“A STUDY OF COMMON ISOLATES IN BLOOD CULTURES FROM TERTIARY CARE PEDIATRIC HOSPITAL”

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ABSTRACT

Blood culture is a microbiological culture of blood. It is employed to detect infections that are spreading through the bloodstream which usually is a sterile environment. Bloodstream infections are a major cause of morbidity and mortality in adults and children alike. Blood cultures are still considered to be the ‘gold standard’ for the detection of microbial pathogens related to bacteremia and sepsis despite newer molecular techniques. This study discusses the optimal use of blood cultures, and highlights the different challenges posed by newborns, infants, and older children. Despite the major advances in neonatal medicine, many infants still develop life-threatening infections during the first month of life. Identifying and caring for an infant with a possible infection starts with a skilled nurse who is proficient in performing neonatal assessments. Improved culture media and new technology integrated into blood culture systems could shorten incubation time required to detect positive culture results. This would then change the length of antibiotic therapy in the management of the newborn infant with suspected sepsis.

KEYWORDS: Sample, Microbiological Culture, Pure Culture, Identification, Biochemical Analysis, Observations.

INTRODUCTION

Blood culture is a microbiological culture of blood. It is employed to detect infections that are spreading through the bloodstream which usually is a sterile environment. Bloodstream infections are a major cause of morbidity and mortality in adults and children alike. Septicemia is a clinical syndrome which is characterized by fever, chills, malaise, tachycardia, hyperventilation and toxicity or prostration, which results when the circulating bacteria multiply at a rate that exceeds their removal by phagocytosis. [1] The mortality rate
from septicemia may be 40% or higher and hence, the timely recovery of bacteria from the patients’ blood can have a great diagnostic and prognostic importance. Detection of bacteremia and fungemia traditionally has been one of the most important functions of clinical microbiology laboratories. Blood cultures are still considered to be the ‘gold standard’ for the detection of microbial pathogens related to bacteremia and sepsis despite newer molecular techniques. This study discusses the optimal use of blood cultures, and highlights the different challenges posed by newborns, infants, and older children.

The objective of this study was to analyze the infant blood cultures to find out the changes in pattern of septicemia in a laboratory. This study was carried during one month period in the year 2015. Fifteen studies, all with observational cohort design, were identified and reviewed. Two included only patients with BCs positive for pneumococcus, yielding 13 studies for the primary analysis. BCs were true-positive in 0% to 14% of cases. They led to antibiotic narrowing in 0% to 3% of patients and to antibiotic broadening ultimately associated with a resistant organism in 0% to 1%, of patients.

MATERIALS AND METHODS

A total 100 clinical samples were collected from Ganga Diagnostic and Medical Centre, Raipur and processed for isolation and identification of causative organism during the study period of July 2015 – August 2015. All these patients were infants and admitted into the tertiary care pediatric hospital. This study was laboratory based carried out for one month. Patients with the symptoms of sepsis were analyzed. In general, patients with bacteremia are likely to have low quantities of bacteria in the blood, for this reason, multiple blood cultures, each containing large volumes of blood, are required to detect bacteremia. 10-20 ml of blood per culture was strongly recommended for adults, infants and small children, only 1-5 ml of blood can usually be drawn for bacterial culture. All the collected blood sample was then placed into BacT/Alert for further processing. BacT/Alert automated machine is capable of Incubating, Agitating and continuously monitoring aerobic and anaerobic media. The BacT/Alert System continuously rocks the blood culture bottles at 70 cycles per minute and scans all bottles (every 10 minutes) for evidence of growth. The machine will automatically flag any positive blood cultures. All suspected positive bottles were processed as follows: 1. Gram stain, 2. Sub-culture onto the following (whole) plates. Sub culturing was done on Nutrient agar media (NAM), Blood Agar (BA) and Mackonkey’s Agar (MA). Subculture was done in media and was allowed to incubate at 37°C.
Biochemical tests are performed in laboratories for the identifications of the isolated microorganisms. Identification was carried out according to Bergey’s Manual (7th Ed.). Biochemical tests performed were Catalase Test, Oxidase Test, Coagulase test, Indole Test, Urease Test, MR/VP (Methyl Red-Voges Proskauer) Test, Citrate Utilization Test and Triple Sugar Iron Agar (TSIA) Test.

RESULTS & OBSERVATIONS

Of these patients, 72% had no growth on culture, 22% showed positive result on blood cultures and 7% showed Polymicrobial growth indicating improperly collected contaminated sample. This is depicted in the diagram below.\(^9\)

**Figure showing **\(^{+ve}\) **response on E. coli & **\(^{-ve}\) **response on Klebsiella sp**

**Figure showing **\(^{+ve}\) **response on Klebsiella sp & **\(^{-ve}\) **response on Staphylococcus sp**
Sepsis is a clinical syndrome associated with mortality and morbidity, blood culture is a valuable tool to identify the etiological agent in sepsis, but it is less sensitive because of prior administration of antibiotics, presence of slow growing and fastidious organism. In fact blood cultures are positive only in 20-40% cases of severe sepsis. In our study too the positivity rate was 22% which correlates well with other studies.
In our study the most common organism isolated is *Staphylococcus aureus* followed by *Klebsiella pneumoniae* which correlates with study done by Bhattacharyya et al. Group B Streptococci, *E. coli*, Coagulase-negative *Staphylococci* and *Candida sp.* are the principal pathogens in neonates as reported by Paisley J.W.\(^9\) Gram-positive organisms accounted for about 70% of the positive culture results, Gram-negative organisms accounted for about 14% and yeast for 18%. Similar rates have also been reported by Garcia Prats et al.\(^3\) Virtually all cultures growing clinically significant Gram-positive and Gram-negative organisms were positive by 24 to 36 hours of incubation which have been reported by Garcia Prats et al.\(^3\)

**DISCUSSION AND CONCLUSION**

Despite the major advances in neonatal medicine, many infants still develop life-threatening infections during the first month of life. Identifying and caring for an infant with a possible infection starts with a skilled nurse who is proficient in performing neonatal assessments. The assessment begins with a nurse’s innate knowledge of the many different risk factors for newborn infection. The nurse needs to be observant for any sign that may indicate sepsis.\(^7,8\) It cannot be overemphasized that prompt recognition, early diagnosis, and immediate treatment of sepsis can dramatically improve the infant’s outcome and limit any potential disability.\(^6,7\)

Once sepsis has been identified, treatment must be initiated promptly, and the infant reassessed for response to the therapy. Hours can make the difference of an infant surviving the infection, or succumbing to its systemic devastation. Because of the nonspecific manifestations of impending sepsis, any changes in the physical and/or behavioral state of an infant should raise the suspicion of sepsis.\(^2,3\) Above all else, nursing assessment and interventions are the most important tool in the prevention, prompt recognition, and effective management of newborn infections. Improved culture media and new technology integrated into blood culture systems could shorten incubation time required to detect positive culture results. This would then change the length of antibiotic therapy in the management of the newborn infant with suspected sepsis.

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