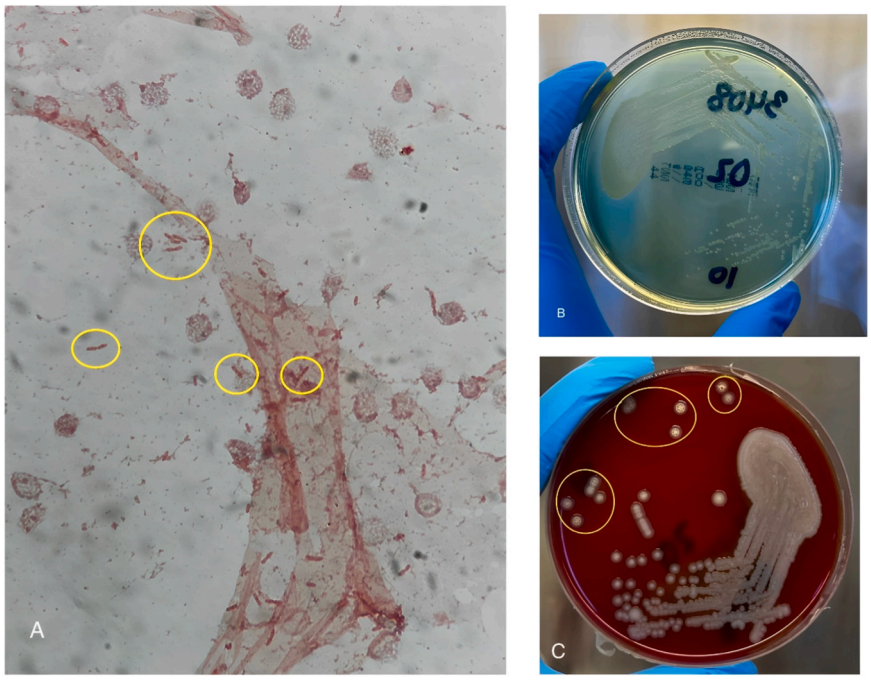

Fig. 2. (a): Direct Gram-stain from positive blood culture bottle demonstrating Gram-negative bacilli with bipolar-staining (indicated by yellow circles) typical of *Burkholderia pseudomallei*. (b): non-lactose fermenting colonies at 24 h of incubation on cysteine lysine electrolyte deficient (CLED) agar. (c): wrinkled colonies (shown by yellow circles) on blood agar after 48 h of incubation.

here underscores the need to be vigilant to suspect *Burkholderia pseudomallei* in returned travelers from melioidosis-endemic areas.

Melioidosis is an under-recognized, largely neglected tropical infection with current global estimates suggesting that 165,000 cases of melioidosis occur worldwide annually [3]. Moreover, melioidosis is a significant travel-related infection albeit its relative rarity with just over 200 cases of travel related melioidosis reported during 1982–2022 of which more than 40 % of cases were associated with travel to Thailand [6,8]. According to CEIC Data (a global database providing the most expansive data insights into both developed and developing economies around the world), 88,062 Omani travelers visited Thailand during the period between April 2023 and March 2024, averaging at approximately 7300 travelers monthly [9].

Songkran is the water-splashing festival celebration during which crowds splash water including non-potable or muddy water on others [10]. Although there are no published reports linking melioidosis to Songkran festival, we plausibly hypothesize that our patient may have acquired melioidosis from exposure to potentially contaminated non-potable water splashes and aerosols during the Songkran festival. Since *Burkholderia pseudomallei* can remain latent for months or years before disease onset [11], it is also conceivable to postulate that this patient's exposure to *Burkholderia pseudomallei* may have occurred during any of the previous visits and dwellings.

A literature search identified three cases of imported melioidosis in Oman [6,12–14]. All three patients were males of 46, 47, and 55 years old. Laos/ Cambodia, Sri Lanka, and India are presumed localities were exposure to *Burkholderia pseudomallei* occurred. Two patients had no known comorbidities while one had diabetes mellitus, chronic liver disease, and alcohol use disorder. Clinical presentation includes septic arthritis, pneumonia, bacteremia, splenic abscesses, and multiorgan dysfunction syndrome. All three patients received meropenem. One patient died. Table 1 depicts clinical details of travel-related melioidosis cases reported from Oman (Table 1).

The clinical spectrum of melioidosis is diverse including acute septicemic, subacute, chronic, and latent or asymptomatic form [5]. The patient herein manifested with two major and common clinical presentations namely acute sepsis syndrome with *Burkholderia pseudomallei* bacteremia and severe bilateral pneumonia requiring transient respiratory support. As demonstrated in this case, severe melioidosis is typically a disease of adult males of more than 50 years and with underlying comorbidities of which chronic kidney and pulmonary diseases are notable [15].

The risk of misidentification of *Burkholderia pseudomallei* when using commonly available identification methods is significant. This limitation may be overcome by expanding Bruker's library to include these select agents, and by using molecular methods.

[7]. In this case, the recognition of bipolar staining of Gram-negative bacilli by an astute microbiologist combined with the recent travel history to an area endemic for melioidosis and MALDI-TOF identification of the isolate as *Burkholderia thailandensis* led to a presumptive diagnosis of melioidosis with subsequent confirmation of the isolate as *Burkholderia pseudomallei* by 16 S rRNA gene sequencing. 16 S rRNA is a molecular diagnostic test used for detection and identification of bacterial pathogens in clinical specimens [16]. In melioidosis, 16 S rRNA is used for differentiating *Burkholderia pseudomallei* from other *Burkholderia* species based on subtle differences in the 16 S rRNA gene between different *Burkholderia* species [17]. This is especially true when MALDI-TOF score threshold is < 2 as is in our case.

Prompt start of appropriate antimicrobial therapy specific to *Burkholderia pseudomallei* is crucial. Although this patient was initially treated as community acquired pneumonia, antimicrobials were swiftly changed to combination of ceftazidime and trimethoprim-sulfamethoxazole targeting *Burkholderia pseudomallei* based on the Gram stain and MALDI-TOF findings. Clinical response with resolution of sepsis, improving hemodynamics, cessation of supplementary oxygen, and negative sterility blood cultures was attained by the seventh day of targeted *Burkholderia pseudomallei* therapy. Ceftazidime for four weeks followed by trimethoprim-sulfamethoxazole for 12 weeks were planned for intensive and eradication therapy, respectively.

4. Conclusion

We presented a case of travel-related melioidosis and reviewed three other imported cases in Oman. This case emphasizes that vigilance,

Table 1
Travel-related melioidosis cases in Oman.

Reference	Age (y)	Sex	Nationality	Country of exposure	(potential) Mode of exposure	Comorbidity	Clinical presentation	Time from exposure to disease onset	*B. pseudomallei* identification method	Antimicrobial therapy	Outcome
Tamtami et al. 2017	55	M	Omani	Laos/ Cambodia	Inoculation (shoulder)	None	Arthritis (shoulder), pneumonia, sepsis, MODS	5 days	Blood culture, API 20 (*B. pseudomallei*)	Meropenem, later changed to ceftazidime	Died
Al-Kindi et al. 2019	47	M	Sri Lankan	Sri Lanka	Unknown	DM, chronic liver disease, ETOH	Jaundice, pneumonia, sepsis, splenic abscess	Unknown	Blood culture, API 20, Vitek 2 (*B. pseudomallei*, MALDI-TOF (*B. pseudomallei*)	Meropenem plus oral Trimethoprim/ Sulfamethoxazole	Survived
Al Salti et al. 2022	46	M	Indian	India	Occupational: farming and gardening	None	Septic arthritis (knee)	Uknown	Synovial fluid culture, API, MALDI-TOF (*B.* thailandensis), 16 S rRNA (*B. pseudomallei*)	Knee surgery plus meropenem (in India)	Survived
Balkhair et al. 2024 (current case)	65	M	Omani	Thailand	Inhalation/ ingestion during Songkran festival	CKD, COPD, Tobacco use	Sepsis, pneumonia, bacteremia	10 days	Blood culture, BD Bactec, MALDI-TOF (*B. thailandensis*), 16 S rRNA (*B. pseudomallei*)	Ceftazidime plus IV Trimethoprim/ Sulfamethoxazole	Survived

heightened clinical suspicion, and use of appropriate microbiology diagnostic tools are of paramount importance for a timely diagnosis and successful management. With the ever-increasing global travel, infectious diseases specialists, microbiologists, and public health professionals are constantly challenged by unfamiliar infections in returned travelers.

Ethical approval

Non required for this case report.

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CRediT authorship contribution statement

Abdullah Balkhair: Writing – review & editing, Writing – original draft, Data curation, Conceptualization. **Badriya Al Adawi:** Writing – review & editing, Data curation. **Prashanth Kumar:** Writing – review & editing, Writing – original draft. **Saja Mohammed:** Writing – review & editing. **Saleh Baawain:** Writing – review & editing, Data curation. **Ruqaiya Al Harrasi:** Writing – review & editing. **Glenneth Gallenero:** Writing – review & editing.

Declaration of Competing Interest

The authors declare that they have no conflict of interest.

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Author Agreement

I have read and agreed with IDCases terms and conditions.

Author contribution

The first/corresponding author was responsible for conceptualizing, writing, and revising the manuscript. Second, third, and fifth authors contributed to the original draft of the manuscript, and all authors contributed to the revision, editing, and reviewing of the original and the submitted drafts.

Patient consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

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