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CASE REPORT

Agrobacterium radiobacter Bacteremia in a Gastric Cancer Patient: A Case Report and Literature Review

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Background: *Agrobacterium radiobacter* (*A. radiobacter*) is a gram-negative environmental bacterium primarily found in soil and plants. While it exhibits low virulence, it can act as an opportunistic pathogen in immunocompromised hosts. Its variable antibiotic resistance patterns pose challenges in clinical management. In this context, we reported a case of catheter-related bloodstream infection (CRBSI) caused by *A. radiobacter* and reviewed its clinical features, diagnostic challenges, and treatment strategies.

Case Presentation: A 70-year-old male with stage IIIA gastric adenocarcinoma and a chemotherapy-associated central venous catheter (CVC) presented with fever and elevated procalcitonin (3.02 ng/mL). Blood cultures from CVC and periphery grew *A. radiobacter*. Empirical piperacillin/tazobactam transiently improved symptoms, but recurrent fever prompted CVC removal on day 10 of hospitalization, leading to rapid resolution of fever, normalization of procalcitonin, and negative follow-up blood cultures.

Conclusion: This case highlights the critical role of catheter removal and susceptibility-guided antibiotic therapy for *A. radiobacter* infections in immunocompromised patients, addressing biofilm challenges and informing antimicrobial stewardship. Collaborative research integrating microbiology, genomics, and clinical data is essential to refine treatment algorithms and improve outcomes in immunocompromised hosts.

Keywords: *Agrobacterium radiobacter*, catheter-related bloodstream infection, antibiotic therapy, immunocompromised host, case report

Introduction

The taxonomy and nomenclature of the genus *Agrobacterium* have been the subject of a long debate, but a consensus has now been reached. To date, at least 20 genomospecies have been recognized, and many are yet to receive valid Latin binomial names. Notably, a number of previous clinical reports on strains of "Rhizobium radiobacter" and "Agrobacterium tumefaciens" point at the same species, now officially termed *Agrobacterium radiobacter* (*A. radiobacter*) (= genomovar G4 of the "A. tumefaciens species complex").[1] *A. radiobacter* is an agricultural soil bacterium that survives on the ground as a saprophytic organism. These organisms are well known to plant microbiologists because they often cause botanical disease.[2] *A. radiobacter* can be distinguished from other species such as *Agrobacterium rhizogenes, Agrobacterium rubi*, and *Agrobacterium tumefaciens*, as the only species that has been described not only as a plant pathogen but also as a human pathogen, although it has low virulence.[3] The first reported case of human pathology in 1980 was prosthetic aortic valve endocarditis.[4] Septicemia, peritonitis, endocarditis, abscesses, meningitis, and catheter-related bloodstream infections have been reported.[2,5–7] Most patients with *A. radiobacter* infections have indwelling catheters in the presence of significant medical comorbidities.[3]

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Moreover, *A. radiobacter* exhibits a characteristic antimicrobial resistance profile that poses a significant challenge to clinical management.[3] It demonstrates intrinsic resistance to many beta-lactam antibiotics, including penicillins and early-generation cephalosporins, primarily mediated by inducible chromosomal AmpC β-lactamases and reduced membrane permeability. Consequently, resistance can emerge during therapy even if initial susceptibility is reported. The pathogen often remains susceptible to broad-spectrum agents like carbapenems, fluoroquinolones, and aminoglycosides, although susceptibility to the latter can be variable.[8] Critically, its ability to form biofilms on medical devices significantly enhances antibiotic tolerance and often necessitates catheter removal for successful eradication.[9]

Given this challenging resistance profile and the critical importance of source control, we present a case of *A. radiobacter* bacteremia in a gastric cancer patient with a CVC, accompanied by a systematic review of the relevant literature based on a search for case reports and series published up to December 2024. The electronic databases PubMed were searched using a combination of keywords including "Agrobacterium radiobacter," "Rhizobium radiobacter," "Agrobacterium tumefaciens," coupled with "infection," "bacteremia," and "human." No language restrictions were applied, though a focus was placed on literature with available English abstracts. The inclusion criteria encompassed microbiologically confirmed human infection cases; environmental isolates and animal studies were excluded. Reference lists of relevant articles were manually screened to supplement potential records, and duplicate reports across databases were removed. Additionally, records for which the full text could not be retrieved were excluded.

Case Description

A 70-year-old man (height, 164 cm; weight, 53.5 kg; BMI, 19.9 kg/m^2) with a history of poorly differentiated adenocarcinoma of the stomach (cT4aN2M0, stage IIIA) was admitted to the gastroenterology department. The patient had no significant comorbidities such as hypertension or diabetes. A totally implantable venous access port had been inserted in the right subclavian vein to administer chemotherapy. The fourth cycle of the S-1 plus Oxaliplatin (SOX) regimen was completed three weeks prior to admission.

Upon admission, the patient was afebrile (body temperature 36.5°C) with stable vital signs: heart rate 97/min, respiratory rate 20/min, and blood pressure 99/66 mmHg. However, he subsequently developed a fever, with his temperature spiking to 39.5°C later that afternoon. Physical examination of the febrile patient revealed a well-appearing man. The CVC insertion site was clean, without erythema, pain, or exudate. No jaundice, lymphadenopathy, or mucositis was evident. Cardiopulmonary auscultation was unremarkable. Abdominal examination showed a soft, flat abdomen with normal bowel sounds and mild epigastric tenderness, but no guarding, rebound, or organomegaly. Notably, apart from the fever, he displayed no tachycardia, hypotension, or other signs of systemic compromise.

Laboratory tests revealed a procalcitonin (PCT) level of 3.02 ng/mL, in contrast to a normal C-reactive protein (CRP) level of 0.68 mg/L. His leukocyte count was 4.33×10^9/liter with a platelet count of 182 ×10^9/liter. The coagulation profile revealed a mildly shortened APTT (20.5 s) and a slightly reduced fibrinogen level (1.92 g/L), alongside significantly elevated D-dimer (5.12 mg/L) and FDP (16.80 µg/mL). The platelet count was within the normal range (180 × 10^9/L). This pattern suggests a hypercoagulable state with concomitant hyperfibrinolysis. He had a mild anemia, with a hemoglobin level of 115 g/L, and did not complain of symptoms other than fever. He is a retiree with no history of gardening, agricultural work, or other significant soil exposure.

It showed a gram-negative, clustered bacterium in both the central CVC and the peripheral blood (Figure 1). Empirical antibiotic therapy with piperacillin/tazobactam (4.5 g q8h; Pfizer) was initiated. The central venous catheter (CVC) and peripheral blood cultures flagged positive after 17 h 03 min and 38 h 33 min of incubation, respectively. Bacteria were transferred to blood agar, chocolate agar, and MacConkey agar and incubated in a 5% CO_2 incubator. A lactose-fermentative gram-negative rod was recovered from all positive bottles that produced highly mucoid colonies on MacConkey agar after two days of growth at 37°C (Figure 1). The isolate was identified as *Agrobacterium radiobacter* using VITEK MS (BioMerieux, Marcy-l'Etoile, France). Antimicrobial susceptibility testing was performed using the VITEK 2 system (BioMerieux, Marcy-l'Etoile, France) with an automated susceptibility card to determine the Minimum Inhibitory Concentrations (MICs). The results were interpreted according to the Clinical and Laboratory Standards Institute (CLSI) M100 34th edition guidelines.[10] Given the absence of species-specific breakpoints for *Agrobacterium radiobacter*, the guidelines for non-*Enterobacteriaceae* other than *Pseudomonas aeruginosa* and

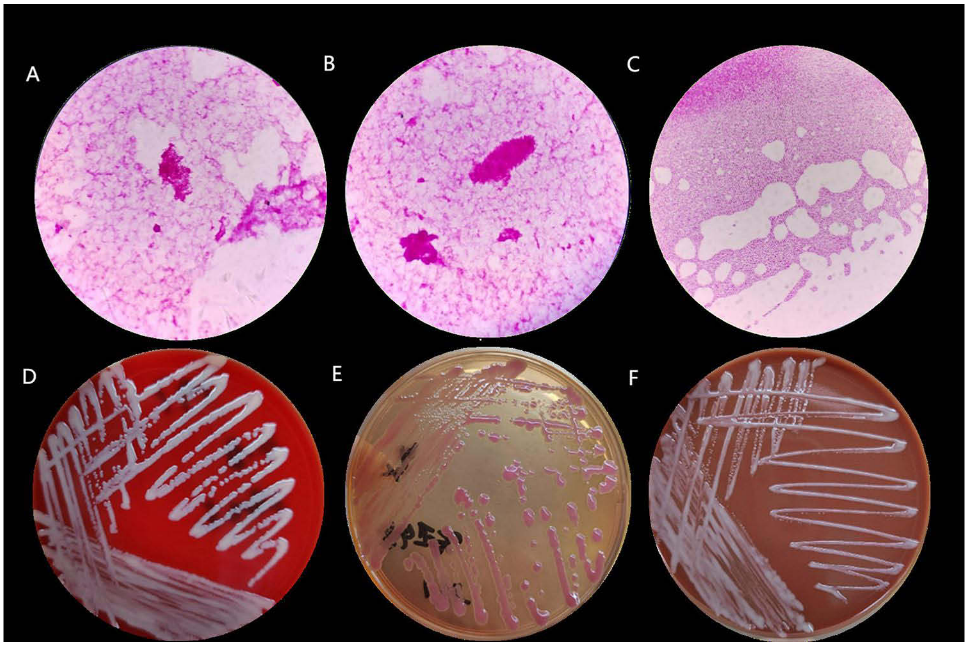

Figure 1 Gram staining of positive blood specimens (**A** and **B**) and isolates (**C**). Colonial morphology of *A. radiobacter* in isolates from blood specimens from our patient on (**D**), blood agar; (**E**), MacConkey agar; and (**F**), chocolate agar.

Acinetobacter spp. were applied. The susceptibility results are listed in Table 1, which indicated resistance to piperacillin/tazobactam. Despite the in vitro resistance, the attending physician was consulted and the decision was made to continue the ongoing piperacillin/tazobactam regimen, as the patient had already shown a positive clinical response, evidenced by defervescence and a reduction in procalcitonin (PCT) to 0.86 ng/mL. However, the patient was febrile again on day 8 of hospitalization. Given the positive blood cultures for the same strain in both CVC and peripheral blood, recurrent fever despite initial improvement, and the absence of any other infectious focus, a diagnosis of catheter-related bloodstream

Table 1 Susceptibility Testing of *Agrobacterium radiobacter* Isolate

Antibiotic	Minimum Inhibitory Concentration by Broth Microdilution (μg/mL) [a]
Ticarcillin/clavulanic acid	<=8
Piperacillin/tazobactam	≥128
Ceftazidime	4
Cefepime	4
Imipenem	<=0.25
Meropenem	<=0.25
Amikacin	≥64
Tobramycin	≥16
Ciprofloxacin	<=0.25
Levofloxacin	<=0.12
Doxycycline	<=0.5
Minocycline	<=1
Tigecycline	<=0.5
Trimethoprim/sulfamethoxazole	<=20

Notes: [a], when numerical minimal inhibit concentration values were provided, the Clinical and Laboratory Standards Institute (CLSI)-recommended breakpoints for *Enterobacteriaceae* other than *Pseudomonas* spp. were used to determine susceptibility.

infection was established. Therefore, the CVC was removed on day 10 of hospitalization. His overall clinical condition rapidly improved, and the subsequent blood cultures remained sterile.

Discussion

Agrobacterium radiobacter is an uncommon opportunistic pathogen that is predominantly associated with immunocompromised hosts or individuals with indwelling medical devices.[2,11,12] This analysis reviewed the data from 30 clinical cases (Table 2) and antibiotic susceptibility profiles (Table 3) to elucidate the epidemiology, clinical features, management strategies, and therapeutic challenges associated with *A. radiobacter* infections. Most cases (63.3%, 19/30) occurred in patients with significant immunosuppression, including hematologic malignancies (eg, acute lymphocytic leukemia, multiple myeloma),[13–17] solid tumors (eg, breast cancer, ovarian carcinoma),[3,9,18,19] HIV infection,[20] or chronic conditions such as end-stage renal disease (ESRD),[2,7,21–23] and diabetes.[24] Notably, 78.3% (18/30) of the infections were linked to intravascular devices, particularly central venous catheters (CVCs; 16 cases),[2,9,15,16,18,20] dialysis catheters (5 cases),[6,7,21,22] and ports (1 case).[3] This aligns with existing literature identifying *A. radiobacter* as a nosocomial pathogen associated with biofilm formation on medical devices.[12] Pediatric and geriatric populations are disproportionately affected, reflecting age-related vulnerabilities in immune function or the frequent use of invasive procedures. Environmental exposure, although rarely documented, has been implicated in one case involving peritoneal dialysis and soil contact.[23] This underscores the ubiquitous presence of organisms in soil and water, suggesting possible entry routes via contaminated medical equipment or breaches using aseptic techniques.

Fever was the most consistent clinical feature (83.3%, 25/30), often accompanied by localized symptoms such as catheter-site pain, cellulitis,[26] or abdominal discomfort (in peritoneal dialysis-associated peritonitis).[2,7] Systemic manifestations, including chills, hypotension,[18,19] and tachycardia,[14,18] have been observed in severe cases (eg, septic shock). Three neonatal cases presented with nonspecific signs (apnea and bradycardia),[25,27,28] emphasizing the diagnostic challenge in nonverbal populations. The diagnosis relied heavily on blood or catheter tip cultures, and *A. radiobacter* was isolated in all cases. Polymicrobial infections are rare but notable; co-isolation with *Haemophilus parainfluenzae*,[26] *Moraxella osloensis*,[6] and *Candida guilliermondii*[17] highlighted the potential for mixed infections in complex clinical scenarios.

Device removal was performed in 40.0% (12/30) of the cases,[2,15,16,18] all of which achieved a cure.[3] This aligns with the guidelines advocating the prompt removal of infected intravascular devices to eliminate biofilm-associated reservoirs.[29] However, 9 patients retained the device, and 4 were successfully treated with antibiotics alone. These exceptions may reflect early intervention (eg, antibiotic initiation prior to biofilm maturation) or limited infection severity (eg, absence of systemic compromise). For instance, a hemodialysis patient retained a tunneled catheter and achieved cure with cefazolin, ceftazidime, and levofloxacin, suggesting that conservative management may be feasible in selected cases with close monitoring.[21]

Empirical regimens frequently combine broad-spectrum agents targeting gram-negative bacteria with adjustments guided by susceptibility testing (Table 3). Ceftazidime was used in 36.6% (11/30) of the cases, despite low in vitro susceptibility (ceftazidime: 41.2%, 7/17). Clinical success with cephalosporins may stem from synergistic effects when combined with aminoglycosides (eg, gentamicin)[9] or β-lactamase inhibitors (eg, tazobactam).[5,9,17] For example, Amaya et al[16] transitioned from vancomycin/ceftazidime/gentamicin to ticarcillin-clavulanate/gentamicin, and achieved resolution without device removal. Fluoroquinolones (ciprofloxacin, levofloxacin) demonstrated high in vitro susceptibility (88.9–100%) and were employed in 30.0% (9/30) of cases, often as step-down therapy.[2,16,18,19,30–32] Carbapenems (imipenem and meropenem) show excellent activity (100% susceptibility) and have been utilized in severe infections, such as septic shock[31] or polymicrobial peritonitis.[6]

The distinct antibiotic susceptibility profile of *A. radiobacter* is primarily driven by its inducible chromosomal AmpC β-lactamase, which confers resistance to penicillins and cephalosporins—including ceftazidime—and is poorly inhibited by tazobactam. This enzymatic resistance, synergized with inherent outer membrane impermeability, explains the treatment failure with piperacillin/tazobactam observed in our case. Furthermore, the mucoid phenotype of the isolate suggests enhanced biofilm-forming capacity, which likely further compromised antibiotic efficacy at the catheter site, leading to recurrent bacteremia despite initial improvement.

Table 2 Characteristics of Reported Cases of Human Agrobacterium radiobacter Infections, 1991–2021

Reference	Year Reported	Isolate	Age/ Sex	Main Diagnosis at Admission	Underlying Conditions	Clinical Features at the Time of BC Sampling	IVDs	IVD Culture	Device Removal	Antibiotic Treatment (Days)	Outcome
[17]	1991	A	6/F	HIV-1 infection	Cytomegalovirus retinitis	Severe leg pain, fever	CVC	*A. radiobacter*	_-	Ceftriaxone	Cured
[15]	1993	B	3/M	Primitive neuroectodermal tumor	None	Fever, lung auscultation	CVC	*A. radiobacter*	_-	Vancomycin, gentamicin, and ticarcillin-clavulanate	Cured
[11]	1993	C	54/F	Multiple myeloma	None	Fever, tenderness, leg swelling, erythema	None	*A. radiobacter*	_-	Cefazolin, oral cepalexin	Cured
	1993	D	5/B	Acute lymphocytic leukemia	None	Fever, stiff neck, and fatigue	CVC	*A. radiobacter*	Yes	Ceftazidime	Cured
[23]	1996	E	13d/M	Lost weight	None	Fever, Agitation and feeding difficulty	None	*A. radiobacter*	_-	Ampicillin	Cured
[22]	1997	F	44/F	Cellulitis and myositis	None	Arm pain and mild swelling, throbbing sensation	None	*A. radiobacter, Haemophilus parainfluenzae*	_-	Ampicillin, ampicillin/ sulbactam	Cured
[12]	2002	G	73/F	Breast cancer	Mild mitral regurgitation	Fever with chills, holosystolic murmur	CVC	*A. radiobacter*	Yes	Cefepime, ciprofloxacin	Cured
		H	53/M	Sudden fever	Chronic myeloid leukemia	Septic shock, with fever, shaking chills, hypotension and tachycardia	CVC	*A. radiobacter*	Yes	Piperacillin, ciprofloxacin	Cured
[13]	2003	I	6/F	Viral-associated hemophagocytic syndrome	None	Fever, rigors	CVC	*A. radiobacter*	Yes	Vancomycin, ceftazidime and gentamicin→ticarcillin-clavulanate and gentamicin	cured
		J	10/M	Acute lymphocytic leukemia	None	Fever, headache	CVC	*A. radiobacter*	Yes	Vancomycin, ceftazidime and gentamicin→ticarcillin-clavulanate and gentamicin	cured

(*Continued*)

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Table 2 (Continued).

Reference	Year Reported	Isolate	Age/ Sex	Main Diagnosis at Admission	Underlying Conditions	Clinical Features at the Time of BC Sampling	IVDs	IVD Culture	Device Removal	Antibiotic Treatment (Days)	Outcome
[2]	2003	K	77/M	Renal neoplasia with end-stage renal disease	Renal neoplasia with end-stage renal disease	Fever	CVC	*A. radiobacter*	No	Cefazoline, ceftazidime, levofloxacin	Cured
[3]	2008	L	42/F	Stage IV ovarian carcinoma	None	Malaise, fever, and shivers	Port	*A. radiobacter*	Yes	Ceftazidime	Cured
[19]	2009	M	75/F	Diabetic nephropathy	Mild congestive heart failure	Fever with chills	Tunneled cuffed hemodialysis catheter	*A. radiobacter*	Yes	Ampicillin/sulbactam	Cured
[8]	2009	N	59/M	T-cell leukemia/ lymphoma	Post-operative allogeneic bone marrow transplantation	Fever	CVC	*A. radiobacter*	No	Tazobactam/piperacillin, amikacin, cefepime	Cured
[10]	2010	O	7/M	ALL, asthma	None	Mild tachycardia, fever and wheezing	CVC	*A. radiobacter*	No	gentamicin	cured
[21]	2010	P	51/M	Acute inferior Wall myocardial infarction with triple vessel disease	Diabetes, hypertension	Recurring melena, fever	CVC	*A. radiobacter*	No	Amikacin, cefoperazone/ sulbactam, tigecycline, imipenem	Cured
[24]	2011	Q	Neonate	Central cyanosis	None	Apnea, bradycardia, and desaturation	None	*A. radiobacter*	No	Ampicillin, gentamicin, cefepime	Cured
[16]	2013	R	73/F	Breast cancer	None	Fever with chills, holosystolic murmur	CVC	*A. radiobacter*	No	Cefepime, ciprofloxacin	Cured
		S	53/M	Chronic myeloid leukemia	None	Fever, shaking chills, hypotension and tachycardia	CVC	*A. radiobacter*	Yes	Piperacillin, ciprofloxacin	Cured
[25]	2013	T	36/F	Motor vehicle Collision	Hypertension	Fever	CVC	*A. radiobacter*	Yes	Cefazolin, cefepime	cured
[20]	2013	U	42/M	Immunoglobulin A nephropathy	None	Cloudy Effluent and diffuse abdominal pain	Dialysis catheter	*A. radiobacter*	No	Cefazolin, ceftazidime	Cured
[6]	2014	V	47/M	Membranous nephropathy	None	Abdominal pain, fever, cloudy peritoneal fluid	Tenckhoff-catheter	*A. radiobacter, Moraxella osloensis*	Yes	Cefazolin, ceftazidime, meropenem	Cured

[26]	2014	W	Preterm Neonate	None	None	Fever, marked abdominal distension	CVC	*A. radiobacter*	Yes	Meropenem, amikacin	Cured
[14]	2016	X	27/F	Sickle cell disease	Deep venous thrombosis	Generalized body pain, sweating, shaking, chills, fever	None	*Candida guilliermondii, A. radiobacter*	_-	Vancomycin, piperacillin/ tazobactam, voriconazole and oral levaquin	Cured
[5]	2017	Y	47/M	Mitral valve endocarditis	Coronary Artery disease, chronic obstructive pulmonary disease and type 2 diabetes mellitus	Mild Diaphoresis, palpitations, occasional night sweats, and mild dyspnea	None	*A. radiobacter*	_-	Ceftriaxone, ertapenem and Levofloxacin, ceftazidime, piperacillin-tazobactam	Cured
[18]	2018	Z	77/M	Renal neoplasia with end-stage renal disease	None	Fever	Tunneled hemodialysis catheter	*A. radiobacter*	No	Cefazoline, ceftazidime, levofloxacin	Cured
[1]	2019	AA	72/M	Elective Transcatheter aortic valve implantation	None	Fever, chills	CVC	*A. radiobacter*	Yes	Amoxicillin-clavulanate, cefepime, ceftriaxone	Cured
		BB	83/F	Acute congestive heart failure, severe aortic stenosis	None	Fever, chills	Cardiac catheterization	*A. radiobacter*	_-	Amoxicillin-clavulanate, meropenem, ciprofloxacin	Cured
[27]	2019	CC	87/F	Watery diarrhea	Cerebral infarction, hypertension, and coronary heart disease	Anorexia, fever, progressive weakness, and oliguria	None	*A. radiobacter*	_-	Cefoperazone/sulbactam	cured
[7]	2021	DD	62/M	Chronic glomerulonephritis	None	Cloudy dialysate	Peritoneal dialysis catheter	*A. radiobacter*	No	Cefazolin, ceftazidime, levofloxacin	Cured

Abbreviations: HIV, Human Immunodeficiency Virus; ALL, acute lymphoblastic leukemia; CVC, central venous catheter; IVDs, in vitro device.

Table 3 Antibiotic Susceptibility Patterns of *Agrobacterium* Spp. Isolates Reported in the Literature

Antibiotic	No. Isolate Tested	% Susceptible [b]
Ticarcillin/clavulanic acid	4	100
Piperacillin/tazobactam	8	87.5
Ceftazidime	17	41.2
Ceftriaxone	7	71.4
Cefepime	10	100
Aztreonam	4	0
Imipenem	11	100
Meropenem	10	100
Amikacin	16	31.3
Tobramycin	11	18.2
Ciprofloxacin	17	100
Levofloxacin	9	88.9
Trimethoprim/sulfamethoxazole	10	50.0
Ampicillin	5	40.0
Piperacillin	4	50.0
Ticarcillin	5	100
Gentamicin	13	38.5

Note: [b], data was abstracted from references and this report.

As summarized in Table 3, key resistance patterns include variable susceptibility to aminoglycosides (eg, amikacin 31.3%, gentamicin 18.2%), necessitating confirmatory testing before use. In contrast, fluoroquinolones and carbapenems demonstrate consistently high susceptibility, supporting their role as empirical therapies, particularly in critically ill patients. Discrepancies between in vitro susceptibility and clinical outcomes—such as the observed efficacy of ceftazidime despite poor in vitro sensitivity—may result from methodological issues (eg, breakpoint criteria for non-*Enterobacteriaceae*) or pharmacokinetic/pharmacodynamic factors (eg, tissue penetration and biofilm activity).

Antibiotic duration in reported cases ranged from 7 to 21 days, with prolonged courses used in deep-seated infections such as endocarditis, and shorter regimens reserved for uncomplicated bacteremia. De-escalation based on susceptibility testing was implemented in several cases, such as transitions from broad-spectrum regimens (eg, vancomycin + ceftazidime + gentamicin) to narrower agents (eg, ticarcillin-clavulanate). Ultimately, the presence of biofilm-associated infection in our patient underscored the necessity of catheter removal as a definitive intervention, complementing antimicrobial therapy to achieve cure.

This study had several limitations. First, the incomplete documentation of antibiotic duration and patient follow-up in the reported cases restricted our ability to draw firm causal inferences regarding treatment efficacy and outcomes. Second, the small cohort size and its considerable heterogeneity—encompassing diverse patient populations such as neonates, adults, and those in oncology versus dialysis settings—challenge the generalizability of our findings. Moreover, the genomic characteristics of the *A. radiobacter* isolates, including mucoid phenotypes and specific virulence factors, which may influence pathogenicity and drug response, remain uncharacterized. Finally, heterogeneity in antimicrobial susceptibility testing (AST) methodologies and interpretive criteria across studies represents another constraint. The absence of species-specific breakpoints for *A. radiobacter* necessitated the application of standards for non-*Enterobacteriaceae* other than *Pseudomonas aeruginosa* and *Acinetobacter* spp., potentially affecting the comparability of resistance rates. To address the latter, we reported raw MIC values where possible and a sensitivity analysis confirmed the robustness of our primary findings for key agents.

Future studies should expand multi-center cohorts to better define epidemiological trends and the evolution of resistance. The integration of molecular typing (eg, whole-genome sequencing) is crucial to identify high-risk clones and clarify resistance mechanisms. Furthermore, evaluating biofilm-disruptive strategies could inform strategies for device retention, and efforts to standardize AST with species-specific breakpoints are needed to improve clinical correlations.

Conclusion

A. radiobacter infections pose significant challenges in immunocompromised hosts and in patients with indwelling devices. Successful management depends on a dual approach: aggressive source control (catheter removal) and tailored antibiotic therapy informed by susceptibility testing. Fluoroquinolones and carbapenems remain the empirical mainstays, whereas cephalosporins require cautious use in combination regimens. Clinicians must be vigilant of emerging resistance and prioritize stewardship to preserve therapeutic efficacy. Collaborative research integrating microbiology, genomics, and clinical data is essential to refine treatment algorithms and improve outcomes in this vulnerable population.

Abbreviations

A. radiobacter, *Agrobacterium radiobacter*; CRBSI, catheter-related bloodstream infection; CVC, central venous catheter; procalcitonin; PCT, end-stage renal disease, ESRD.

Ethics Approval

The authors certify that they have obtained all appropriate patient consent forms. The patient provided written informed consent for the publication of clinical information and photographs. Institutional approval was not required for this case study. This study was conducted in compliance with the Declaration of Helsinki and its subsequent amendments or equivalent ethical standards.

Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

Consent for Publication

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

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Disclosure

The authors report no conflicts of interest in this work.

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