American Journal of Case Reports

e-ISSN 1941-5923
© Am J Case Rep, 2019; 20: 453-458
DOI: 10.12659/AJCR.914360

Received: 2018.11.30
Accepted: 2019.01.04
Published: 2019.04.05

Pseudomonas Mendocina Bacteremia: A Case Study and Review of Literature

Authors' Contribution:
Study Design A
Data Collection B
Statistical Analysis C
Data Interpretation D
Manuscript Preparation E
Literature Search F
Funds Collection G

ABCDEF 1 Melony Gani
ABCDEF 1 Sanjana Rao
ABCDEF 2 Matthew Miller
ABCDEF 3 Sarah Scoular

1 Skaggs School of Pharmacy and Pharmaceutical Sciences, University of Colorado, Aurora, CO, U.S.A.
2 Department of Pharmacy, University of Colorado Hospital, Aurora, CO, U.S.A.
3 Clinical Pharmacy, Skaggs School of Pharmacy and Pharmaceutical Sciences, University of Colorado, Aurora, CO, U.S.A.

Corresponding Author: Sarah Scoular, e-mail: Sarah.Scoular@ucdenver.edu
Conflict of interest: None declared

Patient: Male, 64
Final Diagnosis: Pseudomonas mendocina bacteremia
Symptoms: Encephalopathy • fever • hypotension • rigors • tachypnea
Medication: —
Clinical Procedure: —
Specialty: Infectious Diseases

Objective: Rare disease

Background: *Pseudomonas mendocina* is a Gram-negative, aerobic, rod-shaped bacterium belonging to the family Pseudomonadaceae. In nature, *P. mendocina* has been isolated from water and soil samples. The species rarely causes disease in humans though severe infections resulting in hospitalization and intensive care have been documented. This case is perhaps the second reported case in the United States of a *P. mendocina* related infection. In this case report, we analyze the clinical and laboratory features of *P. mendocina* infection in a severely immunocompromised acquired immunodeficiency syndrome (AIDS) patient and review the available literature.

Case Report: A 64-year-old white male with past medical history significant for human immunodeficiency virus (HIV)/AIDS (CD^4 count on admission <10 cells/mm^3) diagnosed in 1988 and on antiretroviral therapy since 1992, was admitted to our facility for acute management of a suspected invasive mold infection. On hospital day 20 the patient developed a fever of 39.9°C, had an elevated lactate of 2.6 mmol/L and absolute neutrophil count greater than 1000 cells/mm^3. On hospital day 22, both blood culture sets were positive for *Pseudomonas mendocina*. Antibiotic therapy was de-escalated to ceftazidime and after a total treatment course of 10 days the was successfully discharged.

Conclusions: There have been 14 reported cases of *P. mendocina* in the world. Four cases presented with meningitis and 5 with endocarditis. Beyond typical anti-pseudomonal agents, 2 of the reported cases show susceptibility of *P. mendocina* antibiotics such as sulfamethoxazole/trimethoprim and ceftriaxone. All documented case reports of *P. mendocina* infection resulted in successful treatment with antibiotics and survival of the patient.

MeSH Keywords: Bacteremia • Gram-Negative Bacterial Infections • *Pseudomonas Mendocina*

Full-text PDF: https://www.amjcaserep.com/abstract/index/idArt/914360

Indexed in: [PMC] [PubMed] [Emerging Sources Citation Index (ESCI)] [Web of Science by Clarivate]

Background

Pseudomonas mendocina is a Gram-negative, aerobic, rod-shaped bacterium belonging to the family Pseudomonadaceae. In nature, *P. mendocina* has been isolated from water and soil samples and is documented as able to survive on over 75 different substrates [1], growing at temperatures ranging from 25ºC to 42ºC. The species rarely causes disease in humans though severe infections resulting in hospitalization and intensive care such as endocarditis have been documented. *P. mendocina* infections have been reported in various countries ranging from the USA to Taiwan suggesting a ubiquitous nature. A few cases of *P. mendocina* infection have also been reported in otherwise healthy individuals following suspected prolonged exposure to the bacteria.

Of the Pseudomonas species, *P. aeruginosa* is an important nosocomial pathogen due to its ability to flourish in a hospital environment and its high level of resistance to many antibiotics. Unlike *P. aeruginosa*, *P. mendocina* has reported susceptibilities to antibiotics that *P. aeruginosa* is inherently resistant to. This may be due to the infrequency that it causes human infection. In this case report, we analyze the clinical and laboratory features of *P. mendocina* infection in a severely immunocompromised acquired immunodeficiency syndrome (AIDS) patient. This case is the second reported case in the United States of a *P. mendocina* related infection.

Case Report

A 64-year-old white male with past medical history significant for human immunodeficiency virus (HIV)/AIDS (CD_4 count on admission <10 cells/mm^3) diagnosed in 1988 and on antiretroviral therapy since 1992, was admitted to our facility for acute management of a suspected invasive mold infection. The patient's pertinent past medical history includes Kaposi Sarcoma (KS) treated with radiation and involving the right inner thigh, right forearm, and palate, pancytopenia managed with thrice weekly filgrastim, recently diagnosed left orbital apex syndrome and *Aspergillus fumigatus* sinusitis managed initially on isavuconazonium sulfate. Upon admission, treatment with isavuconazonium sulfate was discontinued, and liposomal amphotericin-b and voriconazole were started. Liposomal amphotericin-b was discontinued with recovery of only *Aspergillus fumigatus* from surgical cultures, and voriconazole was changed to posaconazole 300 mg daily on hospital day 13 due to a subtherapeutic voriconazole trough level of 0.3 mg/L. On hospital day 20, the patient developed a fever of 39.9°C, had an elevated lactate of 2.6 mmol/L and absolute neutrophil count greater than 1000 cells/mm^3. Blood cultures were obtained at that time with results from urinalysis and chest x-ray less concerning for infection. Increasing drainage from KS lesions on the thigh was noted and considered as a potential infection source. Broad empiric antibiotic therapy was initiated with intravenous (IV) vancomycin 1250 mg IV every 12 hours and cefepime 2000 mg IV every 8 hours. The patient continued to clinically worsen developing encephalopathy, rigors, persistent fever, hypotension, and tachypnea. Cefepime was changed to piperacillin/tazobactam 4.5 g extended IV infusion every 8 hours and IV fluid bolus was given. The rationale for the switch from cefepime was based on concern for cefepime related encephalopathy, though this was felt to be less likely given the relatively short duration of exposure and contribution from sepsis. The Wound Care Team was consulted in the setting of a potential new infection of his right thigh KS lesion that appeared to have increased sloughing and drainage with a musty odor. On hospital day 22, both blood culture sets were positive for *P. mendocina* with equal time to positivity and non-significant difference in quantitative culture results between the peripherally inserted central catheter (PICC) line and peripheral cultures. The PICC line was removed on hospital day 21, with catheter tip culture and repeat blood cultures from this day and day 22 remaining negative for bacterial growth. Antibiotic susceptibilities were requested for cefepime, ceftazidime, levofloxacin, and meropenem by Etest (bioMérieux, Marcy l'Etoile, France). Unfortunately, piperacillin-tazobactam Etest strips were unavailable due to manufacturer shortage and thus this antibiotic was not tested. Antibiotic susceptibilities of the *P. mendocina* isolate from this patient are summarized in Table 1. Interpretations were determined using the Clinical and Laboratory Standards Institute (CLSI) M100-S27 criteria for other non-*Enterobacteriaceae* and non-*Aeruginosa pseudomonas spp*. Antibiotic therapy was adjusted to ceftazidime ultimately to complete a total 10-day course from first negative blood culture. The ultimate source of infection was unclear, but thought to be related to the open wound (no cultures obtained from this site). Blood cultures cleared quickly, and patient's infection was successfully treated. Rationale for the choice of ceftazidime was based on *in vitro* susceptibility and concern for cefepime related encephalopathy, though this was felt to be less likely given the relatively short duration of exposure and contribution from sepsis. Despite improvement while receiving piperacillin-tazobactam and anticipated

Table 1. Antibiotic susceptibility profile of *Pseudomonas mendocina* isolated.

Antibiotic	Minimum inhibitory concentration (MIC, mcg/mL), interpretation
Cefepime	0.50, susceptible
Ceftazidime	1, susceptible
Levofloxacin	0.064, susceptible
Meropenem	0.125, susceptible

Indexed in: [PMC] [PubMed] [Emerging Sources Citation Index (ESCI)] [Web of Science by Clarivate]

Table 2. Patient characteristics.

Case	Patient age/sex	Underlying conditions	Location	Symptoms	Type of infection	Mono/polymicrobial infection
1	63/M	Resistant HIV/AIDS	USA	Encephalopathy, rigors, tachypnea, fever, hypotension	Bacteremia	Mono
2 [2]	55/M	DM, buccal cancer, community-acquired spontaneous	Taiwan	–	Meningitis	Mono
3 [2]	66/F	Spontaneous ICH, external ventricular drainage	Taiwan	–	Meningitis	Mono
4 [2]	79/M	Spontaneous, COPD, respiratory failure, nosocomial	Taiwan	–	Meningitis	Poly – *Aeromonas caviae*
5 [2]	78/F	Spontaneous, community-acquired	Taiwan	–	Meningitis	Poly – *Acinetobacter* spp.
6 [3]	65/M	alcohol hepatitis, CKD	Taiwan	Lower back pain, deep tissue pus	Spondylodiscitis	Mono
7 [4]	63/M	prosthetic aortic valve, T2DM, poliomyelitis	Argentina	Fever, shivering	Native mitral valve endocarditis	Mono
8 [4]	34/M	none, healthy (motorcycle accident)	Singapore	–	Foot wound infection	Poly – *Stenotrophomonas maltophilia*
9 [5]	22/M	CKD, peritoneal dialysis	Portugal	Abdominal pain, cloudy effluent	Peritonitis	Mono
10 [6]	28/F	Tetralogy de Fallot, previous CV surgeries	Denmark	Abdominal pain, dyspnea, flu-like syndrome, tricuspid stenosis	Native tricuspid valve endocarditis	Mono
11 [7]	79/F	Afib, TIA, HTN	France	Fever	Native aortic valve endocarditis	Mono
12 [8]	36/M	mentally retarded	Turkey	Fever, malaise, anorexia, substantial weight loss (~10kg), tachycardia, hypotension	Native mitral valve endocarditis	Mono
13 [9]	31/M	None, healthy	Israel	Fevers, shivering, malaise, chills, headache, muscle cramps	Bacteremia	Mono
14 [10]	57/M	Gout, chronic alcohol use	USA	Leg ulcers, fever, leukocytosis, tachycardic, hypertensive	Native mitral valve endocarditis	Mono

M – male; F – female; HIV – human immunodeficiency virus; AIDS – acquired immunodeficiency syndrome; DM – diabetes mellitus; ICH – intracerebral hemorrhage; COPD – Chronic obstructive pulmonary disease; CKD – chronic kidney disease; T2DM – type 2 diabetes mellitus; CV – cardiovascular; Afib – atrial fibrillation; TIA – transient ischemic attack; HTN – hypertension.

Indexed in: [PMC] [PubMed] [Emerging Sources Citation Index (ESCI)] [Web of Science by Clarivate]

Table 3. Antibiotic treatment regimens and survival.

Case	Treated with	Survived
1	IV ceftazidime ×10 days	Yes
2 [2]	IV ceftriaxone	Yes
3 [2]	IV ceftazidime	Yes
4 [2]	IV meropenem	Yes
5 [2]	IV cefepime	Yes
6 [3]	IV cefepime ×2 weeks followed by oral ciprofloxacin ×4 weeks	Yes
7 [4]	PO SMZ/TMP ×16 days	Yes
8 [5]	Intraperitoneal cefazolin + intraperitoneal ceftazidime + oral ciprofloxacin ×3 weeks	Yes
9 [6]	IV gentamicin + IV ampicillin, followed by ciprofloxacin	Yes
10 [7]	IV piperacillin + IV gentamicin ×6 weeks	Yes
11 [8]	IV ceftazidime + IV amikacin ×6 weeks	Yes
12 [9]	IV gentamicin + oral ofloxacin ×2 weeks	Yes
13 [10]	IV piperacillin/tazobactam x 6 weeks	Yes
14 [11]	IV ceftriaxone + IV gentamicin ×6 weeks followed by oral ciprofloxacin ×2 weeks	Yes

susceptibility, we chose not to treat with this agent definitively given inability to document *in vitro* susceptibility of this isolate and unnecessary anaerobic coverage. Patient received all treatment for infection during his 44-day total hospital stay and was successfully discharged back to the outpatient care by his primary care provider.

Discussion

A literature search was performed using PubMed by searching the term "*Pseudomonas mendocina*". As shown in Table 2, this case is the second reported case in the USA and overall the fourteenth reported case of human *P. mendocina* infection. *P. mendocina* has a ubiquitous nature which is supported by the large geographic spread of the case reports. Of the 13 reported cases, 6 were reported from Asia (Taiwan [2,3], Singapore [4]), 3 cases were reported from Europe (Portugal [5], Denmark [6], France [7]), 2 cases were reported from the Middle East (Turkey [8], Israel [9]), 1 case was reported from North America (USA [10]), and 1 case was reported from South America (Argentina [11]). The majority type of infection were 5 cases of native valve endocarditis (35%), 4 cases of meningitis, 2 cases of bacteremia, 2 cases of skin and soft tissue infections (spondylodiscitis, foot wound), and 1 case of peritonitis. *P. mendocina* human infections appear to have a slow, insidious onset. Many of the reported patient symptoms included fever, malaise, and shivering days before presentation to the hospital. Positive markers of inflammation were present in several cases including elevated C-reactive protein (CRP), estimated sedimentation rate (ESR), and leukocytosis. Elevated CRP levels ranged from 16 to 233.6 mg/L [4,5,9–11]. Elevated ESR ranged from 33 to 105 mm/hr [4,5,9–11]. Elevated white blood cell counts ranged from 14.7–24 g/L [8,10,11].

No sources of *P. mendocina* infections were confirmed in any of the case reports. In 3 case reports, a source of infection was suspected. In a case report by Johansen et al., the authors suspected that *P. mendocina* was introduced during one of the patient's 3 previous cardiac operations [6]. In a case report by Aragone et al., the authors suspected that bacteria entered the bloodstream through thorn pricks and handling of damp earth in view of the patient's occupation as a florist; the patient presented with small erythematous lesions on the fingertips of both hands attributed to thorn pricks [7]. In the peculiar case reported by Nseir et al., the patient "reported that he had a new pet cockatiel that he fed and watered directly from his mouth". Based on this information, cultures of the bird's bottled drinking water were taken and *P. mendocina* was cultured from the bird's drinking water [9]. Favorable outcomes were described in all case reports and no mortality from *P. mendocina* infection was reported. In cases that reported fevers, patients quickly became afebrile within 24 to 48 hours of antimicrobial therapy initiation.

Most *P. mendocina* infection case reports were monomicrobial infections except for 3 cases of polymicrobial infection [2,11]. In the 3 cases of polymicrobial infection, the other pathogens were also Gram-negative bacteria (Table 2). *P. mendocina* infections were successfully treated with a wide variety of antibiotics including penicillins, early and later-generation cephalosporins, carbapenems, fluoroquinolones, aminoglycosides, and

Indexed in: [PMC] [PubMed] [Emerging Sources Citation Index (ESCI)] [Web of Science by Clarivate]

Table 4. Minimum inhibitory concentrations (MICs) and susceptibilities: Case 1–8.

MIC (µg/mL)	Case 1	Case 2 [2]	Case 3 [2]	Case 4 [2]	Case 5 [2]	Case 7 [3]	Case 8 [8]
Amikacin	–	S	S	S	S	S	S (1)
Ampicillin							NA (12)
Aztreonam	–	–	–	–	–	S	–
Cefepime	S (0.50)	S	S	S	S	S	S (1)
Ceftazidime	S (1)	S	S	S	S	S	S (2)
Ciprofloxacin	–	–	–	–	–	S	
Gentamicin	–	–	–	–	–	S	S (0.25)
Imipenem	–	S	S	S	S	S	S (0.25)
Levofloxacin	S (.064)	–	–	–	–	–	
Meropenem	S (0.125)	S	S	S	S	–	
Piperacillin/Tazobactam	–	–	–	–	–	S	S (2)
SMZ-TMP	–	–	–	–	–	R	

Table 5. Minimum inhibitory concentrations (MICs) and susceptibilities: Case 9–14.

MIC (µg/mL)	Case 9 [6]	Case 10 [11]	Case 11 [10]	Case 12 [9]	Case 14 [4]
Amikacin	–	S (0.5)	–	S	–
Ampicillin	NA (1)	NA	–	–	NA
Ampicillin/Sulbactam	–	–	R (≥32)	–	NA
Aztreonam	–	–	–	R	–
Cefazolin	–	–	NA (32)	–	–
Cefepime	–	–	S (≤1)	–	–
Ceftazidime	–	S (1)	S (2)	S	S
Ceftriaxone	–	S (4)	S (8)	R	–
Cephalothin	–	NA	–	–	–
Ciprofloxacin	S (0.023)	S (0.125)	S (≤0.25)	S	S
Colistin	–	S	–	–	–
Gentamicin	S (2)	S (0.25)	S (≤1)	S	–
Meropenem	S (0.125)	–	–	–	–
Netilmicin	–	S	–	–	–
Ofloxacin	–	–	–	S	–
Pefloxacin	–	S	–	–	–
Piperacillin	–	S (0.62)	–	S	–
Piperacillin/Tazobactam	–	–	S (≤4)	–	S
SMZ-TMP	–	S (≤0.25/4.75)	–	–	S
Tobramycin	–	–	–	S	–

Indexed in: [PMC] [PubMed] [Emerging Sources Citation Index (ESCI)] [Web of Science by Clarivate]

sulfamethoxazole-trimethoprim (Table 3). Treatment of *P. mendocina* was successful with non-traditional *P. aeruginosa* antibiotics such as ampicillin and early-generation cephalosporins. The susceptibility of *P. mendocina* to a broader range of antibiotics than that of *P. aeruginosa* might be attributed to its rare occurrence in human infections. Since *P. mendocina* is not a common clinical human pathogen, there is not much data available about its patterns of susceptibilities and resistance. Available susceptibilities, resistance, and a few reported minimum inhibitory concentrations (MICs) from the 14 case reports are displayed in Tables 4 and 5. As mentioned, *P. mendocina* is susceptible to non-traditional anti-pseudomonal antibiotics. Several cases reported susceptibility to all antibiotics tested (including aminoglycosides, carbapenems, ampicillin, later-generation cephalosporins, fluoroquinolones, and piperacillin/tazobactam) [2,5,6]. Although non-pseudomonal antibiotics, such as ampicillin, cefazolin, and sulfamethoxazole-trimethoprim, were used, there have been some reports of resistance to these drugs. Chi et al. reported resistance to sulfamethoxazole-trimethoprim [4]. Aragone et al. reported resistance to ampicillin and cephalothin [7]. Rapsinski et al. reported resistance to ampicillin/sulbactam and cefazolin [8]. Nseir et al. reported resistance to aztreonam and ceftriaxone [9]. Chiu et al. reported resistance to ampicillin and ampicillin/sulbactam [11]. All documented case reports of *P. mendocina* infection resulted in successful treatment with antibiotics and survival of the patient (Table 3).

Conclusions

Pseudomonas mendocina is a rare source of bacterial infection in humans. There have been 14 reported cases of *P. mendocina* in the world. Four cases presented with meningitis and 5 cases presented with endocarditis. Beyond typical anti-pseudomonal agents, 2 of the reported cases show susceptibility of *P. mendocina* to antibiotics such as sulfamethoxazole/trimethoprim and ceftriaxone. In some cases, *P. mendocina* infections were successfully treated with regimens that included ceftriaxone, ampicillin, and sulfamethoxazole/trimethoprim. The present case study results contribute to the limited data available for clinical treatment of this rare infection. This case report and literature review summarizes all antibiotic treatment, susceptibility, and clinical outcomes data available at the time of publication to aid in future therapeutic approaches. All documented case reports of *P. mendocina* infection resulted in successful treatment with antibiotics and survival of the patient.

Conflict of interest

None.

References:

1. Palleroni NJ, Doudoroff M, Stanier RY et al: Taxonomy of the aerobic pseudomonads: The properties of the *Pseudomonas stutzeri* group. J Gen Microbiol, 1970; 60(2): 215–31
2. Huang CR, Lien CY, Tsai WC et al: The clinical characteristics of adult bacterial meningitis caused by non-*Pseudomonas* (*Ps.*) *aeruginosa* Pseudomonas species: A clinical comparison with *Ps. aeruginosa* meningitis. Kaohsiung J Med Sci, 2018; 34(1): 49–55
3. Chi CY, Lai CH, Fung CP, Wang JH: *Pseudomonas mendocina* spondylodiscitis: A case report and literature review. Scand J Infect Dis, 2005; 37(11–12): 950–53
4. Chiu LQ, Wang W: A case of unusual Gram-negative bacilli septic arthritis in an immunocompetent patient. Singapore Med J, 2013; 54(8): 164–68
5. Jerónimo TM, Guedes AM, Stieglmair S et al: *Pseudomonas mendocina*: The first case of peritonitis on peritoneal dialysis. Nefrologia, 2017; 37(6): 647–49
6. Johansen HK, Kjeldsen K, Høiby N: *Pseudomonas mendocina* as a cause of chronic infective endocarditis in a patient with situs inversus. Clin Microbiol Infect, 2001; 7(11): 650–52
7. Suel P, Martin P, Berthelot G et al: A case of *Pseudomonas mendocina* endocarditis. Med Mal Infect, 2011; 41(2): 109–10
8. Mert A, Yilmaz M, Ozaras R et al: Native valve endocarditis due to *Pseudomonas mendocina* in a patient with mental retardation and a review of literature. Scand J Infect Dis, 2007; 39(6–7): 615–16
9. Nseir W, Taha H, Abid A, Khateeb J: *Pseudomonas mendocina* sepsis in a healthy man. Isr Med Assoc J, 2011; 13(6): 375–76
10. Rapsinski GJ, Makadia J, Bhanot N, Min Z: *Pseudomonas mendocina* native valve infective endocarditis: A case report. J Med Case Rep, 2016; 10(1): 275
11. Aragone MR, Maurizi DM, Clara LO et al: *Pseudomonas mendocina*, an environmental bacterium isolated from a patient with human infective endocarditis. J Clin Microbiol, 1992; 30(6): 1583–84

Indexed in: [PMC] [PubMed] [Emerging Sources Citation Index (ESCI)] [Web of Science by Clarivate]