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Hospital-acquired Urosepsis Caused by *Achromobacter xylosoxidans*

Achromobacter xylosoxidans'ın Neden Olduğu Hastane Kaynaklı Ürosepsis

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Abstract

Achromobacter xylosoxidans is a microorganism found in the nature, soil and water. It may cause opportunistic infections in immunosuppressed patients. It may lead rarely to urinary system infections in patients with underlying urinary abnormalities. We report a case of urosepsis due to *A. xylosoxidans* in a 59-year-old female patient having had total bilateral salpingo-oophorectomy seven years ago due to the diagnosis of endometrial clear cell carcinoma.

Keywords: Healthcare-associated infection, sepsis, bacteremia, urinary tract infection, infection

Öz

Achromobacter xylosoxidans doğada, toprak ve suda bulunabilen bir mikroorganizmadır. İmmün sistemi baskılanmış hastalarda fırsatçı enfeksiyonlara neden olabilir. Üriner sistem anomalileri olan hastalarda nadiren üriner sistem enfeksiyonlarına yol açabilir. Bu olgu sunumunda 59 yaşında, kadın, endometriyum berrak hücreli karsinom tanısıyla yedi yıl önce total bilateral salpingoofektomi yapılmış bir hastada *A. xylosoxidans* ürosepsisi sunulmaktadır.

Anahtar kelimeler: Sağlık bakımı ile ilgili enfeksiyon, sepsis, bakteremi, üriner sistem enfeksiyonu, enfeksiyon

Introduction

Achromobacter xylosoxidans is a Gram-negative aerobic, oxidase-positive bacterium that can be found in soil and water in nature^[1,2]. It may lead to opportunistic infections, such as bacteremia, meningitis, pneumonia and peritonitis, especially in patients with underlying diseases and immunosuppression^[2]. Although it is not a frequently seen non-fermentative bacillus, there are several reports describing nosocomial infections by means of contamination of some medical solutions, such as dialysis fluid, chlorhexidine, and deionized water^[3,4]. In addition, *A. xylosoxidans* has gained more importance recently since it may be resistant to cephalosporins, aminoglycosides, and quinolones^[5,6]. In this paper, we present a case of urosepsis due to *A. xylosoxidans*.

Case Presentation

A 59-year-old female patient with a history of total bilateral salpingo-oophorectomy + radiotherapy seven years ago due to endometrial cell carcinoma and ureterolithotripsy for left ureterolithiasis two years ago was admitted to the Urology Clinic with the complaint of macroscopic hematuria. The patient had undergone transurethral resection of a bladder tumor (TUR-T) and clot evacuation because of a suspicious mass detected on pelvic magnetic resonance imaging (MRI) one month ago (pathological examination of the specimen did not reveal malignancy). Bladder irrigation and hyperbaric oxygen treatment were applied and four units of erythrocyte suspension were transfused. As hematuria could not be stopped, hematoma in the bladder was evacuated by means of cystoscopy. On the seventh day of hospitalization, the patient had fever



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(tympanic temperature of 39 °C) and empirical treatment with cefuroxime axetil (250 mg, POq12H) was started. As the fever did not subside on the 3th day of antibiotherapy, infectious diseases consultation was requested. The patient did not have any symptoms other than hematuria and dry cough. Systematic physical examination revealed only crackles over the left lower lung area. Blood pressure was 110/70 mmHg; pulse rate was 90/min and oxygen saturation level was 96%. The laboratory results were as follows: leukocyte: 4590/mm³, absolute neutrophil count: 3777/mm³, hemoglobin: 9 g/dL, hematocrit: 26.8%, platelet: 37000/mm³, C-reactive protein (CRP)=9 mg/dL (n<0.5 mg/dL), serum creatinine=1.04 mg/dL. After obtaining blood and urine cultures, empirical therapy with meropenem (1 g, intravenous q8H) was initiated with the presumed diagnosis of sepsis. Blood cultures revealed Gram-negative coccobacilli (BacT/ALERT 3D (bioMérieux France) system). Gram-negative coccobacilli of 80.000 colony-forming unit/mL were also isolated from urine. The colonies grew on chocolate-agar were whitish-gray, smooth and mucoid (Figure 1, 2). Conventional biochemical tests were applied for identification. The isolate was oxidase-positive, and non-fermentative. Indole and catalase tests were negative. In addition it was motile and its culture on triple sugar iron was H₂S-negative. The bacillus was identified as *A. xylosoxidans* by MicroScan kit (Beckman Coulter, USA). Antibiotic susceptibilities were performed according to the Clinical and Laboratory Standards Institute guidelines using the M2-A9 standard by Kirby-Bauer disc diffusion method[7]. It was susceptible to co-trimoxazole, ticarcillin, amoxicillin-clavulanic acid, piperacillin-tazobactam, ciprofloxacin, ceftazidime, meropenem and resistant to aztreonam, amikacin, and gentamicin (Table 1). Fever subsided in the 48th hour and the patient recovered on 6th day of treatment. The urine culture performed on the 3rd day of treatment remained sterile. The CRP

level decreased to 2.6 mg/dL (n<0.5 mg/dL), and the patient was discharged on her own free will on the 7th day. Meropenem was shifted to oral trimethoprim sulfamethoxazole (Double strength tablet, bid) and the treatment was continued to complete 21 days.

Discussion

A. xylosoxidans, previously known as *Alcaligenes xylosoxidans*, is a Gram-negative, aerobic, oxidase-positive, non-fermentative, motile bacillus mostly encountered in soil and water[1,2]. *A.*

Table 1. Antimicrobial susceptibility test results of *Achromobacter xylosoxidans* strain

| Antimicrobial drug | Minimum inhibitory concentration (µg/ml) |
|-------------------------------|--|
| Amikacin | >32 (R) |
| Aztreonam | >16 (R) |
| Cefepime | ≤8 (S) |
| Ceftazidime | 4 (S) |
| Ceftriaxone | 32 (I) |
| Ciprofloxacin | ≤1 (S) |
| Gentamicin | >8 (R) |
| Imipenem | ≤4 (S) |
| Levofloxacin | ≤2 (S) |
| Meropenem | ≤4 (S) |
| Piperacilin-tazobactam | ≤16 (S) |
| Tetracycline | >8 (R) |
| Ticarcillin-clavulanic acid | ≤16 (S) |
| Trimethoprim-sulfamethoxazole | ≤2/38 (S) |

S: Susceptible, I: Intermediate, R: Resistant

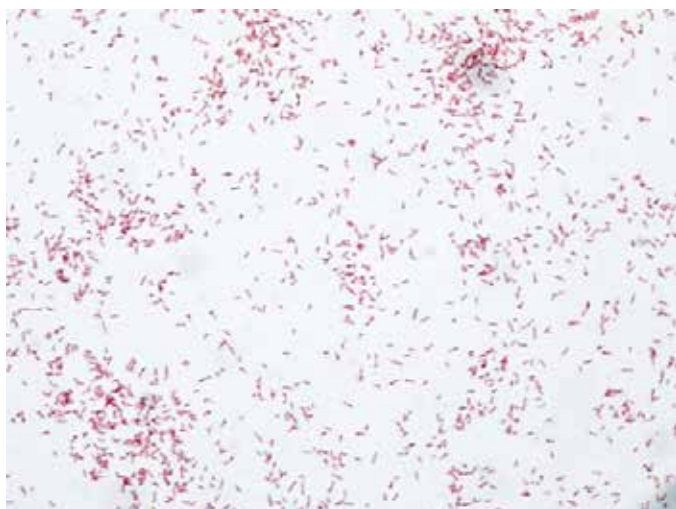


Figure 1. Colonies of *Achromobacter xylosoxidans*, growing on chocolate agar



Figure 2. Gram-negative appearance of the bacteria with Gram stain

xylosoxidans has been reported to be isolated from many body fluids, such as blood, urine, sputum, cerebrospinal fluid and wound swab^[1]. It was first isolated from purulent ear drainages from seven patients with chronic otitis media in 1971 by Yaabuuchi and Ohyama^[8]. It is among the etiologic agents of opportunistic infections in patients with underlying diseases and immunosuppression. Besides, it may lead to nosocomial infections by means of contaminated solutions^[3-5]. Central venous catheter use is also among the risk factors for the development of *A. xylosoxidans* infections^[6]. Severe sepsis and septic shock due to *A. xylosoxidans* bacteremia in hemodialysis patients resulting in death have been reported^[4,9,10]. Aisenberg et al.^[11] identified *A. xylosoxidans* as the causative agent of bacteremia in 46 patients with cancer between 1989 and 2003. Sixty-seven percent of these patients had hematological malignancy; 52% had neutropenia, 26% had a history of high-dose steroid intake, and 26% had diabetes mellitus^[11]. *A. xylosoxidans* rarely leads to urinary system infections. Tena et al.^[12] demonstrated that seven of nine patients with *A. xylosoxidans* urinary tract infection had underlying urinary system abnormalities^[12]. Our patient who had a history of surgery and radiotherapy, had multiple urological interventions, and the agent was isolated as the cause of urosepsis.

A. xylosoxidans has been reported to show high-level of resistance to cephalosporins (>90%), aminoglycosides (>90%) and quinolones (>80%)^[13]. In a study performed by Aisenberg et al.^[11], all the isolates were susceptible to meropenem and piperacillin-tazobactam; 98%, 94% and 87% were susceptible to ticarcillin-clavulanic acid, trimethoprim-sulfamethoxazole and imipenem, respectively. More than 90% of isolates were resistant to cephalosporins (Except for ceftazidime and cefoperazone; susceptibility rates of 92% and 96% respectively) 94% were resistant to aztreonam, 92% - to tobramycin, 89% - to gentamicin and 90% were resistant to amikacin^[11]. Tena et al.^[12] demonstrated that all isolates were susceptible to imipenem and piperacillin-tazobactam, 88.8% to ceftazidime and 77.7% were susceptible to trimethoprim-sulfamethoxazole, whereas all the isolates were resistant to ampicillin and cefuroxime, 89% - to norfloxacin, 78% - to ciprofloxacin, and 67% were resistant to gentamicin^[12]. Turel et al.^[6], reported an *A. xylosoxidans*-related outbreak in a newborn intensive care unit. Thirty-four isolates were identified and all of them were susceptible to meropenem and trimethoprim-sulfamethoxazole, 91% - to piperacillin-tazobactam, 82% - to ciprofloxacin and ceftazidime, 15% - to cefepime and, none of them were susceptible to gentamicin^[6]. Susceptibility pattern of the isolate in our case was similar to the results reported by Aisenberg et al.^[11], Tena et al.^[12] and Turel et al.^[6]. Empirical treatment with cefuroxime was initiated by a physician who was not an infectious diseases specialist and it was not an appropriate drug in this case. After the consultation with infectious diseases specialists, the antibiotherapy was

switched to meropenem. The patient recovered completely with meropenem for seven days followed by oral co-trimoxazole therapy for an additional two weeks^[11,12].

In conclusion, *A. xylosoxidans* is an opportunistic pathogen that may cause infections, such as bacteremia, meningitis, and pneumonia in patients with immunosuppression and underlying diseases. It may also lead to urosepsis in patients with underlying urinary abnormalities. Infections due to *A. xylosoxidans* should be considered in oncology, dialysis, and newborn intensive care units, since it may lead to morbidity and mortality in this group of patients.

Ethics

Informed Consent: Consent form was filled out by the presented case.

Authorship Contributions

Surgical and Medical Practices: Aslihan Demirel, Haluk Akpınar, Data Collection or Processing: Aslihan Demirel, Interpretation: Aslihan Demirel, Nur Efe İris, Literature Search: Aslihan Demirel, Writing: Aslihan Demirel.

Conflict of Interest: No conflict of interest was declared by the authors.

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