

PREVALENCE OF INFECTION IN LOW BIRTH WEIGHT INFANTS

Mirabela Dima^{1*}, C Ilie², Marioara Boia², Daniela Iacob², Aniko Manea², Nicoleta Ionita³, Simona Sipos², Daniela Chiru², RE Iacob⁴

Abstract

The newborn has a variable and uneven susceptibility to infection. In term of onset, neonatal sepsis may be early-onset (within the first 4 days of life) and late-onset (after day 14 of life).

Bacteria, viruses and parasites are transmitted to the fetus and newborn in various ways: trans placental, through amniotic fluid or during expulsion. Another category is represented by nosocomial infections. The study was conducted on a total of 596 low birth weight infants who required a hospitalization in NICU with variable duration, representing a group of suspicion for neonatal infectious pathology. We analyzed the distribution of cases by type of birth, time since amniotic membrane rupture until delivery, Apgar score, a positive bacteriological examination.

Keywords: newborn, neonatal infection, low birth weight.

Introduction

Regardless of etiology (bacterial, viral or otherwise), newborn has a variable and uneven susceptibility to infection. Bacterial infection, defined as clinical syndrome resulting from systemic infection proven by a positive blood culture or other origin, occurs in approximately 1-8 new - born in 1000 births and may be accompanied by meningitis ¼ again - infected infants.

In terms of onset, neonatal infection may be:

- Early postnatal onset (within the first 4 days of life)

and

- Late onset (after day 14 of life).

Improved techniques methodologies for neonatal intensive care have led to increased survival of preterm infants and / or very low birth weight.

This has contributed greatly to the increased incidence of neonatal infections by increasing nosocomial component become the 3rd largest category of neonatal infections. In terms of time (relative to the time of birth), nosocomial infections can be assimilated as a subgroup of late-onset neonatal sepsis (after day 4 of life). They mostly interested infants with very low birth weight (VLBW = very low birth weight), a 25% of them may have one or more infectious episodes detected before discharge.

Nosocomial infections are responsible for the increased rate of neonatal morbidity and mortality as well, and prolongation of hospitalization known to be long lasting as VLBW category. In general the current studies give a neonatal mortality rate of neonatal infections caused 20-30%, but this may increase to 80-90% in polymorphonuclear neutrophil depletion stored in the bone marrow. In the category of infants with very low birth weight (VLBW), the group most affected by infectious pathology, the mortality rate reported in a study (Jill E. Baley and Johana Goldfarb, 1998) was 21% (versus 9 % in VLBW infants uninfected) [1,2].

Transmission of infection. Bacteria, viruses and parasites are transmitted to the fetus and newborn in various ways. Trans placental transmission is responsible for the infections occurred immediately postpartum and is well represented in STORCH infections (syphilis, toxoplasmosis, rubella, cytomegalovirus, HIV, HSV). More commonly, infections are transmitted vertically from mother to child through amniotic fluid or during expulsion. Finally newborns can be infected after birth. These infections can be transmitted to other infants, from the medical staff, including the environment contaminated equipment [3].

Early-onset infections. Most early-onset infections occur in the first 12 hours of life, although it can develop in the first 4 days of life. They are usually fulminant and affects multiple systems, mainly the lungs (pneumonia). Most newborns are spared, but infants are often affected, with a mortality rate of 15-20%.

Listeria monocytogenes was also a common cause among VLBW infants (\leq 1500 grams), from 1991 to 1993. Neonatal Research Network reported that early-onset infections were detected in 1.9% of newborns, although antibiotic therapy was continued over 5 days to almost half of newborns, reflecting the uncertainty of diagnosis.

Gram-positive organisms (GBS, Streptococcus viridans, other Streptococcus and coagulase-negative staphylococcus) predominates over Gram-negative organisms (E. coli, H. influenzae and Klebsiella).

¹University of Medicine and Pharmacy "Victor Babes" Timisoara – Dep. of Neonatology – PhD Student

²University of Medicine and Pharmacy "Victor Babes" Timisoara – Dep. of Neonatology

³Clinical Emergency Hospital, Timisoara

⁴University of Medicine and Pharmacy "Victor Babes" Timisoara – Dep. of Pediatric Surgery

*Research supported by PhD fellowship POSDRU107/1.5/S/ID 78702

E-mail: dima_mirabela, constantinilie@umft.ro, marianoia@yahoo.com, danielariacob@yahoo.com, aniko180798@yahoo.com, ionita_nicoll@yahoo.com, dani.chiru@yahoo.com, radueiacob@yahoo.com

Early onset infections among VLBW infants have higher morbidity, resulting an increased rate of intraventricular hemorrhage, persistent ductus arteriosus and the need for prolonged assisted ventilation [4,5].

Late-onset infections. Late-onset infections are more subtle onset and more likely to degenerate into a focal infection, especially meningitis. Although pathogens can be acquired during the expulsion, they are most commonly taken from the environment. Late-onset infections are commonly associated with the term newborn in the first week of life and occasionally associated with obstetric complications. The mortality rate is lower than in early-onset infection in 10% -20% [6].

Nosocomial infections. Nosocomial infections follows a different pattern. Are inversely related to low birth weight and gestational age; infected infants were predisposed to prematurity complications (intubation, catheterization, respiratory distress syndrome, prolonged ventilation, bronchopulmonary dysplasia, persistent ductus arteriosus, severe intraventricular hemorrhage, necrotizing enterocolitis).

At least two major events overlap neonatal period, time of onset and / or development of neonatal infectious pathology:

- transient immaturity of a mature newborn, prolonged (weeks or months) for premature infant, the overall capacity of anti-infective defense;
- microbial colonization process whose purpose is the training of saprophytic flora (bowel, mouth, skin), unique process that does not occur in any other period of life, it generally ends after the first 10 to 14 days postnatal life.

The normal microbial colonization is itself an argument (if applicable) of limitation or even ban of the use of antibiotic therapy in this critical period. Therefore, in the first 10-154 days old it is recommended that the use of antibiotics should only be done when the infection is well established and is etiologic labeled.

Objectives

This study aims to address the neonatal microbial infections as a complex that includes:

- particular issues of microbial colonization in perinatal context
- the expansion of procedures in NICU
- dynamics of microbial colonization process in a unit of NICU and its correlation with infectious pathology
- assessment of factors and risk groups for systemic infection;
- diagnosis issues of neonatal infections, evolution, prognostic and therapeutic and prophylactic perspectives.

Materials and methods

The study material is represented by the totality of newborns who were hospitalized in the Neonatal Intensive Care Unit (NICU) Clinic of Neonatology "Bega" Timisoara, and who had infectious pathology in the neonatal period.

There has been case law for a period of 4 years (2009-2012), and in this case law were selected infants who experienced a systemic infection, which allowed the delineation of the study group (with positive blood cultures).

In the batch analysis we started from suspicion and we defined the casuistry only after etiological confirmation.

Results and Discussions

During the period studied there was a total of 9376 infants, of which 833 (8.88%) were classified in the broader group of newborns with low birth weight ($\leq 2500g$).

A total of 596 newborn (6.35% of total number of births) required hospitalization with variable duration in NICU, which has been a group of suspicion for neonatal infectious pathology. If we compare the total number of infants admitted in NICU (n = 7596), nearly half of them (43.28%) presented the criteria for suspected neonatal infection, the rest (56.72%) were hospitalized in NICU for other specific neonatal medical problems (Fig. 1).

Distribution of cases according to the type of birth (Fig. 2) shows a sensitive predominance, but insignificant, to caesarean birth versus natural delivery.

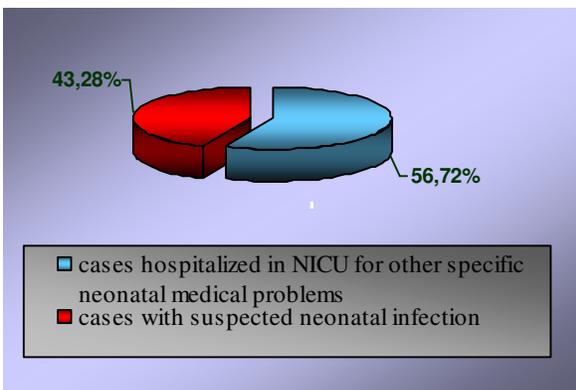


Figure 1: Cases with suspected neonatal infection / cases hospitalized in NICU for other specific neonatal medical problems.

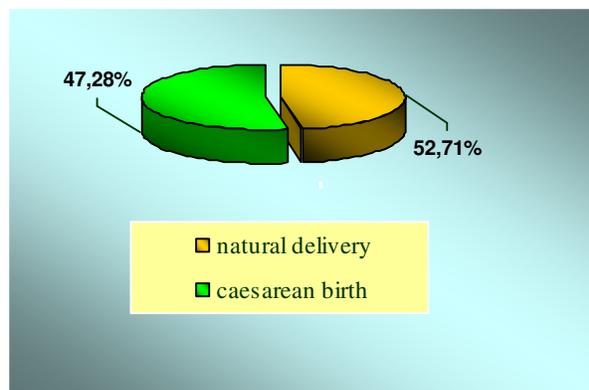


Figure 2: Distribution of cases according to the type of birth.

Material analysis allowed the identification and concrete delineation of perinatal factors of suspicion for the neonatal infectious pathology. We proceeded to isolated analysis and / or multifactorial of their and try to assess their weight in the determinism of a systemic infection.

One of the most important factors of infection remains PRAM (premature rupture of amniotic membranes), cited in our study as an incidence of 39.92% (n = 103). In the following figure (Fig. 3), is illustrated with PRAM distribution of cases in relation to the onset of labor. It is

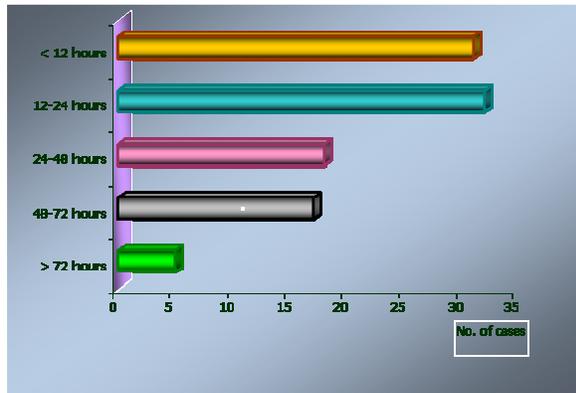


Figure 3: PRAM distribution of cases in relation to the onset of labor (n = 103).

Since all cases of the study group were admitted in NICU, still from birth systematic biological examinations were performed.

Systematic bacteriological examinations performed during the first 24-72 hours of life illustrates a degree of positivity over 50% and the elective areas of microbial colonization are: nose, eyes, skin (vernix axillary).

In relation with the total number of cases of the group study (n = 258), the degree of microbial colonization was 54.26% (n = 140 cases).

Distribution of cases according to the sampling interval - positivity of blood cultures, shows a positivity estimated at 57.89% in the first 4 days of sampling, which is a favorable period to conduct an effective therapy.

At nearly 60% of the study group, length of stay in NICU was > 7 days.

A hospitalization in NICU over 10 days, but mostly over 14 days is typical for systemic infections.

Summarizing the facts in relation to the case law study group (n = 258), we noted the following weight to factors of suspicion for PIN:

- gestational age <37 weeks (n = 110 = 42.63%), especially <34 weeks (n = 98 = 37.98%);
- birth weight ≤ 1500g (n = 42 = 16.27%);
- premature rupture and / or early amniotic membranes (n = 103 = 39.92%);
- first pregnancy regardless of biological age (n = 99 = 38.37%);

noted that over two thirds of cases, this has occurred with > 12h in relation to labor, which increases the degree of prediction for neonatal infection.

Distribution of cases according to the APGAR score at 1 and 5 minutes (Fig. 4) illustrates the significant weight of the newborn fragile or weakened, with vital and immediate adaptation problems, who often requires resuscitation maneuvers with great potential infection.

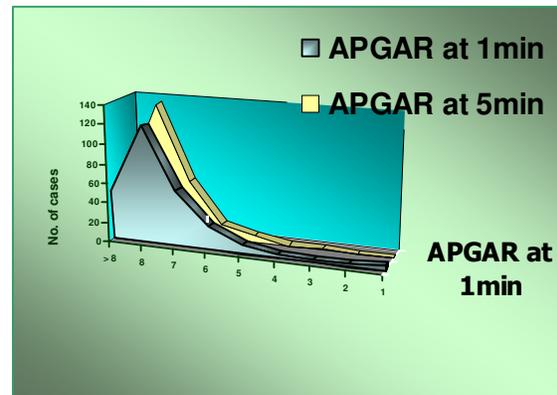


Figure 4: Distribution of cases according to the APGAR score at 1 and 5 minutes.

- 1 minute Apgar ≤ 7 (n = 102 = 39.53%) and especially 5 minutes (n = 8 = 31.39%);

- other pre and perinatal factors: maternal pathology (HTAS pregnancy-induced hypertension, diabetes, epilepsy, etc.); non-traceable pregnancy, couple or single mother illegitimate, birth dystocia (n = 94 = 36.43%).

Conclusions

Systemic neonatal infections of microbial etiology, is one of the most common and feared complications of NICU, with increasing incidence.

The diagnosis of sepsis is sometimes difficult, blood cultures are not being always positive, so it is necessary to corroborate the clinical criteria with other useful criteria for a correct diagnosis, in which the goal will be pursued:

- the isolation of the same etiologic agent in at least two outbreaks, one of which will be done by metastatic path;
- the presence of localized infection or suggestive evolutionary complications

In our observations, it appears that the staphylococcal septicemia is dominant, with the entering gate in order of frequency: Nasopharyngeal, umbilical, eyes, nose.

An important risk factor is the prolonged hospitalization that contributes to the appearance of treatment-resistant infections.

By the peculiarities of "land", newborns with low birth weight are the most exposed to this risk, in this category, the systemic neonatal infections are the third cause of death

after RDS (respiratory distress syndrome) and IVH-intraventricular hemorrhage (normal associate).

The positive blood culture is the categorical criteria for the ethiological diagnosis, and it will be done an antibiotic sensitivity tests to the isolated pathogen agent.

The treatment with antibiotics will be set even in the phase of presumptive diagnosis (after clinical criteria), after which it will be established a 'target' treatment according with the antibiogram.

At least four conditions are necessary to reduce the incidence of:

1. "aseptic" NICU with highly specialized personnel;
2. rapid bacteriological tests and the expansion of "palette" pathogen susceptibility;
3. Minimal enteral nutrition at infants with low and extremely low birth weight..

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Correspondance to:

Mirabela Dima,
University of Medicine and Pharmacy "V. Babes" Timisoara
P-ta E. Murgu, No. 2,
Timisoara,
Romania,
E-mail: dima_mirabela@yahoo.com