

## NEONATAL SEPTICEMIA – RETROSPECTIVE STUDY ON PREMATURE NEWBORN

Marioara Boia<sup>1</sup>, C Ilie<sup>2</sup>, Letiția Ioanăș<sup>3</sup>, Aniko Manea<sup>1</sup>, Daniela Iacob<sup>1</sup>, Daniela Cioboata<sup>2</sup>

<sup>1</sup>University of Medicine and Pharmacology 'V.Babes', Neonatology, Timisoara, Romania

<sup>2</sup>Children Hospital Louis Turcanu, Pathology, Timisoara, Romania

<sup>3</sup>County Emergency Hospital Arad, Dept. of Pediatric, Arad, Romania

### Abstract

Septicemia in neonates (newborn children) refers to generalized bacterial infection documented by a positive blood culture in the first four weeks of life. The study was carried out retrospectively on a one year period (2008) in the Newborn and Infant care Clinique from “Louis Turcanu“ Children Hospital, on a number of 34 hospitalized premature newborn children, selected based on anamnesistic, clinical, epidemiologic and biological criteria. The prevalence of the disease was 4.03% and the mortality was high 14.71% even in the presence of a specific anti-biotherapy. Any baby who is not well must be considered at risk of sepsis and appropriate antibiotics commenced as soon as possible after taking cultures.

**Key words:** septicemia, premature.

### Introduction

Neonatal septicemia appears especially in premature newborns in neonatal intensive care units. Generally, the incidence is 1- 8 cases per 1000 live newborn children (7). It is a severe affliction with high mortality, even in the presence of specific anti-biotherapy. Depending on onset age of the disease, septicemia is divided in: a) early neonatal septicemia or maternal-fetal infection, with onset in the first 7 days of life; b) late neonatal septicemia or postnatal infection, with onset after the first 7 days of life. The risk factors for early neonatal septicemia can be factors related to the mother (early membrane rupture and the long time between the rupture and the birth, being the most significant) and fetus related factors (prematurity represents the most important risk factor for infections). Nosocomial infections are the most significant risk factor in late neonatal septicemia.

The authors of this study have proposed to analyze the risk factors of this disease based on prematurity grades and onset age, correlated with the clinical and biological aspect on one hand, and with morbidity and mortality, on the other hand.

### Material and method

The study was carried out retrospectively on a year period (2008) in the Newborn and Infant care Clinique from “Louis Turcanu“ Children Hospital, on a number of 34 hospitalized premature newborns, selected based on anamnesistic, clinical, epidemiologic and biologic criteria.

The newborns were divided in two groups:

1. First group – lot A – 16 newborns with early onset septicemia, in the first 7 days of life.
2. Second group - lot B – newborns with septicemia with onset after the first 7 days of life

What were put under observation are the risk factors of the condition, on prematurity grades and onset age of the disease. The prevalence was 4.03 %.

### Results and discussions

Prematurity represents one of the most important risk factor for infections. The risk of developing complications increases with decreasing gestational age and birth weight. Preterm infants have a 3- to 10-fold higher incidence of infection than full-term normal birth-weight infants. Possible explanations could be: an immune system much more immature than those of the full-term infants; maternal genital tract infections are considered to be an important cause of preterm labor and an increased risk for vertical transmission to the newborn; the incidence of intraamniotic infections increases with decreasing gestational age; the premature infants need a long period of hospitalization and very often invasive care techniques that can be source for infections (3).

Based on different degrees of prematurity we noticed that in the studied group 32 % were first degree preterm, 24 % were II degree preterm, 38 % preterm III degree and 6% preterm were IV degree (table 1).

Table 1. Septicemia incidence based on prematurity degrees

	Early neonatal septicemia (lot A)	Late onset septicemia (lot B)	
I degree prematurity BW *2500- 2000g	9	2	11 cases (32 %)
II degree prematurity BW 2000- 1500g	3	5	8 cases (24 %)
III degree prematurity BW 1500- 1000 g	3	10	13 cases (38 %)
IV degree prematurity BW under 1000g	1	1	2 cases (6 %)
	16 cases (47.06%)	18 cases (52.94 %)	

\* BW - birth weight

Early onset septicemia occurred to 16 infants (47.06 %). Apart from prematurity, the following risk factors were observed in the studied group:

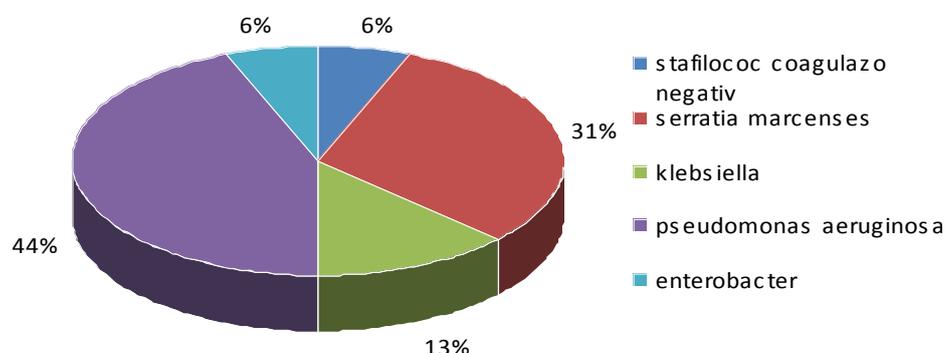
1. In 7 cases (43.75%) ruptured membranes for more than 18 hours occurred. According to Milunsky A., in 50 % of cases, amniotitis occurs and after 3 days since premature rupture of fetal membranes, and when ruptured membranes are present during labor germs ascension from vagina is facilitated, so, after 12 hours since the rupture, the amniotic liquid infects 100% of cases. 6 cases from our group that were infected that way, had rupture of membranes for over 24 hours. That is why right monitoring of labor and specific medications for birth finalizing are required (6).

2. Four newborns (25%) have presented with green amniotic liquid and have necessitated reanimation measures, which can be sometimes invasive (endotracheal tubes, venous catheters) and this increases the risk for infections.

3. Another major risk factor for maternal-fetal infection is represented by the fever over 39°C during labor. In 5 cases (31.25 %) pregnant women have had fever during labor.

In early onset septicemia there is a high risk of mortality, percentages between 10 % and 30 % being mentioned in literature (7). In lot A there was a high mortality, approximately 25%, affecting especially the infants with very low birth weight, under 1500 grams. Thus, from the 4 deceased 3 were premature with birth weight under 1000 grams and one with birth weight under 1500 grams.

The most frequently implicated microbial flora is represented by gram negative bacillus, 15 cases (94%). From this, *Pseudomonas Aeruginosa* represented 44%, followed by *Serratia Marcenses* and *Klebsiella Pneumoniae* (graphic 1). *Pseudomonas Aeruginosa* is an opportunist pathogen which causes severe infections in patients with immune deficiency and newborns. It was encountered in 3 of the deceased infants. Otherwise, in 6% of the cases the blood cultures showed the presence of Coagulase-Negative *Staphylococcus*. According to the specific literature, in early neonatal septicemia the main implicated factor, 30-40 % from cases, is represented by the group B *Streptococcus* (4). But in our lot none of the infants presented positive blood cultures for this germ.



Graphic 1. Incidence of microbial flora in early onset septicemia.

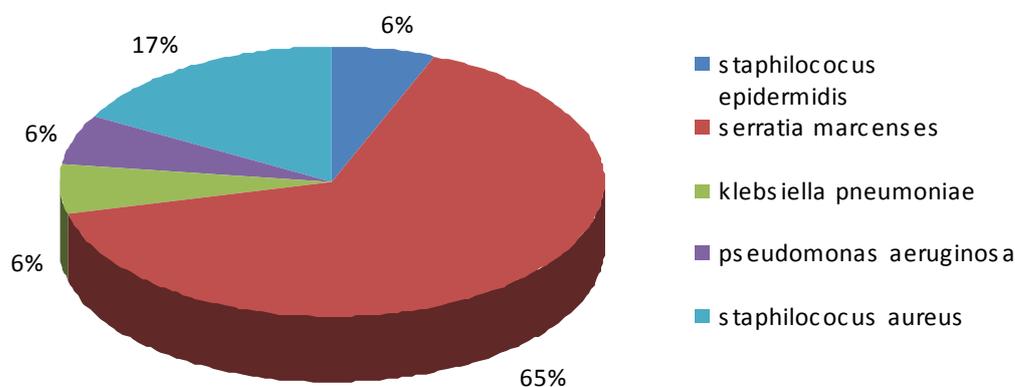
Late onset septicemia occurred in 18 cases (52.94 %) increases in premature infants with gestational age lower than 32 weeks and birth weight under 1500 grams; 11 of the studied cases in lot B (61.1%). The Center for Diseases Control and Prevention defines a nosocomial infection as any infection occurring after admission to the Neonatal Intensive Care Unit (NICU) that was not transplacentally acquired (3).

Long term hospitalization represents an important risk factor for the late onset septicemia because the hospital pathogens are a permanent threat for the premature infants because of their unusual susceptibility to infections. Due to low birth weight all infants from this study necessitated a long period of hospitalization. Frequent contact with

medical stuff and invasive care techniques (gavage tubes, venous catheters) are source for systemic infections, all the newborns from this study needed this type of care and 5 cases (27 %) were intubated and mechanically ventilated.

Mortality in lot B was 5.5%, lower compared with lot A, affecting especially premature newborns with weight lower then 1000g .

The most frequently found germ in lot B was the gram negative bacillus – 14 cases (77%), most common being *Serratia Marcenses*, followed by *Klebsiella Pneumoniae* and *Pseudomonas Aeruginosa*. 23 % of the microbial flora was formed by gram positive cocci (graphic 2).



Graphic 2. The incidence of microbial flora in late onset septicemia.

Clinical findings in all newborns were very severe. On clinical examination we found a profound altered general status, paled, marble skin, prolonged re-coloring time more then 2 seconds, apnea crisis, moaning, tachycardia VB > 170 b/min, gastric residue more then 3 ml before gavage. All the deceased had presented signs of disseminated intravascular coagulation, clinical finding being petechiae and ecchymoses, bleeding, either at puncture site or spontaneous. DIC represents the most important risk factor for unfavorable evolution in neonatal septicemia.

The final diagnosis is based on bacteriologic examination, blood cultures representing the final and major argument for the diagnosis of a systemic infection. Beside blood cultures, some other lab tests have been carried out, which have neither the specificity nor the necessary sensibility to impose the sepsis diagnosis, but help for orientation towards it.

1. Blood count – leukocyte number is useful but unspecific, leukocytosis was between 17240 – 44000 /mm<sup>3</sup>. Thrombocytopenia appears later in severe bacterial infection but despite of this it is registered most of the time as a first

sign of infection. The thrombocytes values were between 15000 – 12000/ mm<sup>3</sup>.

2. C-reactive protein increases towards maximum values in 8-60 hours from the onset of the inflammatory process and decreases promptly under efficient treatment. CRP values were comprised between 8.92 mg/l and 220 mg/l.

3. Acid-base disorders are characteristic for septicemia as well as appearance of metabolic acidosis. All the studied cases presented a disturbance of acid base balance with metabolic acidosis.

#### Conclusions:

Neonatal septicemia remains a major clinical issue in neonatology, with increased rate of mortality and morbidity. In the studied group there was a high mortality rate, 14.71 %. However, lot A had a higher mortality rate (25 %) than lot B (5.5 %).

The most afflicted are premature newborns with gestational age under 32 weeks and birth weight lower then 1500g.

Global prevalence of disease in our section was 4.03 % among which, 47.06% presented early onset septicemia and 52.94 % had late onset septicemia.

Beside prematurity, the most frequently encountered risk factors in lot A were premature amniotic membrane

ruptures for more then 18 hours (43.75 %) and prolonged hospital stays in lot B.

Global incidence of the implicated germs is 85.29 % gram negative bacilli and 14.71% gram positive cocci, so in both groups the gram negative bacilli had a greater incidence.

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Correspondence to:

Marioara Boia,  
Gospodarilor Street, No. 42,  
Timisoara 300778,  
Romania  
E-mail: boiaeugen@yahoo.com