International Journal of Science and Research (IJSR)
ISSN (Online): 2319-7064
Index Copernicus Value (2015): 78.96 | Impact Factor (2015): 6.391

Staphylococcal Bacteremia and Sepsis in Children at the University Hospital Center in Tirana, Albania

Hamide Hoxha[1], Laureta Sadedini[2], Tedi Rudha[3]

[1]Infectious Disease Service, Pediatric Department, University Hospital Center "Mother Theresa", Tirana, Albania

[2]Univesity Hospital Center ″Mother Theresa″ Pediatric Emergency Department, Tirana, Albania

[3] Resident at University Hospital Center "Mother Theresa", Tirana, Albania

Abstract: ***Methicilin sensible and particularly MRSA bacteremia and sepsis are a major pediatric health care problem, despite the availability of new antibiotics. In our country the incidence of MRSA bacteremia and sepsis was increased in the last years. The aim of the study was: to determine the incidence and pattern of staphylococcal bacteremia and sepsis in pediatric group at tertiary hospital in Tirana, Albania. This was a retrospective study performed in Pediatric Infectious Diseases Services, University Hospital Center Tirana in the period of January 2010 to December 2014. Positive culture was found in 242 patients aged below 14 years with a total of 6597 admissions in the period. The highest incidence of bacteremia and sepsis was found in patients under one years old with 82 cases (33, 9%), majority of patients were male 153 cases (63%).Staphylococcus aureus was the most common pathogen 126 cases (52%) among other staphylococcus group. Anemia and malnutrition were in the majority of case in (16, 5%), respiratory tract infections were found in (35, 95%) as the most common primary focus. Staphylococcus aureus is the most common isolated pathogen, the most primary focus are respiratory tract infections, common risk factors were anemia and malnutrition.***

Keywords: Staphylococcal Infections, Sepsis, Children. Bacteremia

1. Introduction

Bloodstream infection has been a primary concern of physicians for over 80 years. Blood cultures are usually done for the evaluation of sick children with or without evidence of a focus of infection. Many serious infections are associated with bacteremia and the blood culture may be positive even when cultures of the specimens taken from the local area of infection (cerebrospinal fluid, tissue aspirate, synovial fluid) are negative.[1]A report of a positive blood culture without apparent site of infection usually prompts a clinical re-evaluation and search for a primary focus.

Septicemia is a pathological condition with a mortality rate varying from 30% to 70% depending on virulence of the pathogen and host factors.[9] Bloodstream infection is an important cause of death, giving a rate of 25%-50%[5] More recently Blomberg et al (2007) reported a mortality of 40% in pediatric patients with laboratory confirmed bacteremia.[2] Bacterial isolation from blood specimen is often associated with high morbidity and mortality particularly among children. In recent years, bloodstream infections due to Staphylococcus group bacteria have increased in frequency and antimicrobial resistance.[1] Staphylococcus aureus bacteremia is a clinical problem with a particularly high incidence and mortality.[6] The majority of bacteremia cases are caused by Staphylococcus spp [10]. [11]Children who are younger than 36 months are at increased risk for bacteremia or sepsis secondary to the immaturity of their immune system. Furthermore children in this age group may be febrile for 1 or 4 major reasons: fever of unknown reason, occult bacteremia, serious bacterial infections, and sepsis.[9][4] Serious Staphylococcal infection includes bacteremia, sepsis, infections of the soft tissues or joints, meningitis bacterial, enteritis, bacterial pneumonia, and urinary tract infections.[7][3] Since the growing health care problems are related to bacteremia in children, we attempted to investigate the prevalence and patter of staphylococcus infections bacteremia in pediatric group at the University Hospital Center, Tirana, Albania. In addition, the study also aimed to provide information to the community and health officials about the prevalence of staphylococcal bacteremia and other serious bacterial infections associated this microorganism in pediatric patients.

2. Methods

This present retrospective study was conducted in the Service of Pediatric Infectious Diseases, Department of Pediatrics, University Hospital Center, Tirana during the period of January 2010 to December 2014. Included were 242 patients aged 1-144 months (less than 14 years) with positive blood culture of staphylococcal microorganism.

All blood cultures positive of staphylococcus microorganism were reported by the Bacteriology Laboratory of University Hospital in the same period. The case records of all patients less than 14 years old were reviewed. University Hospital Center is a tertiary hospital that admitted patients from all Albania and regional district. Clinical, microbiological data and other information such as temperature, immunodeficiency, central line and antibiotic therapy were obtained from the patient's medical record. A questionnaire concerning the demographic data, age, sex, clinical symptoms and signs was reviewed completing a chart for each patient enrolled in the study. Blood culture was performed with an automated blood culture machine (Bact Alert, OrganonTeknik). The organisms were identified by standard bacteriologic techniques.[8]

Furthermore, antibiotic susceptibility testing was done by the Modified Kirby-Bauer Metho. Antimicrobial test was done with ampicillin/amoxicillin, amoxicillin/clavulamic

acid,aztreonum,imipenum,cefepime,cefotaxime,cefoxitin, ceftazidime, ceftriaxone, cefuroxime, cephalexin, gentamicin, vancomycin, piperacillin/ tazobactum and cotrimoxazole.

3. Data Analysis

The analysis was performed using Episode version 6.0 (Centers for Disease Control and Prevention, Atlanta, USA). The means and proportions were compared by the Chi-square test and Student's test. Statistical significance was considered at a value of P 0.05.

4. Results

During the study period, the medical records of the 242 patients with staphylococcal bacteremia and sepsis were reviewed. The age of the patients ranged from 1 to 144 months (mean 27.72). Twenty-five (10.34%) children were between 5 and 14 years old (Table 3). Of the 242 patients, 153 (63, 22%) were male and 89 (36, 78%) female. Bacteremia was documented in 104 patients (42, 96%), in 104 patient with bacteremia, 55 (52, 88%) were with occult bacteremia. Infections associated clinical conditions and risk factors in these children are shown in table 1and 3. They included septicemia 138 patient or (57, 04%), respiratory tract infection (bacterial pneumonia, lymphadenitis tonsillitis otitis) 87(35, 95)**,** osteomyelitis and arthritis 10(4, 13%)**,** meningitis 7(2, 9%), gastroenteritis 42(17, 36%), cellulitis 19 (7, 85%), urinary tract infection 22(9, 09%).

Table 1: The risk factors

Risk Factors	
Anemia	28(11, 57%)
Malnutrition	12(4, 96%)
Readmission	8(3, 31%)
Others (Chronic tonsillitis, cystic fibrosis, Congenital Cardiomyophathy, ,Visceral Leishmaniasis, Immuno –deficiency etc)	23(9, 5%)

Table 2: The different types of isolated Staphylococcus micro-organisms

Organisms isolated	Number of organisms (%)
Staphylococcus aureus	126(52, 2%)
Staphylococcus Epidermidis	72(29, 5%)
Staphylococcus spp.	44(18,3)
MRSA	22 (9.1)

Table 3: Characteristics of patients with staphylococcal bacteremia and sepsis:

Characteristics	*Number of patients (%)*
Age group (month)	
0-1	82 (33.88)
13-60	135 (55.78)
61 and above	25(10.34)
Sex	
Male	153 (63.22)
Female	89 (36.78)
Causes according to the site of infection	
Septicemia	138(57,04%)
Bacteremia	104(42,96%)
Ocult Bacteremia	55 (22, 73%)
Respiratory tract infection	87(35,95)**,**
Meningitis	7(2, 9%)
Osteomyelitis	10(4, 13%)
Gastroenteritis	36(14, 9%)
Cellulitis	25(10, 3 %)
Urinary Tract Infections	22(9, 09%)

The most common causative agents of bacteremia in these children were Staphylococcus aureus (126 patients, 52, 1%).Chief complaints in most of the patients were fever, i.e., 206 (85, 1%) and only 36 (14, 9%) patients presented without fever. Symptoms recorded beside fever were dependent on the primary site of infection. They were rash (16, 6, 6%), convulsions (30, 12.4%), vomiting (128, 52, 9%), diarrhea (42, 17.4%), cough (53, 21.9%), abdominal pain (32, 13.2%), chest pain (18, 7.4%), and bone pain (18,7,4%).Staphylococcus aureas was resistant to ampicillin/amoxicillin(95%),penicillinG (95%),cephalexin (44%)and amoxicillin/clavulinic acid (24%).

Our treatment protocol for MSSA bacteremia cases was the first generation of intravenous cephalosporin combined with Gentamicin. However, the antibiotics were modified according to the blood culture.

5. Discussion

Staphylococcal bacteremia and sepsis still carries high morbidity and mortality in hospitalized patients despite the availability of current sophisticated therapeutic modalities. Over the last decade, the occurrence of them has increased in hospitalized patients. [6][3][17][8][18][19]. The detection of causative bacteria is essential to the proper treatment.

In this study, positive blood culture was confirmed in the 242 patients with various diseases. Primary infection was the common cause giving a rate of 187 patients or (77, 3%). The most common infections identified included respiratory tract infection (35, 96%) and gastroenteritis and soft tissue infection respectively with 14, 9% and 10, 3 %. The findings of our study were not in agreement with those reported by Nimri et al (2001) that common infections were gastroenteritis (40.4%) and not pneumonia or bronchopneumonia[.1]

The most common causative bacteria were Staphylococcus aureus (126 cases, 52, 1%) isolated by surgical repair from osteomyelitis cases, tonsillitis and gastroenteritis. Staphylococcus epidermidis exists in the normal skin and mucosal flora and their presence in blood might indicate contamination of blood culture. In this study, we found 72(29, 5%) Staphylococcus epidermidis isolates, they considered the majority of these isolates as possible skin contaminates. The number of positive blood cultures and sepsis symptoms encourage clinicians to decide antimicrobial therapy.

In addition, occult bacteremia was detected in 55 patients (35, 95%) and the mean age of children was 24 months. Staphylococcus epidermidis were found in high percentage (55.4%), among other Staphylococcus group in the children with occult bacteremia.

High rates of resistance to common antibiotics for mild and moderate infection are potentially a serious problem in hospitalized patients.[11][12][13][15][16].Since particular concern is given to the number of non-susceptible isolates, the overall high rates of resistance to available antibiotics in this study may not reflect the actual rates in the community, because those patients with more susceptible organisms may be successfully treated at home or at a local health center.

We conclude that the highest incidence of bacteremia may be present in patients below 1 year. Considering the whole study population, we find Staphylococcus aureus is the most common isolated pathogen. The most common primary infections are respiratory tract infection.

References

[1] NimriL F, Rawashdeh M, Meqdam MM. Bacteremia in children: etiologic agents, Focal sites, and risk factors. J Trop. Pediatr.2001; 47:356-360.
[2] Blomberg B,Manji KP,Urassa WK,,Tamim BS, Mwakagile DS, Jureen R, et al.Antimicrobial resistance predicts death in Tanzanian children with bloodstream infections a prospective cohort study.BMC Infect. Dis. 2007; 7:43
[3] Gill J, Kumar R, Todd, J, Wiskin C Methicillin resistance Staphylococcus aureusa wareness at a regional hospital in Trinidad. IntJ Infect Dis 2007; 11; 145-51.
[4] Cosgrove SE,Sakoulas G ,Perencevich EN,Schwaber MJ, Karchmer AW Carmeli Y Comparison of mortality associate with
[5] Methcillin-susceptible Staphylococcus aureus bacteremia:a meta-analysis. Clin.Infect.Dis.2003; 36:53-59.
[6] Emori TG, Gaynes RP. An overview of the nosocomial infections, including the role of microbiology laboratory. Clin. Microbiol Rev1993;6:428-442.
[7] Haddon RA,Barnett PL, Grimwood K, Hogg GG Bacteremia in febrile children presenting to a Pediatric emergency department. Med J Aust 1999; 170:475-478.
[8] Kloos WE, Bannerman TL. Update on clinical significance of coagulase-negative staphylococci Clin.Microbiol.Rev. 1994; 7:117-140.
[9] Hussain QS, Khalil SH, Johnson S,Flourney DJ Etiology of bacteremia in a referral hospital in Saudi Arabia. Ann Saudi Med 1987; 7:51-55.
[10] Abdel-Hag N, Quezada M, Asmar BL.Retropharyngeal Abscess in Children.The rising Incidenc of Methicillin-Resistant Staphylococcus Aureus(MRSA) Pediatr Infect Dis J 2012 Jul31(7); 696-9
[11] McNeil JC, Hulten KG, Kaplan SL, Mahoney DH, Mason EH. Staphylococcus Aureus in Pediatric Oncology Patients; High Rates of Antibacterial Resistance, Antiseptic Tolerance and Complications Pediatr Infect Dis J. 2012 Sep 11.
[12] Elliot DJ, Zaoutis TE, Troxel AB, Loh A, Keren R. Empiric Antimicrobial Therapy for Skin and Soft Tissue Infection in the Era of methicillin Resistant Staphylococcus Aureus. Pediatrics Jun.123 (6) e959-66.
[13] Shorrr AF. Epidemiology of staphylo -coccal resistance. Clinc Infect Dis; 45(Suppl 3)S1716 Fowler JR VG, Miro JM, Hoen B, Cabell CH, Abrutyn E Rubenstein E et al.Staphylococca aureus endocarditis: a consequence of medical progress. JAMA 2005; 293; 3012-21.
[14] Perovic O Koornhof H, Black V, Moodley I, Duse Adrian, Galpin J. Staphylococcal aureus bacteremia at two hospitals in Johannesburg.S Afr Med J 2006; 96; 714-7
[15] Wang FD; Chen YY;Chen TI, Liu SY.Risk factors for mortality in patients with nosocomial staphylococcus aureus bacteremia Am J Infect Control 2008; 36; 118-22
[16] Gums JG. Ceftaroline fosamil:a broad-spectrum cephalosporin with methicillin-resistant Staphylo -coccus aureus activity. Infect Dis Clin Pract. March 2012,20(2):122-130
[17] Nailor MD, Sobel JD. Antibiotics for gram-positive bacterial infections: vancomycin, teicoplanin, quinupristin/dalfopristin, oxazolidin-ones, daptomycin, dalbavacinand, telavacin Infect Dis Clin N Am. Dec 2009, 23(4); 965- 82.133.
[18] Thuaites GE, Edgeworth JD, Gkrania- Klotsas E, Kirby A, Tilley R, Torok ME. Clinical management of Staphyloccocal aureus bacteremia. Lancet Infect Dis 2011 March, 11(3):208-222[Medline]
[19] Weisman LE,Thackray HM,Steihorn RH,Walsh WF, Lassiter HA, Dhanireddy R,et al .A randomized study of a monoclonal antibody (pagimaximab) to prevent Staphylococcal sepsis. Pediatrics. 2011 Aug. 128(2); 271-9[Medline].
[20] Jimenez-Truque N,Thomsen i Saye E,Creech CB. Should higher vancomycin through levels be targeted for invasive community-acquired methicillin-resistant Staphylocco-cus aureus infections in children?Pediat infect Dis J.2010 Apr.29(4); 368-70.[Medline].

Author Profile

Dr. Hamide Hoxha graduated in the Faculty of Medicine, University of Tirana, with excellent grades. She works in Pediatric Infectious Diseases Services, Department of Pediatric, University Hospital Center "Mother Theresa" Tirana, Albania, from 1985 and have good experience and skills in this field. She has some publications and participation in some international and national journal and medical conference.

Dr. Laureta Sadedini: is graduated in the Faculty of Medicine University of Tirana. Now she is working at the Pediatric Emergency Department of the University Hospital Center: "Mother Teresa", Tirana, Albania.

Tedi Rudha is graduated in the Faculty of Medicine University of Tirana. Now he works as a resident at the University Hospital Center "Mother Theresa" Tirana, Albania