

# A Case of Urinary Tract Infection Caused by *Aerococcus* *Urinae*

## Abstract

*Aerococcus urinae* is often misclassified in routine diagnostic laboratories. *A. urinae* shares features with *staphylococci*, *streptococci* and *enterococci* as the bacterium grows in clusters, displays a-haemolysis when grown on blood agar, and is resistant to sulphonamide. We report here, a case study of *A. urinae*, which initially was misdiagnosed. Identification and susceptibility testing were performed with automatic Vitek 2 system (bioMérieux). *A. urinae* was identified, with susceptibility to Penicillin G, Levofloxacin, Tetracycline and Vancomycin and resistance only to Gentamycin and Trimethoprim-Sulfamethoxazole (SXT).

**Keywords:** *Aerococcus urinae*; UTI; Diagnosis; Antibiotic resistance

## Case Report

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## Introduction

*Aerococcus urinae* (*A. urinae*) is a newcomer to clinical and microbiological practice. This bacterium is mainly associated with urinary tract infections (UTI) especially in elderly patients with predisposing conditions. *A. urinae* naturally is isolated from dust, air, vegetation, and hospital environments. According to a new study, the incidence was demonstrated to be 33 cases of aerococcal bacteriuria per 100,000 inhabitants per year [1]. Presumably, the diagnosis of infections caused by *A. urinae* is still misdiagnosed in many laboratories around the world mainly because its resemblance to *streptococcus viridans* [2].

## Case Presentation

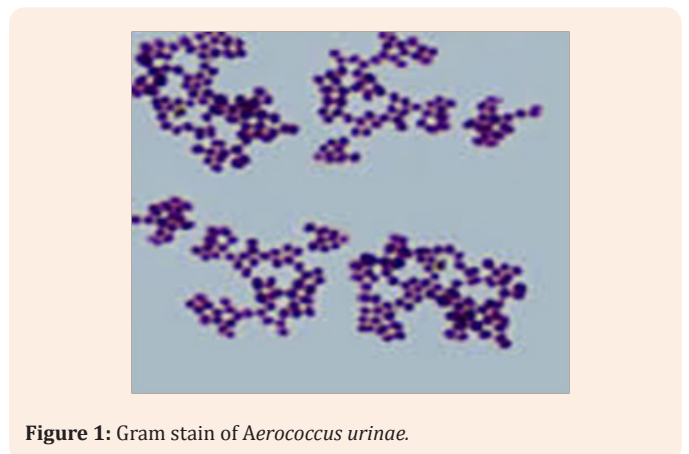
A man of Greek origin, 85 years old, came in for outpatient urine culture due to lower urinary tract symptoms, mainly dysuria. The patient was submitted to surgery for prostatectomy five years ago. The patient is suffering also from diabetes type 1. Urinalysis showed white blood cells-leukocytes (WBC) too numerous to count, a few red blood cells/high power field (HPF) and few bacteria. The urine culture was inoculated onto Mc No 2 and Blood agar (BioMérieux) and the plates were incubated at 37°C under aerobic conditions for 24h. Despite the large amount of leukocytes the urine culture was negative. A few days later the patient came back for a second urine analysis, since the symptoms insisted. This time the culture was incubated for 48h. After this incubation period, small, gray, alpha-hemolytic colonies with concentration > 10<sup>5</sup>cfu/ml were observed on blood agar, whereas no growth was observed on Mc 2 (Figure 1). Gram staining revealed the presence of gram (+), catalase (-) cocci arranged in pairs or clusters (Figure 2). Identification and susceptibility testing were performed with automatic Vitek 2 system (BioMérieux). *A. urinae* was identified, with susceptibility to Penicillin G, Levofloxacin, Tetracycline and Vancomycin and resistance only to Gentamycin and Trimethoprim-Sulfamethoxazole (SXT).

## Discussion

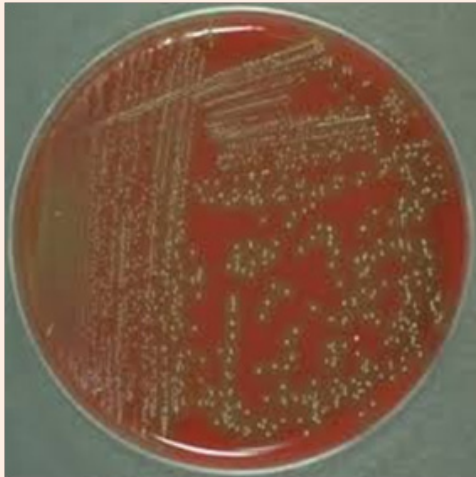
The *Aerococcus* genus now includes eight species of which *A. viridans* (1953) was the one originally described.

In the last two decades additionally six species have been included in the genus: *A. urinae* (1992), *A. christensenii* (1999), *A. urinae hominis* (2001), *A. sanguinicola* (2001), *A. urinae equi* (reclassification of *Pediococcus urinae equi*, 2005), *A. suis* (2007), and *A. vaginalis* (2014) [3].

All species, except *A. suis* (from pigs), *A. urinae equi* (from horses) and *A. vaginalis* (from beef cow), have been found as pathogens in human clinical situations such as urogenital infections [4], bacteremia/septicaemia and infective endocarditis [5]. In addition single cases of soft tissue infections (phlegmon and balanitis), spondylodiscitis, hip abscess, lymphadenitis, acute pyelonephritis and peritonitis have been reported [6]. *A. urinae* may be a possible reason for malodorous urine [7]. They may also appear as contaminants in clinical cultures. Studies from Europe have found a prevalence of *A. urinae* strains of 0.3-0.8% [1] of urine specimens examined and most recently Guilarte et al. [8] observed a prevalence of 4% [8].



**Figure 1:** Gram stain of *Aerococcus urinae*.



**Figure 2:** Culture of *Aerococcus urinae* on Blood agar showing alpha-hemolysis.

Our patient had predisposing conditions, namely advanced age and the history of prostatectomy. A retrospective review by Kelsey Shelton-Dodge et al. [9] on 92 patients showed that 66 isolates of *A. urinae* were obtained from urine cultures whereas the majority of male patients had underlying prostatic disease (63%) [9].

The first report on *A. urinae* was published in 1989 and the name designated in 1992 [6] Isolates of *A. urinae* may easily be mistaken for staphylococci in gram stain, because they appear as gram-positive cocci that are arranged in tetrads or clusters. Colonies on blood agar on the other hand, may be mistaken for *Streptococcus viridans*, because of the alpha-hemolysis and the catalase negative reaction. Primary identification is based upon gram stain of alpha-hemolytic colonies which are catalase negative. *Aerococcus* species will appear as gram-positive cocci in clusters, which differentiates these species from *streptococci* and *enterococci*. The final identification is performed using the Vitek system [10]. Using the Vitek 2 system, *A. urinae* can be misidentified as a *Granulicatella* [11]. So, the gold standard for species determination of *Aerococcus* relies on sequencing of the gene encoding 16S rRNA. These sequences safely identify *aerococci* and separate them from other genus and from each other [12].

Data on *in vitro* susceptibility of *A. urinae* shows that *A. urinae* isolates exhibit an antimicrobial susceptibility pattern similar to that of  $\beta$ -haemolytic streptococci with susceptibility to  $\beta$ -lactams and vancomycin and low level resistance towards aminoglycosides. *A. urinae* is further susceptible to clindamycin, teicoplanin, chloramphenicol, nitrofurantoin, and mupirocin and resistant to sulfonamides, colistin, mecillinam, and fosfomycin [13]. In our case the isolate was sensitive to benzylpenicillin (MIC  $\leq$  0.06), levofloxacin (MIC=0.5), vancomycin (MIC=0.5), tetracycline (MIC  $\leq$  0.25) and resistant to gentamycin 120  $\mu$ g/disc antibiotic and sulfamethoxazole/trimethoprim. These findings correlate with the results of the research of Cattoir et al. [13], where among 350 non-enterococcal *Streptococcaceae* species isolated

from urinary specimens, 30 (8.6%) *Aerococcus* spp. strains were recovered and tested for susceptibility using Vitek 2 system. All aerococcal isolates were susceptible to amoxicillin, vancomycin, and teicoplanin and showed a low-level resistance to gentamicin. Most *A. urinae* isolates were resistant to co-trimoxazole [13]. In another study that was conducted in southern Sweden, concerning isolates of *Aerococcus urinae* species, low MIC values were recorded for penicillin and vancomycin, whereas MICs for gentamycin ranged between 0.5 and 32 mg/L [11].

## Conclusion

*Aerococcus urinae* is an uncommon urinary tract pathogen that causes infections predominately in elderly people with local or general predisposing conditions, such as malignancy, prostatic diseases, diabetes mellitus, dementia.

*Aerococcus urinae* is a slow-growing bacteria, so it is very important to extend the incubation period of urine cultures, especially when urinalysis has shown pyuria, before we proceed to differential diagnosis of aseptic pyuria.

The final identification of *Aerococcus urinae* is performed using the Vitek system and though correct identification is possible, sequencing of the 16S rRNA gene remains the confirmatory test for identification. Nowadays the increased awareness of aerococcal infections, combined with improved tools to identify *aerococci*, will lead to a more correct appreciation of them as human pathogens.

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