Catheter-Related Bloodstream Infection Caused by *Chryseobacterium arthrosphaerae*: The First Reported Case

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Introduction

- *Chryseobacterium* species are non-fermenting, Gram-negative bacilli commonly found in environmental sources. Although usually considered opportunistic pathogens, they have been increasingly implicated in healthcare-associated infections, particularly in immunocompromised patients or those with indwelling catheters.
- Here, we report the first documented case of catheter-related bloodstream infection (CRBSI) caused by *Chryseobacterium arthrosphaerae*.

Colony morphology of *C. arthrosphaerae* on blood agar
Smooth, circular, convex colonies with opaque to slightly translucent appearance, producing a non-diffusible yellow–orange pigment and occasionally a fruity odor.

Case Presentation

Time course

On admission
- 50s woman – admitted for pain control (metastatic breast cancer)
- History – type 2 diabetes (HbA1c 6.1%), neurogenic bladder (vertebral metastasis)

Day 11
- Pyelonephritis, septic shock (*E. coli*) → Meropenem ×10d

Day 30
- Recurrent septic shock, PICC in place for 21d
- Cultures – *C. arthrosphaerae* (catheter tip, 2 blood cultures) → CRBSI suspected
- Treatment – TMP-SMX →PIPC/TAZ (14d)

Day 61
- Clinical improvement, discharged

Clinical course

- A woman in her 50s with metastatic breast cancer was admitted for pain management. Past history included type 2 diabetes and neurogenic bladder due to vertebral metastasis.
- On day 11, she developed *E. coli* pyelonephritis with septic shock, treated with meropenem for 10 days.
- On day 30, she had recurrent septic shock; as her PICC had been in place for 21 days, CRBSI was suspected. Cultures from the catheter tip and blood grew *C. arthrosphaerae*, which was identified by MALDI-TOF MS. She was treated with TMP-SMX, later switched to piperacillin-tazobactam, for a total of 14 days.

Discussion

Antimicrobial Resistance in *C. arthrosphaerae*

【Potential resistance mechanisms】

Genomic analyses of *Chryseobacterium* species, including *C. arthrosphaerae*, suggest several mechanisms that may contribute to their broad resistance patterns:

- **Chromosomally encoded class A and class B β-lactamases** → confer resistance to β-lactams and carbapenems.
  Liang CY, et al. Genes (Basel). 2019;10(4):309. Zhu L, et al. BMC Microbiol. 2024 Mar 8;24(1):80.
- **Efflux pump systems** → reduce intracellular concentrations of fluoroquinolones, tetracyclines, and other drug classes.
  Liang CY, et al. Genes (Basel). 2019;10(4):309.
- **Aminoglycoside-modifying enzymes** → contribute to intrinsic resistance against aminoglycosides.
  Zhu L, et al. BMC Microbiol. 2024 Mar 8;24(1):80.
- **Biofilm formation on indwelling devices** → enhances persistence and tolerance to antimicrobial therapy.
  Im SJ, et al. Medicine (Baltimore). 2020 Aug 21;99(34):e21751

Antimicrobial susceptibility of *C. arthrosphaerae*

	Liang 2019		Im 2020		Zhu 2024		This study	
	MIC	S/I/R	MIC	S/I/R	MIC	S/I/R	MIC	S/I/R
Piperacillin	>64	R	≥128	R	≥128	R	64	I
Piperacillin-tazobactam	>128/4	R	≥128	R	≤16/4	S	≤16	S
Ceftazidime	>16	R	≥64	R	≤8	S	8	
Cefepime	>32	R	≥64	R	≤8	S	>16	R
Aztreonam	>16	R	≥64	R	≤8	S	NA	
Imipenem	>8	R	≥16	R	≤4	S	>8	R
Meropenem	>8	R	≥16	R	≤4	S	8	I
Gentamicin	>8	R	≥16	R	≥16	R	>8	R
Tobramycin	>8	R	NA	NA	≥16	R	>8	R
Amikacin	>32	R	≥64	R	≥64	R	>32	R
Minocycline	>8	R	≤1	S	≥16	R	≤4	S
Tigecycline	>8	R	4	S	NA	NA	NA	NA
Ciprofloxacin	>2	R	1	S	≥4	R	≤0.25	S
Levofloxacin	>8	R	NA	NA	≥8	R	0.5	S
Trimethoprim-sulfamethoxazole	>4/76	R	≤20	S	≥4/76	R	≤2	S

Breakpoints for *Chryseobacterium arthrosphaerae* are not defined; interpretations were based on CLSI M100-Ed35 criteria for non-fermenting Gram-negative bacilli.
Liang CY, et al. Genes (Basel). 2019;10(4):309.Im SJ, et al. Medicine (Baltimore). 2020 Aug 21;99(34):e21751. Zhu L, et al. BMC Microbiol. 2024 Mar 8;24(1):80.

Conclusion

To date, only four cases including ours have reported antimicrobial susceptibility data. Further accumulation of clinical characteristics and susceptibility profiles of *C. arthrosphaerae* is warranted.