

# Recurrent complicated urinary tract infection due to rare pathogen *Sphingomonas paucimobilis*: contamination or real deal?

Tulin Demir<sup>1,2</sup>, Mumtaz Dadali<sup>3</sup>

<sup>1</sup>Ahi Evran University Research and Training Hospital, Microbiology Department, Kirsehir, Turkey;

<sup>2</sup>Public Health Institution of Turkey, National Reference Laboratories of Microbiology, Ankara, Turkey;

<sup>3</sup>Ahi Evran University Research and Training Hospital, Urology Department, Kirsehir, Turkey

## SUMMARY

*Sphingomonas paucimobilis* is an aerobic, oxidase-positive, yellow-pigmented, non-fermentative, Gram-negative opportunistic pathogen that rarely causes infections in humans. It is commonly found in nosocomial environments and, despite its low clinical virulence, it can be responsible for several different infections especially among patients with underlying disease.

Here we describe a clinical case of a 46-year-old male paraplegic patient with a history of neurogenic bladder due to insulin-dependent diabetes mellitus and renal failure who was admitted to the urology clinic of a university hospital in Kirsehir, Turkey, with the complaints

of urinary tract infection (UTI) including fever, chills, dysuria, abdominal and back pain. The urine culture was positive for *Sphingomonas paucimobilis* identified by the Vitek-2 system and the patient was successfully treated with oral co-trimoxazole 800/160 mg twice a day for ten days associated to cefixime and fosfomycin. A literature review of UTIs associated to *Sphingomonas paucimobilis* is reported as well.

**Keywords:** *Sphingomonas paucimobilis*, urinary tract infection, hospital-acquired infection, diabetes mellitus, antimicrobial susceptibility.

## INTRODUCTION

*Sphingomonas* spp. are aerobic, oxidase-positive, yellow-pigmented, non-fermentative, Gram-negative opportunistic pathogen that rarely causes infections in humans. The best known species of the genus is *Sphingomonas paucimobilis* [1-5]. It was first isolated in 1977 and named as *Pseudomonas paucimobilis* and renamed as *S. paucimobilis* in 1990 in accordance with phylogenetic data [1, 6, 7]. It is commonly found in nosocomial environments including hospital water systems, hemodialysis devices and fluids, respiratory ther-

apy equipment and laboratory instruments such as humidifiers, air, bedside water bottles, temperature probes [3, 7-11]. Although it is an organism of low clinical virulence and mortality rate due to the lack of lipopolysaccharide in the cell wall and existence of glycosphingolipids instead, it was shown to be responsible for sepsis, peritonitis, bacteremia, catheter-related infections, urinary tract infections (UTI), osteomyelitis, meningitis, cutaneous infection, adenitis, septic arthritis, osteomyelitis, endophthalmitis especially among patients with underlying disease, immunosuppressive therapy, history of surgery, alcohol, malignancy, postoperative endophthalmitis, diabetes mellitus, renal disease, chronic obstructive pulmonary disease. Additionally, it can cause infections in healthy subjects [1, 4-18].

Various infections in humans have been reported,

Corresponding author

Tulin Demir

E-mail: drtulin@yahoo.com

but most have been limited to sporadic case reports with rarely serious consequences [2]. In the present study, we aimed to evaluate the clinical features of an urinary tract infection case related with *S. paucimobilis* and also to review the data published previously.

## ■ CASE REPORT

A 46 years-old male patient was admitted to the urology clinic of a university hospital in Kirsehir, Turkey, with the complaints of urinary tract infection including fever, chills, dysuria, abdominal and back pain. The patient was paraplegic by ten years and had a history of neurogenic bladder due to insulin-dependent diabetes mellitus, renal failure and frequent urinary tract infections. The patient could only evacuate his bladder by clean intermittent catheterization. Medical history of the patient revealed that the increase in genitourinary symptoms appeared soon after the diagnostic cystoscopy procedure performed to evaluate the patient's urethral obstruction.

The patient was given treatment of oral nitrofurantoin 50 mg four times a day starting an hour before the invasive procedure.

At the time of admission, urine and blood sample of the patient were sent to the laboratory for complete blood cell count, biochemical tests, urine tests and urine culture. Additionally a set of blood culture tube was sent to the microbiology laboratory. Complete blood cell count and biochemical tests were in normal range except high glucose level (150 mg/dL). At the microscopic examination of urine, leucocytes  $>10 \text{ mm}^3$  were observed. Minimal increase in sedimentation rate and C-reactive protein (CRP) was detected. Urine sample was inoculated onto blood agar base, eozine methylene blue agar and incubated for 24 hours at 37°C. Strain identification and antimicrobial susceptibility was performed using VITEK-2 Compact automated system (bioMerieux, France) and conventional biochemical tests. After 24 hour of incubation of the urine culture, blood agar medium yielded pure growth of a  $10^5$  cfu/mL, S-type of colony, yellow, non-fermentative, Gram-negative, rod-shaped bacterium. The microorganism was positive for oxidase and esculin hydrolysis, while negative for urea,

nitrate reduction, citrate utilisation and motility. The isolate has been identified as *S. paucimobilis* by VITEK-2 (bioMerieux, France) system. The antibiotic susceptibility test was also performed with the same system. The susceptibility breakpoint for the isolate was applied as described by CLSI for *P. aeruginosa* [19]. *E. coli* ATCC 25922, *P. aeruginosa* ATCC 27853 were used as control strains. The strain was found to be susceptible to fosfomicin, cefepime ( $\leq 1 \text{ mg/L}$ ), co-trimoxazole ( $\leq 20 \text{ mg/L}$ ), tetracycline (4 mg/L), tigecycline (1 mg/L) and resistant to ceftazidime ( $\geq 64 \text{ mg/L}$ ), imipenem (16 mg/L), meropenem (16 mg/L), amikacin (64 mg/L), gentamicin (16 mg/L), piperacillin, piperacillin-tazobactam (8 mg/L), ciprofloxacin ( $\geq 4 \text{ mg/L}$ ), levofloxacin ( $\geq 8 \text{ mg/L}$ ), colistin ( $\geq 16 \text{ mg/L}$ ), nitrofurantoin, ampicillin-sulbactam ( $\geq 32 \text{ mg/L}$ ), netilmicin ( $\geq 32 \text{ mg/L}$ ) and intermediate susceptible to cefepazone-sulbactam (32 mg/L). Blood culture revealed no growth after five days of incubation. Treatment with oral cefixime, 400 mg once a day, for seven days and oral fosfomicin 3 g once a day for three days was initiated as the patient has multiple risk factors for urinary tract infection. Although clinical improvement was detected, control urine culture showed growth and identified as *S. paucimobilis*. Oral co-trimoxazole 800/160 mg twice a day for ten days was added to the therapy.

He responded well to the treatment and all parameters were in normal range except a minimal increase in CRP. Patient was discharged with complete clinical resolution.

## ■ DISCUSSION

In the present study, *S. paucimobilis* was recovered from urine sample of a patient admitted to the outpatient clinic but a medical history of frequent admission to the hospital due to the recurrent UTI, renal failure and diabetes mellitus. The origin of the infection might have been endogenous due to colonization, exposure to a contaminated medical device, catheters, implants or associated with the contamination of sterile fluids in hospitals [4, 13, 15]. In a previous UTI case bacterial colonization of perineal area during hospitalization was found to be responsible for ascending infection to the urinary tract [4]. Sim-

**Table 1 - Characteristics of the previous urinary tract infection cases related with *S. Paucimobilis*.**

Reference	Age/gender	Underlying disease	Antimicrobial susceptibility
11	37/M	Renal transplant recipient, histoplasmosis, extrapulmonary tuberculosis, diabetes mellitus	VAN, RIF
4	40/ F	Breast ca, chemotherapy	SXT, CIP, IMP
18	58/ M	Healthy	SXT, Carbapenem

VAN=Vancomycin, RIF=Rifampin, SXT=Co-trimoxazole, CIP=Ciprofloxacin, IMP=Imipenem.

ilarly, the cystoscopy procedure has resulted in the colonization of the urinary tract allowing the organism to reach the urinary tract or that the patient became infected due to an improper cystoscopy procedure in our case. Additionally, our case has a clear healthcare-acquisition similar to other published cases [10, 12, 15, 16].

UTI due to this organism is rare and only three cases have been reported up to date to our knowledge: two were from patients with malignancy, diabetes mellitus and renal transplantation, one from healthy individual [4, 11, 17]. Our patient had multiple underlying disease and conditions to develop UTI, including paraplegy, invasive catheterization, diabetes mellitus and renal failure.

Variations in the antimicrobial susceptibilities have been reported. Most strains were resistant to beta-lactam drugs and the most active antimicrobial drugs were quinolone, carbapenem, beta-lactam/beta-lactamase inhibitors and aminoglycosides [4, 10, 11, 13, 15]. Among urinary isolates, multidrug resistance except for rifampicin was detected in a case [11]. In another case the strain was resistant to beta-lactam antimicrobials including third generation cephalosporins, amikacin and susceptible to co-trimoxazole, quinolons and carbapenems [4]. The third strain recovered from healthy case was susceptible to co-trimoxazole, carbapenem and resistant to quinolones [17] (Table 1). Our strain showed susceptibility to cefixime, co-trimoxazole, fosfomicin, tigecycline, tetracycline and recovery of the infection could be achieved by combined antimicrobial therapy.

In conclusion, although *S. paucimobilis* is a rare pathogen and generally interpreted as contaminant in several infection sites, it should be kept in mind as a potential infectious agent especially in patients with immunosuppression and other underlying diseases and should be critically evaluated with the clinical symptoms of the pa-

tients. It is clear that empirical therapy should be avoided and treatment in accordance with the antibiotic susceptibility testing results should be encouraged due to the variation in antimicrobial susceptibility testing results.

**Conflict of Interest:** The authors declare no conflict of interest.

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