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RESEARCH ARTICLE

Achromobacter spp.-Related Bloodstream Infections: A Review of the Literature and a Case Series

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ABSTRACT

Objective: *Achromobacter spp.* are uncommon causes of bloodstream infections, typically associated with nosocomial settings and immunocompromised patients. This study aims to evaluate the clinical characteristics, antimicrobial susceptibility patterns, and outcomes of seven pediatric patients with community-acquired Achromobacter bacteremia.

Materials and Methods: A retrospective review was conducted on seven pediatric cases admitted with sepsis and positive blood cultures for *Achromobacter spp.* between 2020 and 2024. Demographic data, clinical presentation, laboratory findings, microbiologic identification, antimicrobial susceptibility results, treatment regimens, and outcomes were analyzed.

Results: The median age was 16 months; five patients were female. All patients were previously healthy and presented from the community. Fever was the primary symptom, with cough and poor feeding being common additional findings. Four had isolated sepsis, while three had signs of lower respiratory tract infection. Six isolates were identified as Achromobacter denitrificans and one as *A. xylosoxidans*. All isolates were susceptible to piperacillin-tazobactam and carbapenems. Initial empirical treatment with third-generation cephalosporins was modified to piperacillin-tazobactam and carbapenem upon susceptibility results. All patients recovered and were discharged in good condition, with no deaths observed.

Conclusion: Although rare, *Achromobacter spp.* can cause community-acquired sepsis in previously healthy children. Prompt identification and appropriate antimicrobial therapy guided by susceptibility testing are crucial for favorable outcomes.

Keywords: *Achromobacter spp.*, antimicrobial resistance, community-acquired infections, gram-negative bacteria, sepsis

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INTRODUCTION

Achromobacter spp. are environmental gram-negative bacteria that have emerged as opportunistic pathogens and are capable of surviving in aqueous hospital environments. While these organisms are most frequently associated with nosocomial infections such as bloodstream infections, pneumonia, and urinary tract infections, community-acquired infections are extremely rare.[1] *A. xylosoxidans* has been specifically linked to immunocompromised hosts, often with severe consequences.[2] With the increasing use of automated blood culture systems and advanced bacterial identification techniques, more cases are being identified in previously healthy individuals. This study presents a case series of seven pediatric patients with *Achromobacter spp.* bacteremia of apparent community origin.

MATERIALS and METHODS

Between 2020 and 2024, we retrospectively analyzed the medical records of patients admitted to the pediatric infectious diseases unit with a diagnosis of sepsis and a positive blood culture for *Achromobacter spp.* Inclusion criteria were: (1) age under 18 years, (2) community-acquired

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presentation, and (3) confirmed blood culture growth of *Achromobacter* species. Data collected included demographics, clinical presentation, laboratory results, antibiotic regimens, microbial identification, antimicrobial susceptibilities, hospital course, and outcomes. Microbiological identification was made by MALDI-TOF MS, and antibiotic susceptibility testing was conducted using VITEC 2 (BioMérieux) according to EUCAST.

Community-acquired infection was defined as the presence of clinical signs and positive blood cultures obtained at the time of presentation from home, without recent hospitalization (within the past 90 days), absence of central venous catheterization, and no history of known immunosuppression.

This study was approved by the University of Health Sciences, Istanbul Kanuni Sultan Süleyman Training and Research Hospital Ethics Committee of the local committee (Date: 15.08.2025, Approval no: KAEK/2025.08.200) and was conducted in accordance with the ethical principles of the Declaration of Helsinki.

RESULTS

Two of the seven patients were male, and five were female. The median age was 9 months (range: 3 months–44 months). All children were previously healthy and presented from home. Fever was the primary complaint; associated symptoms included cough (5/7), poor feeding (4/7), and irritability (3/7). Three patients also had findings consistent with lower respiratory tract infection, while four were diagnosed with sepsis alone. One patient required high-flow oxygen therapy (Table 1).

Six patients had blood cultures showing A. denitrificans, and one patient had blood cultures showing *A. xylosoxidans*. Initial empirical treatment with third-generation cephalosporins (ceftriaxone or cefotaxime) was switched to piperacillin-tazobactam based on susceptibility results (Table 2). The average length of hospital stay was eight days. There was no mortality. All patients made a full recovery and were discharged in good health. Initial immunologic evaluations were unremarkable.

DISCUSSION

Achromobacter spp. is an infrequent pathogen in both nosocomial and community settings, with *Achromobacter* xylosoxidans being the predominant species among *Achromobacter spp*. isolates.[3] There are limited data on community-acquired infections. Pneumonia and bacteremia are the two predominant clinical manifestations of *Achromobacter spp*. infections in non-CF (Cystic Fibrosis) individuals.[4]

Case reports of *A. xylosoxidans* infections in Turkey have been documented.[5,6]

In our case series, all patients were previously healthy children from the community. Although the clinical presenta-

Table 1. Clinical and laboratory features of patients with *Achromobacter spp*. bacteremia

	Age (month)	Gender	Underlying disease& risk factors	Clinical data	WBC	NEU	LYM	PLT	CRP	PCT	Therapy and outcome
Case 1	16	F	N[a]	Sepsis, pneumonia	15000	7800	5700	371000	37	0.2	Ceftriaxone, switched to piperacillin-tazobactam (7), and discharged
Case 2	44	M	N	Pneumonia	7200	3400	3100	253000	46	0.4	Ceftriaxone, switched to piperacillin tazobactam (10), and discharged
Case 3	7	M	N	Sepsis	22000	18500	3800	534000	55	2.5	Ceftriaxone, switched to piperacillin tazobactam (10), and discharged
Case 4	9	F	N	Sepsis	41000	32000	8400	535000	181	4.5	Ceftriaxone, switched to piperacillin tazobactam (10), and discharged
Case 5	2	F	N	Sepsis	32800	18000	9500	398000	55	0.2	Ceftriaxone switch to meropenem (14) and discharged
Case 6	7	F	N	Sepsis	16200	9200	4060	945000	68	0.3	Ceftriaxone, switched to piperacillin tazobactam (10), and discharged
Case 7	42	F	N	Sepsis, pneumonia	19800	13700	3400	184000	178	2.2	

Ceftriaxone, switched to piperacillin tazobactam (10), and discharged. [a]: None, normal range: 0–5 mg/L, PCT: Procalcitonin; normal range: <0.5 µg/L. CRP: C-reactive protein; F: Female; M: Male; N:none; WBC: White blood cell; NEU: Neutrophil count; LYM: Lymphocyte count; PLT: Platelet count; PCT: Procalcitonin

Table 2. Minimum inhibitory concentrations (MICs) of *Achromobacter spp.* isolates

	Piperacillin-tazobactam	Meropenem	Amikacin	Aztreonam	Trimethoprim/ Sulfamethoxazole	Ceftazidime	Cefepime
Case 1 MIC (µg/mL)	<=4.0 (S)	<=0.25 (S)					
Case 2 MIC (µg/mL)	<=4.0 (S)	1.0 (S)	8.0 (S)	>=64.0 (R)	<=20.0 (S)		
Case 3 MIC (µg/mL)	<=4.0 (S)	<=0.25 (S)	16.0 (S)		<=20.0 (S)	2.0 (S)	16.0 (I)
Case 4 MIC (µg/mL)	<=4.0 (S)	<=0.25 (S)	8.0 (S)	>=64.0 (R)	<=20.0 (S)		16.0 (I)
Case 5 MIC (µg/mL)	<=4.0 (S)	<=0.25 (S)	8.0 (S)		<=20.0 (S)		8.0 (S)
Case 6 MIC (µg/mL)	<=4.0 (S)	<=0.25 (S)			<=20.0 (S)	>=64.0 (R)	8.0 (S)
Case 7 MIC (µg/mL)	<=4.0 (S)	<=0.25 (S)			<=20.0 (S)		

S: Sensitive; R: Resistant; I: Intermediate

tions were non-specific, they were consistent with bacterial sepsis. The management of patients with *A. xylosoxidans* bacteremia is complicated since this pathogen possesses both inherent and acquired resistance mechanisms, frequently resulting in a multidrug-resistant (MDR) phenotype.[7] Clinical isolates of *Achromobacter* have extensive multidrug resistance, albeit not universally. In addition to the production of β-lactamases and penicillin-binding proteins, numerous clinical strains of *A. xylosoxidans* possess genes that encode aminoglycoside-modifying enzymes, which provide resistance to tobramycin and gentamicin.[8]

A. xylosoxidans exhibits an atypical susceptibility profile, demonstrating resistance to aminoglycosides and most β-lactam antibiotics. Anti-pseudomonal penicillins, trimethoprim-sulfamethoxazole, and carbapenems are the chosen therapeutic agents.[1,9] Piperacillin-tazobactam and carbapenems have been shown to maintain high levels of *in vitro* activity against *Achromobacter spp.*, even among multidrug-resistant strains.[10] Our findings are in line with these reports, as all patients responded well to piperacillin-tazobactam. One patient was treated with a carbapenem. Given the organism's intrinsic resistance to aminoglycosides and fluoroquinolones, delayed treatment adjustments can compromise outcomes. This pattern of resistance has been observed consistently across pediatric and cystic fibrosis patient populations, highlighting the challenge of selecting effective empiric therapy.

While prior studies primarily documented infections in patients with comorbidities or prolonged hospitalizations, our series demonstrates that *Achromobacter spp.* can also cause significant illness in community-dwelling, previously healthy children. In the literature, some infections have been reported in healthy children.[11,12]

Shie et al.[13] assessed the features of *A. xylosoxidans* bacteremia in Taiwan and found that malignancies, central venous catheter placements, and prior major surgeries were the predominant underlying diseases.

Aisenberg et al.[14] indicated that *Achromobacter* bacteremia manifested with fever (52%), sepsis syndrome (22%), and respiratory issues (17%). A study detailing 40 cases of *A. xylosoxidans* bacteremia indicated that the predominant symptoms were fever (82%), chills (37.5%), hypotension (32.5%), and altered consciousness.[13]

A. xylosoxidans has often been isolated from environmental sources in hospital-acquired illnesses.[3] *A. xylosoxidans* was identified in deionized water within an intensive care unit, in tap water, and on the hands of two healthcare workers in a hemodialysis unit.[15]

Since the dates of positive blood cultures in our patients were not temporally clustered, an outbreak investigation was not initiated. All patients were hospitalized during the COVID-19 pandemic; however, SARS-CoV-2 was not detected in respiratory PCR tests as a causative pathogen.

The possibility of pseudo-bacteremia due to contamination during venipuncture, media preparation, or laboratory handling was considered. Nevertheless, all patients showed clinical signs consistent with true bacteremia, supported by laboratory findings such as positive blood cultures and elevated procalcitonin levels.

A lumbar puncture was performed on the 2-month-old infant diagnosed with sepsis, and cerebrospinal fluid results were not consistent with meningitis. Blood cultures for all patients were obtained at the time of initial presentation to the pediatric emergency department. None of the patients had a prior history of hospitalization.

Although previous studies have reported an increased incidence of *Achromobacter* bloodstream infections during the COVID-19 pandemic,[16] typically associated with prolonged hospitalization, broad-spectrum antibiotic use, and invasive procedures, none of our patients had underlying medical conditions, immunosuppression, or known risk factors such as central venous catheterization or mechanical ventilation.

This case series also underscores important epidemiological concerns. The occurrence of infection in children with no prior healthcare exposure suggests environmental reservoirs, such as contaminated water sources, which have been implicated in other outbreaks. These findings call for broader surveillance and environmental studies.

In terms of resistance patterns, our results mirror those in global surveillance studies, which highlight the need for local antibiograms to guide empiric choices. The ability of *Achromobacter spp.* to persist in moist environments, including hospital plumbing and devices, may also contribute to sporadic community emergence. Such an investigation is warranted when a cluster of cases emerges within a short timeframe, raising suspicion of a potential outbreak. In such scenarios, bacteriological cultures should be obtained from environmental sources, including antiseptic solutions (chlorhexidine digluconate, aqueous and alcoholic), wash basins, incubator surfaces, liquid soaps, faucets, nebulizers, and tap water. Additionally, healthcare workers' hands should be sampled by direct fingerprinting onto Petri dishes.[1]

This study has several limitations. First, it is a retrospective case series with a small sample size, which may limit the generalizability of the findings. Second, the study was conducted at a single center, potentially introducing selection bias. Finally, there was no long-term follow-up to assess for recurrence or long-term complications, which limits conclusions regarding the extended outcomes of these infections.

CONCLUSION

This case series demonstrates that *Achromobacter spp.*, despite traditionally being considered nosocomial pathogens, can cause community-acquired sepsis in healthy children. Increased clinical awareness and accurate identification are essential. For positive outcomes, timely susceptibility testing and appropriate antibiotic selection are critical.

Disclosures

Ethics Committee Approval: The study was approved by the University of Health Sciences, Istanbul Kanuni Sultan Süleyman Training and Research Hospital Ethics Committee (No: KAEK/2025.08.200, Date: 15/08/2025).

Informed Consent: Informed consent was obtained from all participants.

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