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Microbes causing severe neonatal septicemia in a tertiary neonatal intensive care unit

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Abstract
Neonatal sepsis is the most challenging neonatal disease in developing countries despite the progress in the neonatal management. The aim of the study is to demonstrate the most common organisms causing severe neonatal sepsis in a tertiary neonatal intensive care unit. The study conducted in the neonatal intensive care unit (ICU) unit of pediatric department in Suez Canal University Hospital in the period from December 2013 to November 2014.Blood cultures showed the growth of *Escherichia coli* (40 %), *Staphylococcus aureus* (27 %), *Klebsiella* (20 %), and *Pseudomonas* (13 %). Escherichia coli is the most common quarantine in a tertiary neonatal intensive care unit.

Keywords: Neonatal sepsis, microbe, intensive care unit

Introduction

Neonatal infection could probably be happened as an early or late onset infection in the first few days of the life. More than seventy percent of neonates with early onset infection occur in the first day of life but the onset is quicker in neonates with low birth weight. Early onset sepsis syndrome is associated with maternal bacteria, obtained via placenta, by a climbing infection from the cervix or by germs settling the mother's genitourinary zone. The bacterial microbes most commonly associated with early onset infection include Escherichia coli, coagulase-negative staphylococcus, Group B streptococcus (GBS), Haemophilus influenzae, and Listeria monocytogenes [1].

On the other hand late-onset sepsis syndrome transpires at older age of life and is acquired from the nature. Bacteria that cause late-onset sepsis syndrome include Staphylococcus aureus, coagulase-negative staphylococci, Escherichia coli, Pseudomonas species, Klebsiella, Enterobacter, Candida, GBS, Acinetobacter, Serratia, and anaerobes [2].

Pneumonia is more usual in early onset sepsis, but meningitis and bacteremia are more communal in late-onset sepsis [1].

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The most common threat factors related with early onset neonatal sepsis Group B streptococcus (GBS), prolonged rupture of membranes, prematurity, maternal urinary tract infection, chorioamnionitis [3] and colonization of maternal birth canal and gastrointestinal tract with GBS [4].

The clinical signs of neonatal sepsis are non specific, however, those of early sepsis syndrome are also associated with other neonatal diseases, such as intracranial hemorrhage, respiratory distress syndrome (RDS) and inborn errors of metabolism [5].

A systematic physical evaluation of the infant should be implemented in series as changes in findings from one assessment to the next gives important information about the existence of sepsis [6]

In severe sepsis, an initial early phase characterized by pulmonary hypertension, decreased cardiac output, and hypoxemia [7]. Meningitis is the most common manifestation of contagion of the CNS. It is habitually associated with GBS, Escherichia coli , and Listeria species infections [8]. The intestinal tract can be colonized by bacteria during intra utrine lifecycle or throughout labour or by consuming septic amniotic liquid [9].

Materials and Methods

Study design: This study was carried out as a cross-sectional comparative study.

Setting of the study: The study conducted in the neonatal intensive care unit (ICU) unit of pediatric department in Suez Canal University Hospital in the period from

December 2013 to November 2014. Inclusion criteria: Preterm and full term neonates from both sexes, diagnosed with neonatal sepsis based on clinical, laboratory and positive blood culture results.

Methods of the study: An informed written consent was obtained from parents of all neonates.

All of the studied patients were subjected to the following: A complete history was taken and neonatal examinations were done for all the patients.

Laboratory investigations: Complete blood count, C-reactive protein and blood cultures. The isolated micro-organisms were identified by standard bacteriological methods.

Results

Demographic characteristics

No statistically significance as regard gestational age, sex, maturity. Table (1)

Table 1. Demographic characteristics of the studied neonates in both groups

Variable	Sepsis N=30			
Gestational age	Mean		SD	
(weeks)	35.40		2.62	
Sex	Male		female	
	n	%	n	%
	15	50%	15	50%
	Preterm		Full term	
Maturity	n	%	n	%
	22	73.3%	8	26.7%

Clinical data of septic neonates

We found that 38.3 % of neonates were reported with poor feeding, 33.3% had respiratory distress, 13.3% had jaundice, 1.6% had hypothermia, 6.6% had diarrhea, 3.3% convulsion and 3.3% sclerema.

Regarding the risk factors

We found, three cases (10.0%) with maternal GBS colonization, two cases (6.7%) with premature rupture of membranes (PROM), 22 cases (73.3%) with prematurity, one case (3.3%) with maternal urinary tract infection and two cases (6.7%) with chorioamnionitis.

Blood cultures

Fourty percent of babies grew *Escherichia coli* in blood culture , whereas 26.6% had *Staphylococcus aureus*, 20% had *Klebsiella* species, and 13.3% were having *Pseudomonas* species. Table (4)

Table 4. The results of blood culture in patients group

Result	Number of patients	Percentage
Escherichia coli	12	40%
Staphylococcus aureus	8	26.6%
Klebsiella species	6	20%
Pseudomonas species	4	13.4%

Discussion

Neonatal sepsis is one of the most important etiologies of impermanence in the neonates [10].

Our study showed that the incidence of neonatal infection is more among the premature neonate. As 22 premature neonates (73.3%) had sepsis, while only 8 full terms (26.7%) had sepsis.

The bacteria responsible for neonatal sepsis have varied over time [11].

In our study we found that there was no significant statistical difference between the gender of patient and incidence of sepsis as 15 male cases with sepsis and 15 female cases with sepsis but this in the contrast of other study which noticed males more affected [12].

We found that blood culture in patients group where the result were *Escherichia coli* 40% and *Staphylococcus aureus* 26.6%, *Klebsiella* 20%, and *pseudomonas* 13.4%.

Early-onset neonatal sepsis is caused by bacteria acquired from the mother before or during confinement so microbes from the maternal genital region may play an important role in early infection [13]. Ghotaslou et al. [14] from Iran found that gram positive set of bacteria was the most frequent cause of neonatal sepsis.

Disclosure

The funders had no role in the study design; in the collection, analysis, and interpretation of data; in the writing of the paper; and in the decision to submit the paper for publication.

Conflict of Interests

The authors declare no financial/personal relationship with other people or organizations that could inappropriately influence (bias) this work.

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