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Microorganisms Isolated From Blood Cultures in Pediatrics Clinic

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Amaç

Kan ve dolaşım sistemi enfeksiyonları morbidite ve mortaliteyi etkileyen en önemli enfeksiyonlardır. Mortalite ve morbiditesi yüksek olmasından dolayı sepsis etkeni mikroorganizmaların tanımlanması, hastanın tedavisi açısından önemli olup tanı ve tedavide en değerli test kan kültürüdür. Bu çalışmada kan kültürlerinden izole edilen mikroorganizmaların retrospektif olarak değerlendirilmesi amaçlanmıştır.

Araçlar ve Yöntemler

Necmettin Erbakan Üniversitesi Meram Tıp Fakültesi Hastanesi Pediatri kliniğinde yatan hastalardan alınan ve Tıbbi Mikrobiyoloji laboratuvarına 01.01.2017 – 31.12.2017 tarihleri arasında kabul edilen örneklerden üreme saptanan 1004 hastaya ait kan kültürleri çalışmaya alınarak retrospektif olarak incelenmiştir. Alınan kültürler otomatize sistemle (BacT/Alert 3D, BioMerieux, Fransa) inkübe edilerek değerlendirilmiştir. İnkübasyon süresince pozitif sinyal veren şişelerden Gram boyama yapılarak sonuç ilgili kliniğe ön bilgi olarak verilmiştir. Daha sonra örnekler %5 koyun kanlı agar ve eosin methylene blue (EMB) besiyerine ekilmiş ve 37 °C’de 24-48 saat inkübe edilmiştir. Kültürde üreyen mikroorganizmalar konvansiyonel yöntemlerle ve MALDI-TOF MS/ VITEC 2 sistemiyle (BioMerieux, Fransa) tanımlanmıştır.

Bulgular

Kan kültürlerinden izole edilen 1004 mikroorganizmanın 568’i (%56.6) koagülaz negatif stafilokok (KNS) olarak tanımlanmış, 125’i (%12.5) *K.pneumoniae*, 50’si (%5.0) *S. aureus*, 50’si (%5.0) *Candida* spp., 30’u (%3) *Acinetobacter* spp., 28’i (%2.8) *E.coli*, 27’si (%2.7) *Enterococcus* spp., 25’i (%2.5) *Pseudomonas* spp., 16’sı (%1.6) *Enterobacter cloacae*., 85’i (%8.5) diğer mikroorganizmalar olarak tanımlanmıştır.

Sonuç

Laboratuvarımızda kan kültürlerinde en sık olarak KNS izole edilmiş olup bu mikroorganizmaların çoğunun tek kan kültüründe izole edildiği dikkate alınırca çoğunun kontaminant olabileceği düşünülmektedir. Bu yüzden kan kültürlerinin en az iki set halinde alınmasının doğru tanı açısından faydalı olacağı kanaatine varılmıştır. Ayrıca *K.pneumoniae*, *S. aureus*, *Candida* spp. gibi mikroorganizmaların sepsis etkeni olabileceği de akılda tutulmalıdır.

Aim

Blood and circulatory system treatments are the most important substances that clear morbidity and mortality. Blood culture in the diagnosis and treatment of sepsis causative microorganisms prior to their high mortality and morbidity, whether they are leading or not, is the blood culture. The aim of this study was to retrospectively isolate microorganisms isolated from blood cultures.

Materials and Methods

Blood cultures of 1004 patients from the inpatients of Necmettin Erbakan University Meram Medical Faculty Hospital Pediatric Clinic, who were admitted to the Medical Microbiology Laboratory between 01.01.2017 and 31.12.2017, were analyzed retrospectively. Cultures were evaluated by incubation with an automated system (BacT / Allert 3D, BioMerieux, France). Gram staining was obtained from the vials that gave positive signals during the incubation period and the result was given as a preliminary information to the relevant clinic. Samples were then seeded in 5% sheep blood agar and eosin methylene blue (EMB) medium and incubated at 37 ° C for 24-48 hours. Cultured microorganisms were identified by conventional methods and MALDI-TOF MS / VITEC 2 system (BioMerieux, France).

Results

Of the 1004 microorganisms isolated from blood cultures, 568 (56.6%) were identified as coagulase negative staphylococci (CNS), 125 (12.5%) were *K.pneumoniae*, 50 (5.0%) were *S. aureus*, 50 (5.0%) were *Candida spp.*, 30 (3%) *Acinetobacter spp.*, 28 (2.8%) *E.coli*, 27 (2.7%) *Enterococcus spp.*, 25 (2.5%) *Pseudomonas spp.*, 16 *Enterobacter cloacae*. (85%) were identified as other microorganisms.

Conclusion

In our laboratory, most common CNS was isolated in blood cultures and considering that most of these microorganisms were isolated in single blood culture, most of them were thought to be contaminant. Therefore, at least two sets of blood cultures were considered to be beneficial for accurate diagnosis. In addition, *K.pneumoniae*, *S. aureus*, *Candida spp.* It should be kept in mind that microorganisms such as sepsis may be the causative agent.

Keywords: *Blood culture, pediatrics, reproductive microorganisms.*

Introduction

Nowadays, hospitalization rates of patients are increasing in parallel with the improvements in care and treatment. Long-term hospitalizations for the treatment of chronic diseases, especially cancer, etc., increase the risk of infection in all patients, especially in immunocompromised patients and patients with poor general status. Nosocomial infections are more common due to the administration of broad-spectrum antibiotics to patients, life support through invasive procedures, and longer hospital stay (1,2).

Blood and circulatory system infections are the most important infections affecting morbidity and mortality. Increased invasive procedures to diagnosis and treatment, increased cancer surgery and organ transplantation, and widespread use of immunosuppressive therapies are some of the risk factors for blood and circulatory system infections (3). Blood culture is an important diagnostic method used to isolate microorganisms that cause bacteremia and is an important in terms of guiding the treatment (4,5).

Nosocomial infections agents, especially sepsis agents, vary from country to country, from hospital to hospital, depending on the country's development status, antibiotic use strategies, and general condition and characteristics of patients. Even in different hospital units, different microorganisms can cause infections. Determining the diversity of microorganisms growing in blood cultures and determining antibiotic susceptibilities are important to precautions effective infection control measures, to establish empirical treatment protocols and initiate appropriate treatment (6).

Because of high mortality and morbidity, identification of microorganisms causing sepsis is important for the treatment of the patient. Blood culture is the most valuable test for diagnosis

and treatment. The aim of this study was to evaluate microorganisms isolated from blood cultures retrospectively.

Materials and methods

Blood cultures accepted to the Medical Microbiology Laboratory that obtained from patients hospitalized in the pediatric clinic of Necmettin Erbakan University Meram Medical Faculty Hospital between 01.01.2017 and 31.12.2017 was included in this study. Blood culture results of 1004 patients were analyzed retrospectively. Cultures were made with the incubation in automated system (BacT / Allert 3D, BioMerieux, France). Gram staining was made from the vials that gave positive signals during the incubation period and the result was given as a preliminary information to the relevant clinic. Samples were then passaged to 5% sheep blood agar and eosin methylene blue (EMB) medium and incubated at 37 ° C for 24-48 hours. Cultured microorganisms were identified by conventional methods and MALDI-TOF MS / VITEC 2 system (BioMerieux, France).

Results

Of the 1004 microorganisms isolated from blood cultures, 568 (56.6%) were identified as coagulase negative staphylococci (CNS), 125 (12.5%) were *K.pneumoniae*, 50 (5.0%) were *S. aureus*, 50 (5.0%) *Candida* spp., 30 (3%) were identified as *Acinetobacter* spp., followed by other microorganisms. The microorganisms isolated according to years shows in Table 1.

Discussion

Bloodstream infections are the most frequent infections in pediatric patients and one of the most serious and potentially life-threatening infectious diseases. Early diagnosis and therapy are essential for the prevention of morbidity and mortality (7).

In the majority of cases, antimicrobial therapy must be admitted empirically in these patients generally. The accuracy in predicting the pathogen and antimicrobial resistance patterns is crucial for successful therapy (8). For this reason, it is necessary to know the microorganisms that grow in the hospital. Growing microorganisms vary according to hospitals.

In a study, which researched nosocomial bloodstream infections of pediatric patients in Brazilian, it is reported that the most common isolated pathogens were coagulase-negative staphylococci (CoNS) (21.3%), *Klebsiella* spp. (15.7%), *Staphylococcus aureus* (10.6%), and *Acinetobacter* spp. (9.2%) (9). It is reported that *S. aureus* to be the most common cause of nosocomial bloodstream infections, followed by *Klebsiella pneumoniae* and coagulase-negative staphylococci, respectively in a study (10).

In Gaziantep Children's Hospital, CNS was most frequently isolated in blood cultures, followed by *Salmonella* spp, *S. aures*, *Klebsiella* and streptococci species, respectively (11). In another study, *E.coli*, *Klebsiella* and CNS were the most frequently isolated microorganisms (12). It is reported by Birol et al. that the most common isolates included 1000 (35.6%) coagulase-negative staphylococci 782 (27.8%) *S. aureus* and 303 (10.8%) *Escherichia coli* (13).

As seen in the studies, isolated microorganisms vary according to regions. In this study, the most frequently isolated microorganisms were CNS, *K.pneumoniae*, *S. aureus*, *Candida* spp., *Acinetobacter* spp.

Blood culture is one of the most important tests used in the diagnosis of sepsis. In our laboratory, most common CNS was isolated in blood cultures. Considering that most of these microorganisms were isolated in single blood culture, most of them were thought to be contaminant. Therefore, at least two sets of blood cultures should obtained to be beneficial to accurate diagnosis. In addition, It should be kept in mind may be cause to sepsis of *K. pneumoniae*, *S. aureus*, *Candida* spp., and other microorganisms.

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Table 1. The microorganisms isolated according to years.

Isolated microorganisms	2016 year n-%	2017 year n-%	2018 year n-%	Total n-%
CNS*	120 - 49.8%	262 - 58.4%	186 - 59.2%	50 - 56.6%
<i>K.pneumoniae</i>	43 - 17.9%	49 - 10.9%	33 - 10.5%	125 - 12.5%
<i>S. aureus</i>	9 - 21.7%	33 - 7. %	8 - 2.5%	50 - 5%
<i>Candida spp.</i>	24 - 10%	17 - 3.8%	9 - 2.9%	50 - 5%
<i>Acinetobacter spp.</i>	3 - 1.3%	15 - 3.4%	12 - 3.8%	30 - 3%
<i>E. coli</i>	8 - 3.3%	12 - 2.7%	8 - 2.5%	28 - 2.8%
<i>Enterococcus spp.</i>	8 - 3.3%	10 - 2.2%	9 - 2.9%	27 - 2.7%
<i>P. aeruginosa</i>	7 - 2.9%	11 - 2.5%	7 - 2.2%	25 - 2.5%
<i>E. cloacae</i>	6 - 2.5%	6 - 1.3%	4 - 1.3%	16 - 1.6%
Others	13 - 5.4%	34 - 7.6%	38 - 12.1%	85 - 2.5%
Total	241	449	314	1004

* Coagulase negative staphylococci