

Urinary tract infection caused by *Myroides* spp. in diabetic patients: To be or not to be

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ABSTRACT

Myroides is a non-fermentative, Gram-negative rod-like bacteria. It is a rare opportunistic pathogen which has been reported to cause many serious infections. Management of infections caused by *Myroides* can be challenging due to its high resistance to most antibiotics. We report three cases of urinary tract infection (UTI) due to *Myroides* species in patients with diabetes mellitus Type II. *Myroides* spp. isolated were resistant to all the antibiotics tested: Amoxicillin-clavulanic acid, piperacillin-tazobactam, cefepime, ceftriaxone-cefoperazone sulbactam, amikacin, gentamicin, imipenem, meropenem, ciprofloxacin, colistin, tigecycline, and co-trimoxazole. Two strains were sensitive to minocycline (minimum inhibitory concentration <1 µg/mL). Two patients had Foley's catheter in place and one patient had urinary retention at the time of diagnosis. The infection in two cases was nosocomial, whereas one case appeared to have a community-acquired infection with *Myroides*. Clinicians should consider the possibility of *Myroides* as a pathogen in UTI in diabetic patients, especially in nosocomial settings.

Key words: *Myroides*, Diabetes Mellitus, Urinary tract infection

Myroides (*Myroides* spp.) is a non-fermentative, Gram-negative, rod-like bacteria and is widely distributed in nature [1]. *Myroides* is a rare opportunistic pathogen which has been reported to cause urinary tract infections (UTI), wound infection, and pneumonia septicemia among other infections [2-4]. Management of infections caused by *Myroides* can be challenging due to its high resistance to most antibiotics [5]. We report three cases of UTI due to *Myroides* spp. in diabetic patients.

CASE REPORT

Case 1

A 58-year-old male, a known case of diabetes mellitus Type II, hypertension, and hypothyroidism, was admitted to the intensive care unit (ICU) for the left-sided cerebrovascular accident. During his hospital stay, tracheostomy tube, Foley's catheter, Ryle's tube, and peripheral venous line were in place. 4 days after hospitalization, the patient suffered an infectious episode due to *Escherichia coli* isolated from culture of endotracheal aspirate and was successfully treated with piperacillin-tazobactam. 9 days after hospitalization, the patient developed symptoms of UTI and the investigations revealed hemoglobin (Hb) - 9.9 g/dl, total leukocyte count (TLC) - 15,400, sodium - 135 meq/L, potassium - 3.3 meq/L, urea - 36 mg/dl, and creatinine - 0.9 mg/dl. The patient was started on

ceftriaxone and imipenem. Cultures from tracheostomy tube and blood were sterile. Urine microscopy revealed 3-5 white blood cells (WBC)/hpf and urine culture yielded a growth of *Myroides* spp. The organism was resistant to all antibiotics tested except minocycline (minimum inhibitory concentration [MIC] <1 µg/mL) (Table 1). Foley's catheter was removed and a condom catheter was used afterward. The patient recovered from the UTI after the removal of the Foley's catheter and continuation of ongoing antimicrobial therapy only.

Case 2

A 55-year-old male, a known case of diabetes mellitus Type II and dilated cardiomyopathy, was admitted to the hospital with complaints of severe breathlessness at rest, dry cough, and reduced urine output. 3rd day after hospitalization, he developed urinary retention and fever. Suprapubic catheterization was done. Empirical treatment with ceftriaxone was started. Routine workup showed Hb - 11.3 g/dl, TLC - 16,900, platelets - 2.34 lakh, Na - 132 meq/L, K - 2.6 meq/L, urea - 54 mg/dl, and creatinine - 1.4 mg/dl. Urine microscopy showed 20-30 WBCs/hpf and culture results showed growth of *Myroides* spp. The organism was resistant to all antibiotics tested except minocycline (MIC <1 mg/dl) (Table 1). The patient had symptomatic relief within 48 h of suprapubic catheterization. The patient left the hospital against medical advice and was lost to follow-up.

Table 1: Antibiotic susceptibility profiles of the *Myroides* spp. isolated*

	Case 1	Case 2	Case 3
Organism isolated from urine culture	<i>Myroides</i> spp.	<i>Myroides</i> spp.	<i>Myroides</i> spp.
Underlying risk factors	Diabetes mellitus Type II, hypertension, hypothyroidism catheterization, ICU stay	Diabetes mellitus Type II, urinary retention	Diabetes mellitus Type II, COPD catheterization, ICU stay
Amox-clav	R	R	R
Piperacillin-tazobactam	R	R	R
Cefepime	R	R	R
Ceftriaxone	R	R	R
Cefoperazone-sulbactam	R	R	R
Amikacin	R	R	R
Gentamicin	R	R	R
Imipenem	R	R	R
Meropenem	R	R	R
Ciprofloxacin	R	R	R
Colistin	R	R	R
Tigecycline	R	R	R
TMP-SMX	R	R	R
Minocycline	S	S	-

*Identification and antibiotic susceptibility testing was done using VITEK*2 (bio Merieux, USA), as per the manufacturer's instructions, R: Resistant, S: Sensitive. ICU: Intensive care unit, COPD: Chronic obstructive pulmonary disease, TMP-SMX: Trimethoprim-Sulfamethoxazole

Case 3

A 56-year-old male, a known case of chronic obstructive pulmonary disease (COPD) and diabetes mellitus Type II, was admitted to the ICU for exacerbation of COPD and altered sensorium. The patient was on ventilator and Foley's catheter was in place. Culture from endotracheal aspirate yielded growth of *Pseudomonas aeruginosa*. Antibiotic therapy with piperacillin-tazobactam and gentamicin was started and the patient's general condition improved. 3 days later, the patient developed acute kidney injury with hypernatremia (serum Na - 156 meq/L, K - 5.4 meq/L, urea - 143 mg/dl, and creatinine - 1.4 mg/dl). Hb - 11.9 mg/dl, total leukocyte count - 32,000/mm³, polymorphs - 70%, platelet count - 180,000/mm³. Blood culture results showed no growth after 7 days of aerobic incubation. Urine microscopy showed 2-3 WBCs/hpf and urine culture showed a growth of *Myroides* spp. Resistant to all antibiotics tested (Table 1). While awaiting culture results, the urea and creatinine levels of the patient worsened to 216 mg/dl and 2.4 mg/dl, respectively. Urinary catheter was removed and the patient was taken up for emergency hemodialysis. Patient's condition stabilized and he recovered slowly. A sequential urine culture did not show any growth. He was discharged from the hospital 10 days later. It cannot be reliably said if the kidney failure was triggered by *Myroides* infection but in absence of any other identifiable cause and presence of pyuria pathogenic role of *Myroides* was assumed in this patient.

DISCUSSION

Myroides spp. has established itself as a true pathogen rather than only an environmental commensal over the years. Cases

of *Myroides* causing UTI have been reported in patients with chronic nephritis, urinary retention, urinary calculi, and diabetes mellitus [6,7]. Nosocomial outbreaks of *Myroides* UTI have also been reported in the published literature [2,8]. Diabetes is one of the major risk factors associated with UTIs caused by *Myroides*. All of the three cases in our report were long-standing diabetics. A similar association was reflected in a recently published study from Apollo hospital, where 7 out of 13 cases of *Myroides* UTI had diabetes mellitus [7]. Another apparent risk factor in our patients is the presence of Foley's catheter. It is possibly because of the strong tendency of *Myroides* spp. to form biofilms [9]. Due to the same reason, it is important to discriminate colonizations from true infection in case of *Myroides*. Decision to treat or not to treat becomes important in such cases. Hu *et al.* [6] reported that 9/11 patients who were catheterized and had *Myroides* isolation from urine showed no pyuria. These patients were not treated and urine culture became negative after removal of catheter. Addressing this issue of diagnosing catheter associated asymptomatic bacteriuria (CA-ASB) and catheter associated UTI (CA-UTI), Infectious Disease Society of America (IDSA) published clinical practice guidelines in 2010 [10]. CA-UTI in patients with indwelling urethral, indwelling suprapubic, or intermittent catheterization is defined by the presence of symptoms or signs compatible with UTI with no other identified source of infection along with $\geq 10^3$ colony-forming units (cfu)/mL of ≥ 1 bacterial species in a single catheter urine specimen. All three of our patients had signs and symptoms compatible with CA-UTI as per the guidelines. Therefore, an antibiotic therapy was intended to be used.

In case of *Myroides* UTI, the susceptibility to various antibiotics reported in literature is quite variable. However, majority of reports

describe the *Myroides* isolates to be multi or pandrug resistant and difficult to treat and therefore with variable success. A case of nosocomial UTI in an end-stage renal disease patient reported from Taiwan was found to be sensitive to imipenem and piperacillin-tazobactam and was successfully treated [11]. However, Solanki *et al.* [7] reported that all the isolates of *Myroides* recovered from urine were resistant to all the antibiotics tested. Similarly, Ktari *et al.* [8] isolated *Myroides* spp. from seven patients with UTI and all of them were resistant to all the antibiotics tested. Three of them could be successfully treated with ciprofloxacin and rifampicin therapy.

The *Myroides* isolates reported here were also resistant to all the antibiotics tested except minocycline in two cases. A case of *Myroides* causing urosepsis in an immunocompromised patient has been reported from Pune, recently, where the isolate was resistant to all antibiotics tested except minocycline. The patient, however, succumbed to the infection despite the antimicrobial therapy including minocycline [12]. There is a dearth of studies/reports exploring UTI due to *Myroides* in diabetic patients. We report a set of three cases of *Myroides* UTI in diabetes mellitus Type II patients here. The infection in Cases 1 and 3 was nosocomial, whereas Case 2 appears to have a community-acquired infection. Indwelling catheter, urinary retention, and prolonged ICU stay might be the risk factors associated with *Myroides* infections in these cases. Our patients survived, but it is still difficult to say which modality helped them the most removal of Foley's catheter/relieving urinary retention, antimicrobial therapy or both? A lacuna in the knowledge is thus apparent and the need of larger studies evident.

Hence, it should be kept in mind that *Myroides* is capable of causing serious infections in diabetic patients and is becoming increasingly common. Studies on *Myroides* infections in diabetic patients and effective treatment modalities can be taken up in the future.

CONCLUSION

Clinicians should consider the possibility of *Myroides* as a pathogen in urinary tract infections in diabetic patients especially in nosocomial settings.

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