

## **CASE PRESENTATION OF URINARY TRACT INFECTION BY *STENOTROPHOMONAS MALTOPHILIA***

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## РЕДКИЙ СЛУЧАЙ ИНФЕКЦИИ МОЧОВЫХ ПУТЕЙ, ВЫЗВАННОЙ STENOTROPHOMONAS MALTOPHILIA

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## Abstract

*Stenotrophomonas maltophilia* is an emerging aerobic, non-fermentative, gram-negative multidrug-resistant global opportunistic bacillus. *S. maltophilia* causes a wide range of infections including respiratory tract infections, blood stream infections and, less commonly, biliary tract infections, skin and soft tissue infections, as well as bone and joint infections. It is increasingly being reported to cause urinary tract infections (UTIs). As for the case report, a 87-year-old male patient visited the Biopathology Laboratory of Nikea Primary Healthcare Center, Piraeus, Greece, for routine examination, being referred by the family doctor (GP). Patient history revealed diabetes mellitus type 2, arterial hypertension, hypercholesterolemia, hypertriglyceridemia, hyperuricemia, chronic obstructive pulmonary disease, diagnosed before 30 years prostate cancer Gleasongrade 6, operated before 15 years, followed by hormone therapy and radiation therapy. Patient history also revealed urinary tract stones with 3 episodes of obstructive pyelonephritis during the last 5 years, followed by hospital admissions and administration of intravenous antibiotic treatment. During the hospital admissions, he had a permanent bladder catheter and received special antimicrobial treatment, for various microorganisms detected in his urine samples, such as *Escherichia coli*, *Klebsiella pneumoniae*, *Proteus mirabilis* and *Enterococcus faecalis*. Urinary incontinence has been a symptom for 15 years, after the prostate cancer surgery. Moreover, during the last 5 years, the patient faced many difficulties in his daily life because of the urinary incontinence. The situation was managed by bladder catheterisation, which further worsened his condition with recurrent UTIs and new episodes of pyelonephritis with subsequent hospitalization. Urinalysis showed proteinuria, intense pyuria, abundance of microorganisms and abundance of red blood cells. The urine culture grew monomicrobial *Stenotrophomonas maltophilia*  $>10^5$  CFU/ml. The bacterium was identified by the RapID™ REMEL ONE identification system (Thermo Fisher Scientific). Antimicrobial susceptibility testing revealed susceptibility to Trimethoprim/Sulfamethoxazole, Levofloxacin, Ceftriaxone and

moderate susceptibility to Ciprofloxacin and Norfloxacin. The patient received treatment with Trimethoprim/Sulfamethoxazole.

**Keywords:** Urinary tract infections (UTIs), pathogen, *Stenotrophomonas maltophilia*, chemoprophylaxis, treatment, monomicrobia.

## Резюме

*Stenotrophomonas maltophilia* является новой аэробной, неферментирующей, грамотрицательной, полирезистентной глобальной условно-патогенной палочкой. *S. maltophilia* вызывает широкий круг инфекций, включая инфекции дыхательных путей, инфекции кровяного русла и, реже, инфекции желчевыводящих путей, инфекции кожи и мягких тканей, а также инфекции костей и суставов. Все чаще сообщается, что она вызывает инфекции мочевыводящих путей (ИМП). В настоящей работе описывается 87-летний пациент мужского пола, посетивший лабораторию биопатологии Центра первичной медико-санитарной помощи Nikea, Пирей, Греция, для планового осмотра по направлению семейного врача (GP). В анамнезе больного выявлен сахарный диабет 2 типа, артериальная гипертензия, гиперхолестеринемия, гипертриглицеридемия, гиперурикемия, хроническая обструктивная болезнь легких, рак предстательной железы по Глисону 6 баллов, диагностированный в возрасте менее 30 лет, оперированный менее 15 лет назад, с последующим проведением гормональной и лучевой терапии. В анамнезе пациента также были выявлены камни мочевыводящих путей и 3 эпизода обструктивного пиелонефрита за последние 5 лет с последующей госпитализацией и назначением внутривенного лечения антибиотиками. Во время госпитализации ему был установлен постоянный катетер мочевого пузыря, с назначением специального противомикробного лечения при выявлении различных микроорганизмов, обнаруженных в образцах мочи: *Escherichia coli*, *Klebsiella pneumoniae*, *Proteus mirabilis* и *Enterococcus faecalis*. Недержание мочи наблюдалось в течение 15 лет после операции по поводу рака простаты. Более того, в течение последних 5 лет пациент испытывал многочисленные трудности в повседневной жизни из-за недержания мочи, что удалось нивелировать путем катетеризации мочевого пузыря, что еще больше ухудшило состояние пациента рецидивами ИМП и новыми эпизодами пиелонефрита с последующей госпитализацией. Анализ мочи выявил

протеинурию, выраженную пиурию, множественные микроорганизмы и эритроциты. В посеве мочи обнаружен мономикробный штамм *Stenotrophomonas maltophilia* >10<sup>5</sup> КОЕ/мл, идентифицированной с помощью системы RapID™ REMEL ONE (Thermo Fisher Scientific). При тестировании на чувствительность к противомикробным препаратам выявлена чувствительность к триметоприму/сульфаметоксазолу, левофлоксацину, цефтриаксону и умеренная чувствительность к ципрофлоксацину и норфлоксацину. Пациент получал лечение триметопримом/сульфаметоксазолом.

**Ключевые слова:** инфекции мочевыводящих путей (ИМП), возбудитель, *Stenotrophomonas maltophilia*, химиопрофилактика, лечение, мономикробные препараты.

## 1 Introduction

Stenotrophomonas maltophilia is an emerging aerobic, non-fermentative, gram-negative multidrug-resistant global opportunistic bacillus. Usually found in aqueous habitats, as well as in animals, foods and water sources. *S. maltophilia* causes a wide range of infections including respiratory tract infections, blood stream infections and, less commonly, biliary tract infections, skin and soft tissue infections, as well as bone and joint infections [3, 8]. It is increasingly being reported to cause urinary tract infections (UTIs). The aim of our study is to present a UTI case, caused by *S. maltophilia*.

*Stenotrophomonas maltophilia* represents the fourth most common pathogen among nonfermenting gram-negative bacteria (following *Pseudomonas aeruginosa*, *Acinetobacter* spp, and *Burkholderia cepacia* complex), with a reported incidence of 7.1 to 37.7 cases/10 000 discharges (regarding nosocomial infections).

*S. maltophilia* usually must bypass normal host defenses to cause human infection. For example, if an irrigation solution becomes colonized with this organism, irrigating an open wound can cause colonization or infection of the wound. *S. maltophilia* is usually incapable of causing disease in healthy hosts without the assistance of invasive medical devices that bypass normal host defenses.

Risk factors associated with *S. maltophilia* infection have been defined and may include underlying malignancy, immunosuppressant therapy, cystic fibrosis, Chronic obstructive pulmonary disease (COPD), HIV infection, neutropenia, mechanical ventilation, prior colonization with *Stenotrophomonas*, central venous catheter, genitourinary catheter, continuous ambulatory peritoneal dialysis (CAPD), recent surgery, trauma, prolonged hospitalization, ICU admission, and exposure to broad-spectrum antibiotics, third or fourth generation cephalosporins and carbapenems, and hyperalimentation.

*Stenotrophomonas (Xanthomonas) maltophilia* is a multidrug-resistant gram-negative bacillus that is an opportunistic pathogen particularly among hospitalized patients. *S. maltophilia* infections have been associated with high morbidity and

mortality in severely immunocompromised and debilitated individuals, with overall mortality rates ranging from 21% to 69%.

Treatment of *S. maltophilia* infections is difficult because this organism presents low susceptibility to antibiotics.

The mainstay of treatment for *Stenotrophomonas* infections is trimethoprim-sulfamethoxazole (TMP-SMX) and it remains the current drug of choice. Fluoroquinolones (FQs) have in vitro activity against *S. maltophilia*.

### Case report

A 87-year-old male patient visited the Biopathology Laboratory of Nikea Primary Healthcare Center, Piraeus, Greece, for routine examination, being referred by the family doctor. Patient history revealed diabetes mellitus type 2, arterial hypertension, hypercholesterolemia, hypertriglyceridemia, hyperuricemia, chronic obstructive pulmonary disease, diagnosed before 30 years, prostate cancer Gleason grade 6, operated before 15 years, followed by hormone therapy and radiation therapy. Patient history also revealed urinary tract stones with 3 episodes of obstructive pyelonephritis in the last 5 years, followed by hospital admissions and administration of intravenous antibiotic treatment. There were underlying diseases (risk factors) such as: a) diabetes mellitus type 2, b) arterial hypertension, c) hypercholesterolemia, d) hypertriglyceridemia, e) hyperuricemia, f) chronic obstructive pulmonary disease diagnosed 30 years ago, g) prostate cancer Gleason grade 6 operated 15 years ago, h) followed by hormone therapy, i) and radiation therapy, j) urinary tract stones with 3 episodes of obstructive pyelonephritis in the last 5 years and k) urinary incontinence the last 5 years. During the 3 times hospital admissions, he had a permanent bladder catheter and received special antimicrobial treatment, for various microorganisms detected in his urine samples, such as *Escherichia coli*, *Klebsiella pneumoniae*, *Proteus mirabilis* and *Enterococcus faecalis*. During the hospital admissions (3 episodes of obstructive pyelonephritis in the last 5 years) he had a permanent bladder catheter and received special antimicrobial treatment, for various microorganisms detected in his urine samples,



such as *Escherichia coli*, *Klebsiella pneumoniae*, *Proteus mirabilis* and *Enterococcus faecalis*. There is no data base for the treatment that he received, because he was treated in hospital. He came to Nikea Primary Healthcare Center afterwards for routine examination, being referred by the family doctor. Urinary incontinence has been a symptom for 15 years, after the prostate cancer surgery. Moreover, the last 5 years the patient faced many difficulties in his daily life because of the urinary incontinence. Patient history, including urinary tract stones, with 3 episodes of obstructive pyelonephritis in the last 5 years, followed by hospital admissions where bladder catheterization was done. The situation was managed by bladder catheterisation, which further worsened his condition with recurrent UTIs and new episodes of pyelonephritis with subsequent hospitalization. The patient had also received a 6 month treatment of chemoprophylaxis with Nitrofurantoin (Furolin). The laboratory performed urinalysis (Multistix 10 SG Reagent Strips, Siemens Healthineers) and urine culture (incubation at 37<sup>0</sup> C for 24 hours on MacConkey agar, Columbia blood agar, and Sabouraud dextrose agar for fungi). The urinalysis described in the study was taken on 11 April 2023. Next day, *Stenotrophomonas maltophilia* was the only pathogen identified. The bacterium was identified by the RapID<sup>TM</sup> REMEL ONE identification system (Thermo Fisher Scientific) on 12 April 2023. The patient received treatment with Trimethoprim/Sulfamethoxazole, and he was cured. There were no subsequent tests after the identification by the RapID<sup>TM</sup> REMEL ONE identification system.

## 2 Results

Urinalysis showed proteinuria, intense pyuria, abundance of micro-organisms and abundance of red blood cells. The urine culture grew monomicrobial *Stenotrophomonas maltophilia* >10<sup>5</sup> CFU/ml. The bacterium was identified by the RapID<sup>TM</sup> REMEL ONE identification system (Thermo Fisher Scientific), Figure 1. Antimicrobial susceptibility testing revealed susceptibility to Trimethoprim/Sulfamethoxazole, Levofloxacin, Ceftriaxone and moderate susceptibility to Ciprofloxacin and Norfloxacin (Kirby-Bauer Disk Diffusion

Susceptibility Test Protocol). The patient received treatment with Trimethoprim/Sulfamethoxazole.

### 3 Discussion


*Stenotrophomonas maltophilia*, formerly named *Xanthomonas maltophilia* or *Pseudomonas maltophilia*, causes various infectious in immunocompromised individuals, which can be complicated by septic shock, respiratory failure, pulmonary hemorrhage, metastatic cellulitis, tissue necrosis that may be extensive, septic thrombophlebitis, disseminated infection, and death [4,5]. Risk factors for infection by *S. maltophilia* include malignancy, the presence of indwelling catheters, chronic respiratory disease, chemotherapy, immunosuppressive therapy, prolonged antibiotic use and long-term hospitalization or admission to ICU [6]. Our study is to present a UTI case report, caused by *S. maltophilia*. Our results are in accordance to the literature references. According to Umar et al, males with mean age between 43 and 85 years, are more prone to developing UTIs caused by *S. maltophilia* [9]. Moreover, patients with underlying urological or nephrological diseases, such as the patient included in the study, tend to develop a more severe illness [1,7,9]. In most cases presented in the literature, the bacterium was sensitive to Trimethoprim/Sulfamethoxazole [2, 9].

### 4 Conclusion

*Stenotrophomonas maltophilia*, formerly named *Xanthomonas maltophilia* or *Pseudomonas maltophilia*, causes various infectious in immunocompromised individuals, which can be complicated by septic shock, respiratory failure, pulmonary hemorrhage, metastatic cellulitis, tissue necrosis that may be extensive, septic thrombophlebitis, disseminated infection, and death [4,5]. Risk factors for infection by *S. maltophilia* include malignancy, the presence of indwelling catheters, chronic respiratory disease, chemotherapy, immunosuppressive therapy, prolonged antibiotic use and long-term hospitalization or admission to ICU [6]. Our results are in accordance to the literature. According to Umar et al, males with mean age between 43 and 85 years, are more prone to developing UTIs caused by *S.*

117 *maltophilia* [9]. Moreover, patients with underlying urological or nephrological  
118 diseases, such as the patient included in the study, tend to develop a more severe  
119 illness [1,7, 9]. In most cases presented in the literature, the bacterium was sensitive  
120 to Trimethoprine/Sulfamethoxazole [2, 9]. As a conclusion, accurate identification  
121 and susceptibility testing of this emerging pathogen are critical for the management  
122 of infected patients and prevention of spread of this emerging pathogen. Accurate  
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125 pathogen.

## FIGURES

**Figure 1.** Identification of *Stenotrophomonas maltophilia* by RapID™ REMEL ONE.


ERIC™ *Electronic RapID Compendium*

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Laboratory: My Laboratory  
User: admin

Ref No: 23.0000201  
Report Date: 12/4/2023

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RapID NF Plus

Identification Report

Microcode: 611250

- ADH	+ PHS	+ aGLU	- GLU	+ GGT	- IND
+ TRD	- NAG	- ONPG	+ PRO	- TRY	- NO3
+ EST	- aGLU	- URE	- PYR	+ BANA	- OXI

IDENTIFICATION = *Sten. maltophilia*

Choice(s)	Probability	Bioscore	Contraindicated Tests
<i>Sten. maltophilia</i>	99,99%	1/19	None

Probability Level: Satisfactory

BioFrequency: Acceptable

Widely distributed in nature and a variety of clinical specimens. Found in urinary, respiratory, and wound infections. Previously designated *Pseudomonas* or *Xanthomonas maltophilia*.

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**Блок 3. Метаданные статьи**

CASE PRESENTATION OF URINARY TRACT INFECTION BY  
*STENOTROPHOMONAS MALTOPHILIA*

**Running head:**

*STENOTROPHOMONAS MALTOPHILIA* CASE STUDY

**Keywords:** Urinary tract infections (UTIs), pathogen, *Stenotrophomonas maltophilia*, chemoprophylaxis, treatment, monomicrobial.

Краткие сообщения.

4 pages, 0 table, 1 figure.

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**Блок 3. Метаданные статьи**

СЛУЧАЙ ИНФЕКЦИИ МОЧЕВЫХ ПУТЕЙ, ВЫЗВАННОЙ  
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**Краткое название:**

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## REFERENCE

Порядковый номер ссылки	Авторы, название публикации и источника, где она опубликована, выходные данные	Полный интернет-адрес (URL) цитируемой статьи и/или doi
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