



CASE REPORT

First fatal central line-associated bloodstream infection caused by *Alistipes onderdonkii*

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ABSTRACT

Alistipes onderdonkii (*A. onderdonkii*) is a rare anaerobic Gram-negative bacillus that forms part of the normal gastrointestinal microbiota but has recently emerged as an opportunistic pathogen in immunocompromised individuals. We report a fatal bacteremia due to *A. onderdonkii* in a 61-year-old man with end-stage renal disease on hemodialysis via a right internal jugular catheter and multiple comorbidities. He presented with septic shock; catheter cuff infection was evident. Anaerobic catheter blood cultures yielded a slow-growing Gram-negative bacillus identified as *A. onderdonkii* by MALDI-TOF MS. Susceptibility showed activity to amoxicillin-clavulanate, ampicillin-sulbactam, and metronidazole, with penicillin and ceftriaxone resistance. Therapy was de-escalated to ampicillin-sulbactam. Despite source control and ICU support, the patient developed gastrointestinal bleeding and multiorgan failure, culminating in death. This case highlights the pathogenic potential of *A. onderdonkii* as a cause of severe bloodstream infection in vulnerable patients with multiple comorbidities and chronic hemodialysis catheters. Increased awareness of this emerging *Alistipes* species may facilitate timely recognition, appropriate antimicrobial management, and further understanding of its clinical significance.

Keywords: *Alistipes onderdonkii*; fatal; bloodstream infection; opportunistic pathogen.

INTRODUCTION

Alistipes onderdonkii is a strictly anaerobic, Gram-negative bacillus that is part of the normal human gastrointestinal microbiota but has recently emerged as an opportunistic pathogen in immunocompromised individuals. Human infections caused by *A. onderdonkii* are exceedingly rare, with only a few reported cases of bacteremia in the literature (Song *et al.*, 2006; Parker *et al.*, 2020; Lin *et al.*, 2024). The organism is difficult to identify using conventional microbiological methods because of its fastidious anaerobic growth; the introduction of matrix-assisted laser desorption/ionization time-of-flight mass spectrometry (MALDI-TOF MS) has improved its recognition in clinical laboratories. We report a fatal case of *A. onderdonkii* bacteremia in a patient with end-stage renal disease receiving maintenance hemodialysis via a tunneled central venous catheter, highlighting the pathogenic potential of this uncommon anaerobe, the role of rapid laboratory identification, and the importance of timely targeted antimicrobial therapy in high-risk patients.

CASE REPORT

A 61-year-old male with a history of diabetes mellitus, hypertension, dyslipidemia, idiopathic Parkinson's disease, and end-stage renal disease (ESRD) presented to the emergency department with a two-

day history of deteriorating consciousness. The patient had been independent in conducting his daily activities, including managing his hemodialysis regimen, and had been on maintenance hemodialysis since June 2023. Due to vascular exhaustion, his vascular access was maintained via a right internal jugular vein (IJV) tunneled catheter inserted one year prior. He had undergone hemodialysis treatment recently and missed his last session due to declining health.

Upon arrival, the patient exhibited profound neurological impairment, as evidenced by a Glasgow Coma Scale (GCS) score of E1V1M1. Vital signs indicated severe hypertension (BP 217/77 mmHg) with heart rate of 74 bpm. The patient was intubated for airway protection in view of low GCS. A computed tomography (CT) scan of the brain ruled out acute intracranial hemorrhage or focal lesions.

Laboratory investigations confirmed leukocytosis with a white blood cell count of $22.4 \times 10^9/L$, predominantly neutrophils ($19.60 \times 10^3/L$) and monocytosis ($1.06 \times 10^3/L$). Hemoglobin was low at 96 g/L while the platelet count was within normal limits ($201 \times 10^9/L$). Additionally, C-reactive protein was markedly elevated at 146.42 mg/L. The results indicated an active bacterial infection with a significant inflammatory response. Renal profile showed hyperkalemia (potassium level 6.3 mmol/L), elevated blood urea (37.3 mmol/L), and creatinine levels (1463 $\mu\text{mol/L}$), indicating significant renal impairment (Table 1).

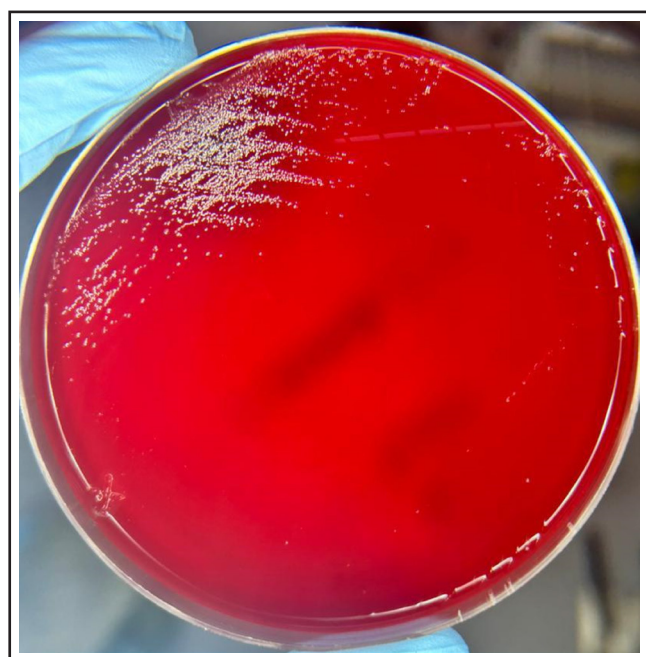
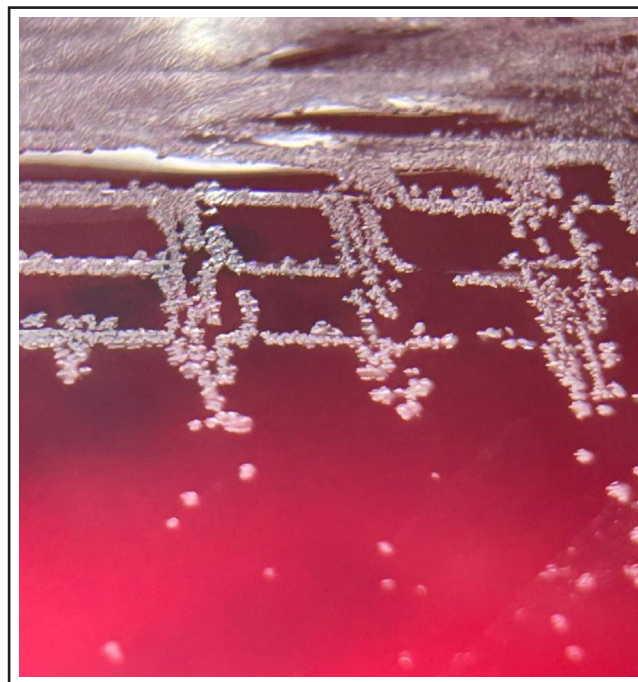
Table 1. Full blood count and serum biochemistry test

Full Blood Count	Value	Unit	Reference Range
Total White Cells	22.4	$10^9/L$	4.0–10.0
Neutrophils	19.60	$10^3/\mu L$	2.0–7.0
Lymphocytes	1.72	$10^3/\mu L$	1.0–3.0
Monocytes	1.06	$10^3/\mu L$	0.2–1.0
Hemoglobin	96	g/L	13–17
Platelet	201	$10^9/L$	150–400
Serum Biochemistry Test	Value	Unit	Reference Range
Urea	37.3	mmol/L	3.2–8.2
Sodium	145	mmol/L	136–145
Potassium	6.3	mmol/L	3.4–4.5
Creatinine	1463	$\mu\text{mol/L}$	62–115
C-Reactive Protein (CRP)	146.42	mg/L	0–5

Clinical examination revealed an exposed cuff and purulent discharge from the right internal jugular catheter site. Empirical therapy with intravenous ceftazidime and cefazolin was initiated for suspected catheter-related bloodstream infection (CRBSI), and the catheter was subsequently removed. The patient was started on insulin therapy to correct hyperkalemia and urgent hemodialysis was done. Subsequently, the patient was transferred to the intensive care unit (ICU) and hemodynamically supported by dual inotropic agents.

The anaerobic blood culture drawn from the permanent catheter was flagged positive after 2 days and Gram-stain revealed a Gram-negative rod. After 48 hours of incubation in anaerobic condition, the growth of scanty, tiny, whitish colonies with beta-hemolysis was seen on anaerobic blood agar (Figures 1-3). The isolate was further re-incubated up to 96 hours and was identified by MALDI-TOF MS as *Alistipes* ssp *onderdonkii* with a log score of 2.29, indicative of reliable identification. Aerobic and peripheral cultures remained negative.

Antimicrobial susceptibility testing based on MIC breakpoints for anaerobes by Clinical and Laboratory Standards Institute (CLSI)

**Figure 1.** Growth of scanty, tiny, whitish colonies on anaerobic blood agar after 48 hours of incubation.**Figure 2.** Close-up image of pure growth with circular, convex, whitish colonies on anaerobic blood agar.**Figure 3.** Weak beta-hemolysis on anaerobic blood agar after 96 hours of incubation at 37°C.**Table 2.** Antibiotic susceptibility test result

Antimicrobial Agents	MIC Value ($\mu\text{g/mL}$)	Interpretation
Amoxicillin-clavulanate	1	Susceptible
Ampicillin-sulbactam	1	Susceptible
Metronidazole	0.016	Susceptible
Ceftriaxone	256	Resistant
Penicillin	32	Resistant

M100 35th Edition revealed susceptibility to amoxicillin-clavulanate, ampicillin-sulbactam, and metronidazole while exhibiting resistance to ceftriaxone and penicillin (Table 2).

Antibiotic therapy was switched to ampicillin-sulbactam based on sensitivity results. The patient's course was further complicated by fresh per-rectal bleeding secondary to rectal ulcers. Despite rectal packing and aggressive resuscitation, the patient developed sudden asystole prior to a planned sigmoidoscopy and succumbed to the illness.

DISCUSSION

Alistipes onderdonkii is a rare obligate anaerobic Gram-negative bacillus increasingly recognized as a potential opportunistic pathogen in immunocompromised and medically complex patients. The organism is often presumed to arise from gastrointestinal (GI) translocation in the setting of inflammation or perforation, supported by reviews of GI sources contributing to bacteremia and translocation in elderly or inflamed GI tracts (Parker *et al.*, 2020; Lin *et al.*, 2024). In the present case, the patient had multiple predisposing factors for severe infection, including end-stage renal disease requiring long-term tunneled hemodialysis catheter access, diabetes mellitus, advanced age, and critical illness at presentation. These underlying conditions likely contributed to impaired host immunity, disruption of mucosal barrier integrity, and increased susceptibility to bloodstream infection.

The clinical presentation in this case was severe, characterized by septic shock, profound metabolic derangement, multiorgan dysfunction, and eventual fatal outcome despite catheter removal, hemodialysis, vasopressor support, and susceptibility-guided antimicrobial therapy. Similar observations have been reported in recent literature, where *Alistipes* bacteremia predominantly occurred among elderly patients with multiple comorbidities, particularly gastrointestinal diseases, malignancies, chronic illnesses, and immunocompromised states. Watanabe *et al.* (2025) described *Alistipes* bacteremia in older patients with digestive and cancer comorbidities, with several patients developing septic shock and mortality despite treatment. The authors proposed gastrointestinal translocation as a major pathogenic mechanism, particularly in patients with mucosal inflammation or dysbiosis (Watanabe *et al.*, 2025).

Hemodialysis catheters are well recognized risk factors for bloodstream infection and mortality among patients with end-stage renal disease. Chronic catheter dependence significantly increases the risk of bacteremia, hospitalization, septic complications, and death compared with arteriovenous fistula access. The prolonged use of a right internal jugular tunneled catheter in this patient, together with exposed cuff and purulent exit-site discharge, likely facilitated bacterial colonization and bloodstream invasion (Lima *et al.*, 2024). Furthermore, critically ill dialysis patients often exhibit impaired innate and adaptive immune responses, rendering them more vulnerable to uncommon and opportunistic anaerobic pathogens.

Obligate anaerobic bacteria are very rare causes of CRBSIs and central line-associated bloodstream infections (CLABSIs), accounting for a small proportion of reported cases, typically less than 5%. The vast majority of CLABSIs and CRBSIs are caused by aerobic or facultative anaerobic microorganisms that reside on the skin or contaminate the catheter hub. Previous studies have reported that anaerobic catheter-related bloodstream infections were predominantly associated with gastrointestinal or genitourinary sources. These infections occurred mainly among immunocompromised patients, particularly solid organ or stem cell transplant recipients and those receiving chemotherapy, and most cases required antimicrobial treatment (Seidelman *et al.*, 2022).

The absence of *Alistipes onderdonkii* growth from the peripheral blood culture limits definitive attribution of the bloodstream infection to the tunneled catheter and does not fulfil the microbiological criteria for a definitive catheter related bloodstream infection (CRBSI). In this case, a positive anaerobic

blood culture was obtained from the tunneled catheter, together with an exposed catheter cuff and purulent discharge at the catheter exit site, raising strong clinical suspicion of a catheter-associated bloodstream infection. Therefore, the infection is more appropriately described as a central line-associated bloodstream infection (CLABSI) (Buetti *et al.*, 2022). An alternative gastrointestinal source cannot be excluded, particularly in view of the coexistence of fresh per-rectal bleeding secondary to rectal ulcers further supports the possibility of gastrointestinal mucosal disruption as a contributing source of bacteremia. Although the source of *A. onderdonkii* bacteremia in this patient remains uncertain, the possibility of gastrointestinal translocation should be considered. Nevertheless, this case remains clinically relevant because *A. onderdonkii* is an uncommon anaerobic bloodstream pathogen, and its isolation from a patient with a long term tunneled central venous catheter and clinical evidence of catheter site infection represents an important clinical observation, particularly in a high-risk patient with end-stage renal disease.

The route by which *Alistipes onderdonkii*, an organism predominantly associated with the intestinal microbiota, may have reached and become associated with the tunneled internal jugular catheter cannot be established with certainty in this case. Intestinal translocation with subsequent transient bacteraemia and catheter seeding represents one possible mechanism, particularly in a patient with end stage renal disease and multiple risk factors for bloodstream infection. Recent reports of *Alistipes* bacteraemia, including cases caused by *A. onderdonkii*, suggest that these organisms may translocate from the gastrointestinal tract into the bloodstream, particularly in patients with underlying gastrointestinal abnormalities or significant comorbidities (Watanabe *et al.*, 2025). The absence of *A. onderdonkii* growth from the peripheral blood culture does not necessarily exclude this proposed route. The organism may have been present transiently in the bloodstream and subsequently cleared following empirical antibiotic therapy, or the level of bacteraemia may have been insufficient for recovery from the peripheral specimen. Importantly, the recovery of *A. onderdonkii* from the central catheter-derived blood culture, in conjunction with an exposed catheter cuff and purulent discharge at the catheter exit site, remains an important clinical finding that cannot be disregarded.

Microbiologically, *A. onderdonkii* remains an uncommon isolate in routine clinical laboratories and may be underrecognized due to its slow-growing anaerobic nature and historical limitations in identification methods. In the current case, MALDI-TOF MS enabled rapid and reliable identification with a high confidence log score. Similar reports have emphasized the importance of advanced diagnostic modalities such as MALDI-TOF MS and 16S rRNA sequencing for accurate identification of rare anaerobic organisms. The increasing implementation of MALDI-TOF MS in clinical microbiology laboratories will likely contribute to improved recognition of *Alistipes* infections in the future (Woo *et al.*, 2008).

The antimicrobial susceptibility profile observed in this isolate carries important therapeutic implications. The organism demonstrated resistance to penicillin and ceftriaxone while remaining susceptible to amoxicillin-clavulanate, ampicillin-sulbactam, and metronidazole. Similar variability in antimicrobial susceptibility has been documented among *Alistipes* species, including reports of beta-lactamase production and resistance to selected beta-lactam antibiotics. Parker *et al.* (2020) highlighted that certain *Alistipes* strains possess beta-lactamase activity, potentially contributing to resistance against penicillins and cephalosporins. The ceftriaxone resistance observed in this isolate therefore reinforces the importance of performing isolate-specific susceptibility testing rather than relying solely on empiric anaerobic coverage assumptions (Lu *et al.*, 2025; Watanabe *et al.*, 2025).

Despite escalation of intensive care support and subsequent de-escalation to targeted ampicillin-sulbactam therapy, the patient deteriorated and succumbed to the illness. This unfavorable outcome

likely reflects the combined effects of severe sepsis, extensive comorbidities, dialysis dependence, gastrointestinal bleeding, and delayed physiological recovery rather than antimicrobial failure alone. Similar fatal outcomes have been described in severe *Alistipes* bacteremia, particularly among frail elderly patients with malignancy, gastrointestinal pathology, or septic shock. The present case therefore adds further evidence that *A. onderdonkii* should not be regarded merely as a commensal anaerobe but rather as a potentially invasive pathogen capable of causing life-threatening bloodstream infection in vulnerable hosts (Lu et al., 2025; Watanabe et al., 2025).

This case also highlights the importance of maintaining a high index of suspicion for anaerobic pathogens in critically ill dialysis patients presenting with catheter infection and gastrointestinal pathology. Early source control, appropriate anaerobic blood culture processing, rapid organism identification, and susceptibility-guided therapy remain essential components in the management of rare anaerobic bloodstream infections. Increased recognition of *Alistipes* species in clinical microbiology laboratories may further improve understanding of their pathogenic role, antimicrobial resistance patterns, and clinical outcomes.

CONCLUSION

The inaugural case of *Alistipes onderdonkii* bacteremia presented herein emphasizes the critical need for increased clinical awareness regarding this emerging pathogen in catheter-related bloodstream infections. The documented resistance patterns necessitate the use of tailored antimicrobial therapies in affected individuals, reinforcing the necessity of proactive surveillance of antimicrobial susceptibility. As research into the role of gut microbiota continues to evolve, understanding the pathogenic mechanisms associated with *A. onderdonkii* will be vital for enhancing diagnosis, treatment, and prevention strategies in susceptible patient populations. This case serves as a compelling reminder of the need to monitor catheters, assess gut health, and engage in vigilant clinical practices to manage infections effectively.

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Conflict of Interest Statement

The authors declare that they have no competing interests.

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