

Myroides: A Rare but Hard-to-crack Villain in a Critical Care Setup

Arul Janakiammal Mahendran¹, Sumita Agrawal², Neha Rastogi³, Nitesh Gupta⁴

Keywords: Critically ill patients, Diabetes mellitus, Infectious diseases, Intensive critical care.
Indian Journal of Critical Care Medicine (2021); 10.5005/jp-journals-10071-23845

Editor Sir,

Myroides species are ubiquitous in the environment, yet infections are sporadic. They are of increasing concern since these bacteria are exceptionally resistant to most antibacterial agents. Given the corresponding increase in documented infections caused by *Myroides* species and the possible challenges with effective treatment, the clinicians should be wary of the possibility of this organism becoming a more prominent pathogen, especially to the immune-compromised population.

A 60-year-old male, known case of diabetes mellitus, had undergone left lower limb amputation for the diabetic foot. The next day, the patient presented to the intensive care unit with sudden onset breathlessness and fever. On examination, the patient was conscious and oriented. He was visibly tachypneic with a respiratory rate of 24/minute; pulse was 130/minute (tachycardia); and blood pressure (BP) was 90/54 mm Hg with a mean arterial pressure (MAP) of 62 mm Hg. Arterial blood gas (ABG) analysis showed metabolic acidosis with a wide anion gap (pH: 7.21, PO₂: 110, PCO₂: 16, HCO₃: 12, lactate: 4.5, Na⁺: 138, and Chloride Levels (Cl) -94). Blood sugar was 354 mg/dL, and urine for ketones was also positive. The patient started with treatment in lines of diabetic ketoacidosis (DKA) with intravenous fluids, potassium correction, bicarbonate, and antibiotics (meropenem, amikacin, and vancomycin) empirically in renal-modified doses.

Before initiation of antibiotics, urine and blood culture samples were withdrawn, ABG and BP improved over the next 24 hours, and sugar levels normalized. However, white blood cell count progressively increased from baseline 18,000 to 24,000/mm³, and the patient was having spikes of fever. It was concluded that DKA had resolved, but sepsis persisted. At this point, urine routine showed 45 to 50 pus cells, chest X-ray was normal, wound site was healthy, and urine culture awaited. The patient's Foley's catheter was changed and antibiotics upgraded to colistin since most of the local flora causing hospital-acquired infection were sensitive only to colistin.

Nevertheless, the patient continued to have a high-grade fever over the next 48 hours. On day 3, the blood culture report was available, which was negative. A urine culture on day 2 showed gram-negative rods; the final report of the urine culture revealed *Myroides* species, VITEK 2 automated diagnostic system. However, sub-speciation with 16S rRNA sequencing was not available in the author's center. The isolate showed resistance to all broad-spectrum antibiotics, including colistin—a repeat sensitivity analysis ordered for sensitivity to cotrimoxazole, tetracyclines, tigecycline, and minocycline. The report showed sensitivity to only minocycline.

^{1,4}Department of Pulmonary, Critical Care and Sleep Medicine, VMMC and Safdarjung Hospital, Delhi, India

²Department of Pulmonary, Critical Care and Sleep Medicine, Medipulse Hospital, Jodhpur, Rajasthan, India

³Department of Infectious Diseases, AIIMS, Delhi, India

Corresponding Author: Sumita Agrawal, Department of Pulmonary, Critical Care and Sleep Medicine, Medipulse Hospital, Jodhpur, Rajasthan, India, e-mail: doc.sumitaagrawal@gmail.com

How to cite this article: Mahendran AJ, Agrawal S, Rastogi N, et al. Myroides: A Rare but Hard-to-crack Villain in a Critical Care Setup. *Indian J Crit Care Med* 2021;25(6):735–736.

Source of support: Nil

Conflict of interest: None

The patient received minocycline 200 mg intravenous loading dose followed by 100 mg intravenous twice daily for three days, after which his fever subsided, and the TLC count decreased. Repeat urine routine reports returned normal, followed by sterile culture reports. Subsequently, the patient was discharged in stable condition.

Myroides species are a rare cause of human infection. Infections are rare but can occasionally be life-threatening.¹ The clinical manifestation of *Myroides* causing urinary tract infection was documented in patients with chronic nephritis, urinary retention, urinary calculi, and diabetes mellitus.^{2,3} Reports of isolated outbreaks of urinary tract infections following exposure to a contaminated water source or in the trauma setting are reported in the literature.^{1,4} The two most common *Myroides* species seen in humans are *M. odoratus* and *M. odoratimimus*. Other less common *Myroides* species, such as *M. pelagicus*, *M. profundus*, and *M. marinus*, have not been reported as a cause of infections in humans.³⁻⁵ The traditional epidemiology of *Myroides* involves infection of an immune-compromised host; diabetes in index case represents the same. Both *M. odoratus* and *M. odoratimimus* infections in people with diabetes were previously documented.⁶⁻⁸ In the index case, the primary portal of entry and infection source postulated to be the presence of Foley's catheter, possibly because of the strong tendency of *Myroides* spp. to form biofilms. In the case of *Myroides* urinary tract infection, the susceptibility to various antibiotics reported in the literature is quite variable. Therefore, choosing the appropriate antimicrobial treatment for *Myroides* infections can be quite challenging because of the limited clinical experience. However, most reports describe the *Myroides* isolates as multi- or pan-drug-resistant and challenging to treat and, therefore, with variable success. Solanki et al.⁸ reported that all the isolates of *Myroides* recovered from urine were resistant to all the

antibiotics tested. Verma et al.⁹ reported successful treatment of *Myroides* infection sensitive only to minocycline, as seen in the current discussion. *Myroides* remain an unusual pathogen that is omnipresent in the environment. Nevertheless, frequently described in a variety of clinical settings. Clinicians should remain wary of the plausibility of this pathogen as an etiologic agent for invasive infection, notably in the immune-compromised or in the inadequacy of response from routine treatment.

ORCID

AJ Mahendran  <https://orcid.org/0000-0003-4907-1312>

Sumita Agrawal  <https://orcid.org/0000-0001-5713-6556>

Neha Rastogi  <https://orcid.org/0000-0002-0063-3444>

Nitesh Gupta  <https://orcid.org/0000-0002-5842-5584>

REFERENCES

1. Benedetti P, Rassu M, Pavan G, Sefton A, Pellizzer G. Septic shock, pneumonia, and soft tissue infection due to *Myroides odoratimimus*: report of a case and review of *Myroides* infections. *Infection* 2011;39(2):161–165. DOI: 10.1007/s15010-010-0077-1.
2. Holmes B, Snell JJ, Lapage SP. *Flavobacterium odoratum*: a species resistant to a wide range of antimicrobial agents. *J Clin Pathol* 1979;32(1):73–77. DOI: 10.1136/jcp.32.1.73.
3. Hu SH, Yuan SX, Qu H, Jiang T, Zhou YJ, Wang MX, et al. Antibiotic resistance mechanisms of *Myroides* sp. *J Zhejiang Univ Sci B* 2016;17(3):188–199. DOI: 10.1631/jzus.B1500068.
4. Yağci A, Cerikçioğlu N, Kaufmann ME, Malnick H, Söyletir G, Babacan F, et al. Molecular typing of *Myroides odoratimimus* (*Flavobacterium odoratum*) urinary tract infections in a Turkish hospital. *Eur J Clin Microbiol Infect Dis* 2000;19(9):731–732. DOI: 10.1007/s100960070001.
5. Cho SH, Chae SH, Im WT, Kim SB. *Myroides marinus* sp. nov., a member of the family Flavobacteriaceae, isolated from seawater. *Int J Syst Evol Microbiol* 2011;61(Pt 4):938–941. DOI: 10.1099/ijs.0.024067-0.
6. Motwani B, Krezolek D, Symeonides S, Khayr W. *Myroides odoratum* cellulitis and bacteremia: a case report. *Infect Dis Clin Pract* 2004;12(6):343–344. DOI:10.1097/01.idc.0000144904.51074.79.
7. Endicott-Yazdani TR, Dhiman N, Benavides R, Spak CW. *Myroides odoratimimus* bacteremia in a diabetic patient. *Proc (Bayl Univ Med Cent)* 2015;28(3):342–343. DOI: 10.1080/08998280.2015.11929268.
8. Solanki R, Dawar R, Aggarwal DK, Rani H, Imdadi F, Jasuja S. Nonfermenting gram-negative bacilli and urinary tract infection—sorting the mystery of infections caused. *J Med Microb Diagn* 2015;4(4):21. DOI: 10.4172/2161-0703.1000210.
9. Verma Y, Hemachander SS, Shah K. Urinary tract infection caused by *Myroides* spp. In diabetic patients: to be or not to be. *Indian J Case Rep* 2018;4(1):1–3. DOI: 10.32677/IJCR.2018.v04.i01.001