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Nosocomial Burkholderia cepacia infection in a tertiary hospital; Five-year surveillance: A retrospective cross-sectional study

Bir üniversite hastanesinde nozokomiyal Burkholderia cepacia enfeksiyonu; Beş yıllık surveyans: Retrospektif kesitsel çalışma

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Abstract

Aim: Burkholderia cepacia is an aerobic, Gram-negative and multi-drug resistance bacteria that cannot ferment glucose. Burkholderia cepacia, important opportunistic bacteria in immunosuppressed patients, causes severe pulmonary infections. In this study, we aimed to evaluate Burkholderia cepacia cases detected in last five years.

Methods: The study designed as retrospectively. Forty-six cases with B. cepacia in the tertiary hospital between 2013 and 2018 were included in the study. Age, gender, clinical history of the patient, type of sample taken, and patients' final conditions (alive or dead) and duration of hospitalization were recorded.

Results: When the distribution of the samples were examined, it was found that 32.6% (n=15) in the blood culture, 32.6% (n=15) in the urine culture, 17.4% (n=8) in the tracheal aspirate culture and 17.4% (n=8). Patients' final conditions were evaluated as alive or dead. Accordingly, 65.2% (n=30) were alive and 34.8% (n=16) of the patients were dead. When the distribution of the cases according to the clinics were examined, Anesthesia with 19.6% (n=9) was the first place. The average length of stay in hospital was 24.6 ± 25.3 days (minimum-maximum: 3-122 days).

Conclusion: Burkholderia cepacia is an important nosocomial opportunistic infection and is often multi drug resistant. For this reason, the disease should be effectively treated otherwise it should not be forgotten that the disease will result in mortality.

Keywords: Burkholderia cepacia, Surveillance, Turkey

Öz

Amaç: Burkholderia cepacia, glikozu fermente edemeyen aerobik, Gram-negatif ve çok ilaca dirençli bir bakteridir. İmmunsüprese hastalarda önemli bir fırsatçı bakteri olan Burkholderia cepacia, ciddi pulmoner enfeksiyonlara neden olur. Bu çalışmada, son beş yılda tespit edilen Burkholderia cepacia vakalarını değerlendirmeyi amaçladık.

Yöntemler: Çalışma retrospektif olarak planlandı. Çalışmaya 2013-2018 yılları arasında üçüncü basamak hastanedeki 46 B. cepacia olgusu dahil edildi. Yaş, cinsiyet, klinik öykü, alınan örnek tipi, hastaların son durumu (yaşıyor veya ölü) ve hastanede yatış süresi kaydedildi.

Bulgular: Örneklerin dağılımı incelendiğinde, kan kültüründe %32,6 (n=15), idrar kültüründe %32,6 (n=15), trakeal aspiratta %17.4 (n=8) bulundu. Hastaların son durumları yaşıyor veya ölü olarak değerlendirildi. Buna göre, olguların %65,2'sinin (n=30) yaşadığı, %34,8'inin (n=16) ise öldüğü tespit edildi. Olguların kliniklere göre dağılımı incelendiğinde, anestezi %19,6 ile (n=9) ilk sıradaydı. Hastanede kalış süresi ortalama 24,6 ± 25,3 gündü (minimum-maksimum: 3-122 gün).

Sonuç: Burkholderia cepacia önemli bir nozokomiyal fırsatçı enfeksiyondur ve sıklıkla çok ilaca dirençlidir. Bu sebeple hastalık etkin bir şekilde tedavi edilmelidir aksi halde hastalığın mortalite ile sonuçlanacağı unutulmamalıdır.

Anahtar kelimeler: Burkholderia cepacia, Sürveyans, Türkiye

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Introduction

Burkholderia cepacia was first identified by Burkholder as a bacterial effect of onion rot in 1950, and this phytopathogen was named Pseudomonas cepacia. The identification of Burkholderia was made in 1992 as a result of the investigation of rRNA II belonging to P. cepacia and six other bacteria (Pseudomonas solanacearum, Pseudomonas picketii, Pseudomonas gladioli, Pseudomonas mallei, Pseudomonas pseudomallei and Pseudomonas caryophylli). Burkholderia cepacia is an aerobic, Gram-negative and multi-drug resistance bacteria that cannot ferment glucose. Burkholderia cepacia, an important opportunistic bacteria in immunosuppressed patients, causes severe pulmonary infections [1,2].

Bacteria can live in humid environments and nutrient-poor fluid. It can also cause outbreaks in hospital with contaminated intravenous solutions, disinfectants, hospital equipments, and contact person to person [3].

In this study, we aimed to evaluate Burkholderia cepacia cases detected in our hospital between 2013 and 2018.

Materials and methods

The study designed as retrospectively. Forty-six cases with Burkholderia cepacia in the tertiary hospital between 2013 and 2018 were included in the study. Ethical committee approval for the study was obtained. Patients' files were scanned. Age, gender, clinical history of the patient, type of sample taken, and patients' final conditions (alive or dead) and duration of hospitalization were recorded.

Statistical analysis

Data were statistically evaluated using the Statistical Package for the Social Sciences version 17.0 software (SPSS Inc, Chicago, Illinois, USA). Continuous data were expressed as mean and standard deviation, and categorical data were expressed as the frequency and percentage.

Results

Of the 46 cases included in the study, 30.4% (n=14) were female and 69.6% (n=32) were male. The mean age was 56.0 ± 23.7 years (minimum-maximum: 0-90 years). Of the cases, 6.6% (n=3) were under the age of 18 and 93.4% (n=43) were in the adult group.

When the distribution of the samples were examined, it was found that 32.6% (n=15) in the blood culture, 32.6% (n=15) in the urine culture, 17.4% (n=8) in the tracheal aspirate culture and 8.7% (n=4) in the sputum culture, 6.5% (n=3) in wound site culture and 2.2% (n=1) in cervical culture.

Patients' final conditions were evaluated as alive or dead. Accordingly, 65.2% (n=30) were alive and 34.8% (n=16) of the patients were dead.

When the distribution of the cases according to the clinics were examined, Anesthesia with 19.6% (n=9) was the first place. In the second place, 17.3% (n=8) of the Infectious diseases department were followed by 13% (n=6) of the Internal Medicine Intensive Care Unit (ICU) and Urology department. Sample distribution of all clinics was presented in Table 1.

When the length of stay in hospital was examined, the average length of stay in hospital was 24.6 ± 25.3 days (minimum-maximum: 3-122 days).

The antibiotic resistance status of the cases was summarized in Table 2.

Table 1: Distribution of Burkholderia cepacia according to clinics

Clinic	n (%)
Anesthesiology and Reanimation	9 (19.6)
Infectious Diseases Clinic	8 (17.3)
Internal Medicine ICU	6 (13.0)
Urology Clinic	6 (13.0)
Gynecology Clinic	3 (6.5)
Internal Medicine Clinics	3 (6.5)
Pediatrics ICU and Newborn ICU	3 (6.5)
Coronary ICU	2 (4.4)
Neurology ICU	2 (4.4)
General surgery ICU	2 (4.4)
Neurosurgery ICU and Clinic	2 (4.4)
Total	46 (100)

ICU: Intensive care unit.

Table 2: Antibiotic resistance test results of Burkholderia cepacia

Antibiotics	Resistance %
Amikacin	76.1
Ertapenem	39.1
Meropenem	34.8
Imipenem	65.2
Piperacillin tazobactam	47.8
Ceftazidime	61.5
Cefepime	65.0
Cefotaxime	66.7
Ciprofloxacin	67.4
Trimethoprim sulfametaxazole	17.4
Tigecycline	28.3

Discussion

Burkholderia cepacia is a Gram-negative rod-shape bacteria. It can be found in soil, water, fruits and vegetables. Nonfermenting, Gram-negative bacteria such as Acinetobacter baumannii, Pseudomonas aeruginosa and Stenotrophomonas maltophilia are the leading causes of hospital-acquired infections. B. cepacia can also be added to the list of these bacteria. B. cepacia, an infrequent infection, is an opportunistic bacteria. Generally, the disease is severe in patients with cystic fibrosis and chronic lung disease, and can cause lethal tabulations in immunosuppressed people [4]. In hospitalized patients, besides pulmonary infection, septic arthritis, bacteremia and sometimes outbreaks can occur [5,6]. One of the factors that facilitate intra-hospital spread is the ability of bacteria to survive in humid environment and to be non-fermentative. Thus, bacteria can multiply in tap water, nebulizers, enteral feeding containers and other contaminant hospital equipment [7,8].

The data of Burkholderia cepacia are generally presented as sporadic cases or nosocomial outbreak. In a study by Abdelfattah et al. [9], B. cepacia was detected in 14 blood cultures. It was determined that the cause of the infection was an ultrasonographic probe used in the evaluation of the central venous catheter entry site. In a study by Koruk et al. [10], eight patients who underwent urological surgery had B. cepacia in the urine culture. The investigation revealed that the outbreak was related to the DJ catheter. In a study by Dizbay et al. [4], data belong to 39 patients with B. cepacia, which is considered hospital- originated, between 2003 and 2007 has been presented. In this study, the average age was 54.4 ± 23.4 years and male / female ratio was reported as 1.29. In our study, the mean age was 56.0 ± 23.7 years and the male ratio was higher (male / female ratio 2.29). When the cases of B. cepacia in the literature are examined, it is observed that a significant part of them have

cystic fibrosis and associated lung diseases. None of the cases in this study had cystic fibrosis. In a surveillance study conducted in our country, it was determined that 64.1% of infected cases received mechanical ventilation support and 58.9% of them had pneumonia. In the same study, 61.5% of cases were followed up in ICU [4]. A patient who diagnosed as pneumonia followed up with mechanical ventilator in intensive care unit has been presented by Turan et al. [11]. In our study, 50% of the cases were intensive care patients and 26.1% were pneumonia.

In a study by Dizbay et al. [4], 58.9% of the cases were pneumonia, 25.6% were bloodstream related infection, 5.1% were urinary system infection, 7.6% were surgical site infection and 2.5% soft tissue infection. In our study, a significant part of the cases (32.6%) were bloodstream related infection and urinary system infection (32.6%) while the rate of pneumonia cases was 26.1%.

Aminoglycoside, first and second generation cephalosporins are intrinsic resistant to B. cepacia. Most are resistant to broad spectrum antibiotics. The resistance mechanisms are efflux pump activation and inducible chromosomal beta lactamase production. Ceftazidime, carbapenem, piperacillin, levofloxacin and trimethoprim / sulfamethoxazole are among the most effective antibiotics. Combination therapy is recommended, and synergy tests lead to this issue [6,12]. In many studies, carbapenem resistance was found 48-89% in cases with nosocomial Burkholderia cepacia infection with cystic fibrosis [13-15]. In a study by Dizbay et al. [4], carbapenem resistance was 46.1% for imipenem and 48.7% for meropenem. The most effective antibiotic is Piperacillin-tazobactam (38.4%). A case with bronchiectasis and pneumonia was successfully treated with imipenem [11]. In another study, patients were treated with carbapenem, co-trimoxazole, and piperacillin-tazobactam successfully in the Burkholderia cepacia outbreak [10]. In another study, the most effective antibiotic is meropenem (90%) [16]. In a study by Srinivasan et al. [17], the most sensitive antimicrobial agents were found to be colistin (93%) and Co-trimoxazole (71%).

The retrospective nature of the study is the limitation of our study.

Burkholderia cepacia is an important nosocomial opportunistic infection and is often multi drug resistant. Thus, for the control of B. cepacia infections, rational and appropriate antibiotic policies should be developed and isolation measures should be taken when colonized or infected patients are needed. Also the disease should be effectively treated otherwise it should not be forgotten that the disease will result in mortality.

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