

Janibacter melonis Bone Marrow Infection in an Immunocompetent Child With Prolonged Fever of Unknown Origin: A case report

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Case Report

Keywords: Janibacter melonis, Case report, Bone marrow infection, Fever of unknown origin, Immunocompetent, Paediatric, Actinomycete

Posted Date: July 1st, 2026

DOI: <https://doi.org/10.21203/rs.3.rs-9920478/v1>

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Additional Declarations: No competing interests reported.

Version of Record: A version of this preprint was published at BMC Infectious Diseases on August 28th, 2026. See the published version at <https://doi.org/10.1186/s12879-026-14336-w>.

Abstract

Introduction: *Janibacter melonis* is a rare environmental actinomycete with only two previously reported human infections, both bacteraemias in adults. Bone marrow involvement in an immunocompetent paediatric host has not been described.

Case presentation: A previously healthy 13-year-old girl presented with prolonged fever of unknown origin following an initial pneumonia-like illness. After extensive non-invasive investigations failed to identify an aetiological agent, bone marrow aspiration and culture identified *J. melonis*. She was successfully treated with a combination of intravenous linezolid and trimethoprim-sulfamethoxazole, achieving microbiological clearance by day 20 and sustained clinical remission at three-month follow-up.

Conclusions: This case expands the known clinical spectrum of *J. melonis* to include deep-seated bone marrow infection in immunocompetent children, and supports the use of linezolid-based combination therapy. Bone marrow culture should be considered early in the diagnostic algorithm for paediatric fever of unknown origin when standard investigations are unrewarding.

Introduction

The genus *Janibacter* belongs to the class Actinobacteria, order Actinomycetales, and family Intrasporangiaceae [1]. These aerobic, Gram-positive, non-motile, non-spore-forming bacteria exhibit a characteristic rod-coccus growth cycle and are widely distributed in soil, surface water, wastewater, and spoiled produce [1–4]. Since the first description of *Janibacter limosus* by Martin and colleagues in 1997, several species-including *J. terrae*, *J. hoylei*, *J. indicus*, *J. massiliensis* sp. nov., and *J. melonis*-have been isolated from environmental and clinical specimens [1–4, 5–9, 15].

Human infections caused by *Janibacter* species are exceedingly rare. Most documented cases have occurred in immunocompromised individuals, including patients with haematological malignancies, neonates, and the elderly [5–8]. Reported manifestations have included bacteraemia, vaginitis, and psoas abscess [5–10]. *Janibacter terrae* bacteraemia has even proved fatal in two patients with severe immunosuppression [5].

Janibacter melonis was first characterised in 2004 from abnormally spoiled oriental melon in Korea [3]. It is a Gram-positive, aerobic, non-acid-fast coccus that shares 99% 16S ribosomal RNA (rRNA) gene sequence similarity with other *Janibacter* species [3, 11]. Prior to the present report, *J. melonis* had been implicated in only two human infections: a case of bacteraemia in an otherwise healthy adult following skin trauma, in which insect-borne transmission was hypothesised [12], and a case of bacteraemia in an adult with lymphoma during haematopoietic stem cell mobilisation [11]. In addition, *J. melonis* has been isolated from the duodenal mucosa of a patient with coeliac disease, suggesting a potential role as an intestinal pathogen [13].

To our knowledge, this is the first documented case of a *J. melonis* bone marrow infection, the first case to occur in an immunocompetent child, and the third human infection caused by this organism overall.

Case presentation

A 13-year-old girl with no significant medical history was admitted with a productive cough lasting 14 days and a fever lasting 12 hours. Chest computed tomography (CT) revealed bilateral lower lobe pneumonic consolidation, predominantly on the left (Fig. 1A). Nucleic acid amplification testing for *Mycoplasma pneumoniae* was negative, and routine investigations were inconclusive. Treatment with amoxicillin-clavulanate yielded no clinical benefit.

Given the patient's age, the radiological pattern and the local epidemiology, an atypical bacterial infection was suspected. Following the provision of written informed consent, treatment with doxycycline and a short course of methylprednisolone was commenced, after which the fever subsided. However, fever returned within 24 hours of discontinuing the steroid. Drug-resistant organisms were then considered. On two separate occasions, the family declined bronchoscopy with bronchoalveolar lavage and next-generation sequencing (NGS). Levofloxacin was started empirically, restoring apyrexia. On discharge, oral moxifloxacin was poorly tolerated due to gastrointestinal side effects, and the fever recurred promptly. She was readmitted to hospital—first to a regional children's hospital, where she was given a cephalosporin, and then discharged at the family's request before the recommended treatment duration had been completed—and ultimately returned to our unit 26 days after her initial presentation, still suffering from a persistent daily fever.

During this third admission, the levels of inflammatory markers (C-reactive protein and erythrocyte sedimentation rate) and the results of the complete blood count were within the reference ranges. The abdomen was soft with no hepatosplenomegaly. A repeat chest CT scan showed that the prior pulmonary opacities had almost completely resolved (Fig. 1B). Repeated blood cultures yielded no growth. An extensive serological and microbiological survey, covering bacterial, viral, fungal and autoimmune causes, returned no positive results. Antinuclear antibodies were transiently positive at a low titer, but there were no associated clinical features.

Following the provision of written informed consent, a bone marrow aspiration and culture were performed; the guardians declined all other invasive procedures. Cytological examination confirmed normal trilineage haematopoiesis with no morphological abnormalities or malignant infiltration. Aerobic culture of the aspirate yielded a slow-growing, cream-coloured colony, which was identified as *Janibacter melonis* using matrix-assisted laser desorption/ionisation time-of-flight mass spectrometry (MALDI-TOF MS) (Fig. 2). Concurrent and subsequent blood cultures remained sterile. Formal antimicrobial susceptibility testing was not performed due to the absence of standardised breakpoints for this organism.

An intravenous linezolid and trimethoprim-sulfamethoxazole combination was initiated, guided by the two previously published human cases [11, 12]. The fever resolved by day 6 of targeted therapy.

Following a multidisciplinary infection review and a remote consultation with the Chinese PLA General Hospital, the decision was made to continue with at least three weeks of intravenous therapy, including seven consecutive afebrile days, followed by an oral course of at least two months. A repeat bone marrow culture on day 20 of treatment was negative, confirming microbiological clearance. The patient was discharged to complete the therapy as an outpatient and remained well without relapse at the three-month follow-up, with normalised inflammatory indices. Figure 3 provides a schematic overview of the patient's clinical course, including key events, antimicrobial therapy, and microbiological findings.

Discussion

The genus *Janibacter* comprises aerobic, Gram-positive, actinomycete bacteria belonging to the Intrasporangiaceae family. These bacteria are widely distributed in soil, surface water, wastewater and spoiled produce [1–4]. *Janibacter melonis* was first characterised in 2004 in spoiled oriental melon [3]. It has only been implicated in two other human infections prior to this report: one case of bacteraemia in an otherwise healthy adult where insect-borne transmission was hypothesised [12], and one case of bacteraemia in an adult with lymphoma during haematopoietic stem cell mobilisation [11]. To our knowledge, this is the first documented case of a *J. melonis* bone marrow infection in a paediatric patient, and the first case to occur in an immunocompetent child.

Our patient met the standard clinical criteria for immunocompetence: she had an entirely normal health history, had grown and developed appropriately for her age, had not been exposed to immunosuppressants, and had unremarkable haematological indices throughout her illness. A formal immunological workup was not pursued, consistent with routine practice for previously well children lacking features pointing to a specific immunodeficiency. The source of acquisition remains uncertain. The patient denied ingesting spoiled fruit or contaminated food, travelling outside the region, or coming into contact with wastewater. Similar to the first reported human case, indirect environmental acquisition, possibly via an arthropod vector, is a potential mode of transmission [12]. Laboratory contamination was effectively ruled out based on the clinical course: prolonged fever, a clinical response consistent with the culture results, and documented clearance on follow-up culture.

There are no treatment guidelines or validated susceptibility breakpoints for *J. melonis*. Regimen selection was based on the limited case literature and extrapolation from broader actinomycete pharmacology [11, 12]. The combination of linezolid and trimethoprim-sulfamethoxazole resulted in the complete resolution of fever and microbiological eradication, with no relapse during the three-month follow-up period. This lends provisional support to this approach for treating deep-seated infections. In the only other successfully treated case, cefoperazone-sulbactam was used in an immunocompromised host [11]. The choice of linezolid in this case was guided by its documented activity against Gram-positive pathogens and its ability to achieve therapeutic concentrations in bone tissue. The addition of trimethoprim-sulfamethoxazole was intended to broaden coverage and leverage the different mechanisms of action.

Paediatric fever of unknown origin (FUO)-conventionally defined as fever lasting ≥ 3 weeks without an identified cause after adequate evaluation [14]-poses a persistent diagnostic challenge when the non-invasive workup is exhaustive and unrewarding. In this case, the aetiological agent was identified exclusively through bone marrow culture, a procedure not routinely included early in the diagnostic algorithm. Although invasive, bone marrow aspiration carries a low complication rate and can detect occult pathogens, including rare actinomycetes, that are not identified by conventional sampling methods. Clinicians confronted with protracted unexplained fever in children should consider bone marrow culture once standard investigations have been exhausted.

Conclusions

In conclusion, this case represents the first documented bone marrow infection caused by *J. melonis* in an immunocompetent child, expanding the known clinical spectrum of this rare pathogen. Early bone marrow culture should be considered in the diagnostic workup of paediatric fever of unknown origin when conventional investigations fail to yield a diagnosis. Combination therapy with linezolid and trimethoprim-sulfamethoxazole achieved complete microbiological eradication and sustained clinical cure in this patient. Further reports are needed to establish optimal treatment regimens and susceptibility breakpoints for this rare organism.

Declarations

Ethics approval and consent to participate

This case report was conducted in accordance with the Declaration of Helsinki and was exempted from formal ethics review by the Institutional Review Board of Zigong First People's Hospital (exemption No. 2026-057).

Consent for publication

Written informed consent for publication was obtained from the patient's guardians.

Competing interests

The authors declare that they have no competing interests.

Funding

No funding was received for this work.

Author Contribution

BZ and XL contributed to the conception and design of the work, drafted the manuscript, revised it critically for important intellectual content, gave final approval of the version to be published, and agreed to be accountable for all aspects of the work.

Acknowledgement

The authors thank the multidisciplinary infection team at Zigong First People's Hospital and the remote consultants at the Chinese PLA General Hospital for their clinical guidance.

Availability of data and materials

The data supporting this case report are available from the corresponding author upon reasonable request.

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Figures

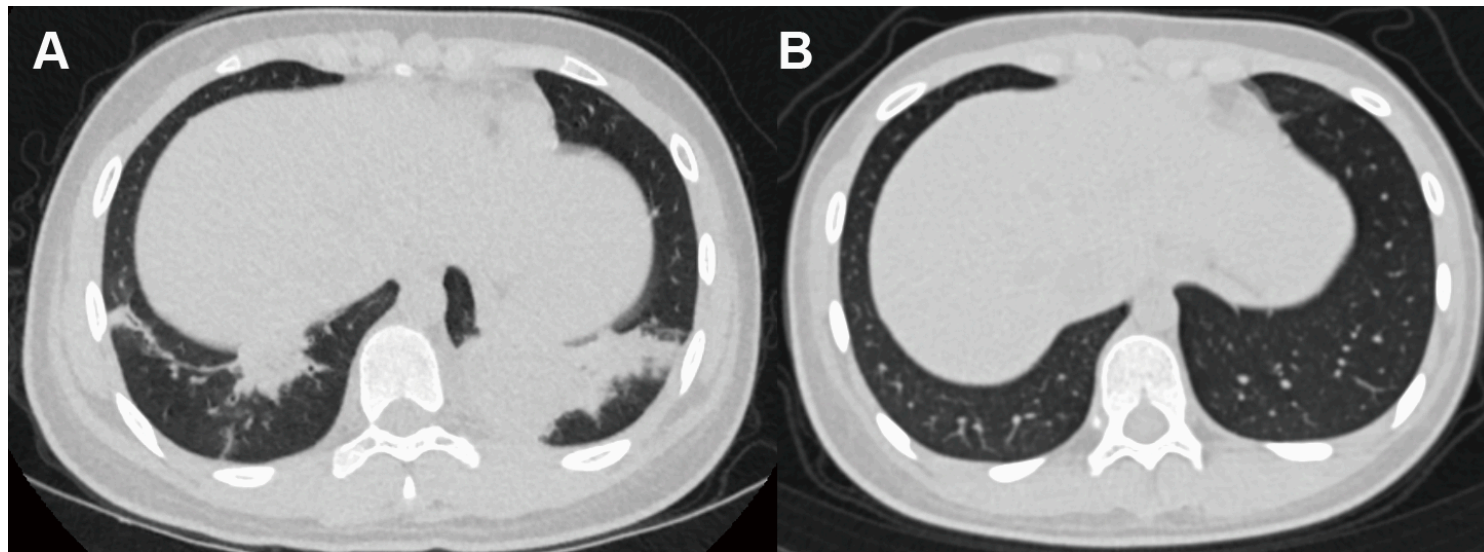


Figure 1

Chest CT scan images.

A: Day 3: bilateral lower lobe consolidation, predominantly in the left lower lobe. B: Day21: near-complete resolution of pulmonary opacities.

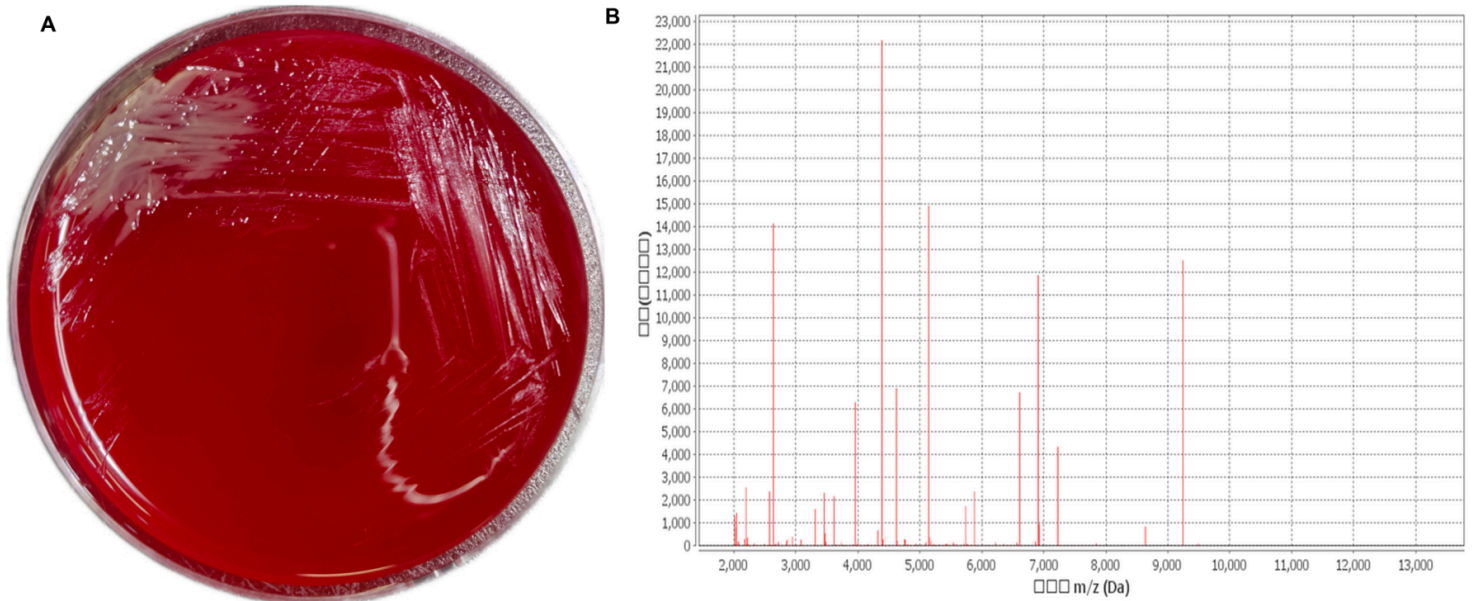


Figure 2

Microbiological identification of *Janibacter melonis* from bone marrow culture.

A: Bone marrow culture on blood agar plate after 7 days of aerobic incubation at 35 °C with 5% CO₂. B: MALDI-TOF mass spectrum of the isolate, identified as *Janibacter melonis* with a 99.9% confidence score.

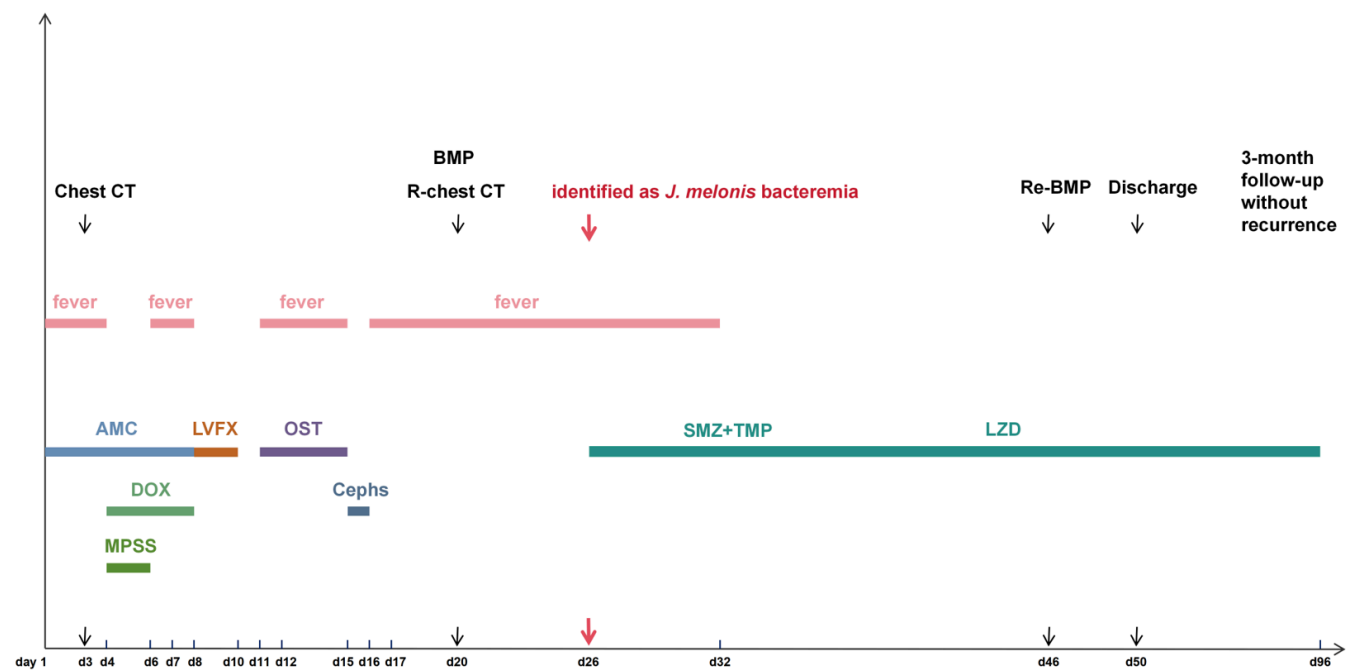


Figure 3

Timeline of the clinical course of the patient.

Empirical amoxicillin–clavulanate (AMC) was given on admission (day 1). Chest CT was performed on day 3, and methylprednisolone (MPSS) plus doxycycline (DOX) were started on day 4, with initial fever resolution; fever recurred after MPSS was discontinued on day 6. Antibiotics were switched to levofloxacin (LVFX) on day 8, achieving apyrexia. Fever relapsed on day 11 at discharge, and oral oseltamivir was self-administered until day 15 with persistent fever; the patient received a cephalosporin at another hospital with temporary improvement before being readmitted to our unit on day 16. Repeat chest CT and bone marrow aspiration (BMP) were completed on day 20. *Janibacter melonis* bacteremia was identified by bone marrow culture on day 26, after which targeted therapy with trimethoprim–sulfamethoxazole (SMZ-TMP) combined with linezolid (LZD) was initiated. A repeat bone marrow culture on day 46 was negative. The patient was discharged on day 50 to complete oral LZD therapy and remained well without recurrence at the 3-month follow-up (day 96).