Peculiarities of Pneumonia in Newborn

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Abstract

A comprehensive study of newborns with pneumonia was conducted on those under the age of 28 days, hospitalized in the clinical departments of the City Clinical Hospital No. 1 of the city of Tashkent. 52 newborns were examined, of which 26 newborns were admitted to the clinic from maternity hospitals, the remaining 26 newborns were admitted from home. Predisposing factors contributing to the development of pneumonia in children under 28 days of age were the frequency of acute respiratory diseases of mothers during pregnancy, carriage of TORCH infection, aggravated pregnancy: in the form of preeclampsia, threatened miscarriage, chronic hypoxia, fetoplacental insufficiency, anemia and pathological childbirth. Clinical manifestations of pneumonia in newborns were characterized by a complex of non-specific, as well as specific symptoms and syndromes of respiratory damage. In the clinical picture of newborns transferred from maternity hospitals with a diagnosis of pneumonia, the most common concomitant symptom was intense jaundice, which reached 4-5 zones on the Cramer scale that corresponds to a pronounced degree of hyperbilirubinemia. Most newborns had signs of perinatal CNS damage. For an objective quantitative assessment of the dynamics of the neurological status of newborns, we used the "Score scale for the severity of perinatal encephalopathy", developed at the Research Institute of Pediatrics of the Russian Academy of Medical Sciences A.A. Stepanov (1998). It is based on a comprehensive assessment of the motor activity of innate reflexes and behavioral reactions of newborns, taking into account the quantitative characteristics of each newborn.

Keywords: Clinic, Etiology, Features, Pneumonia, Newborn, Encephalopathy, Score.

INTRODUCTION

Pneumonia in newborns is one of the severe pathologies causing increased neonatal morbidity and death. During the neonatal period, pneumonia develops much more often than in other age periods. The beginning of spontaneous breathing is one of the most important factors in the child's adaptation to external existence; intrauterine infection and the development of an inflammatory process is one of the main causes of high-frequency disorders of the adaptation of the respiratory system. [3,5,6,9,12].

Pneumonia is an acute polyetiological infectious disease characterized by inflammation of the lung tissue distal to the terminal bronchioles with intraalveolar exudation, which is manifested by intoxication, respiratory failure, symptoms of damage to the lower respiratory tract (shortness of breath, cough, local physical changes) in the presence of infiltrative changes on the radiograph. chest organs [14,16,17,19,28].

Particularly vulnerable to viral and bacterial infections are full-term infants who have undergone perinatal hypoxia and premature newborns. [15,16].

The causative agents of congenital pneumonia are both viruses and bacteria, depending on the route and time of infection. Congenital pneumonia developing during transplacental transmission is more often caused by pathogens of TORCH infections [16,18]. Congenital pneumonia of bacterial etiology is more common due to intranatal infection of the fetus. [18,19,29]. On studying the etiology of congenital pneumonia, the role of both different types of bacteria and respiratory viruses and their associations were revealed. It has been proven that the microbial factor affects the severity of the course and the outcome of congenital pneumonia [1,3,6,26]. Bacteria (S. haemolyticus, S. Epidermidis, Enterococcus, Klebsiella spp.) acted as an etiological factor in congenital pneumonia with a favorable outcome. The diagnostic criteria for CAP (BP) consists of the main criteria, such as focal infiltration on a series of chest x-rays and the same microflora in mother and child, and the development of pneumonia during the first 72 hours of life. For the diagnosis of congenital pneumonia, auxiliary criteria are also used including the changes in the indicators of general clinical tests and the clinical picture [4,7,8,13, 14, 15,24,25].

At present, pneumonia is particularly relevant to a general practitioner due to its high prevalence in the pediatric population up to 1 month. In practice, especially in outpatient settings, early diagnosis is a serious problem. Certain diagnostic difficulties are presented by viral pneumonia characterized by a protracted course [18,19,26]. They make up from 12 to 40% of all

pneumonias. The protracted course of pneumonia against the background of the use of anti-bacterial agents remains a problem of modern pulmonology. The clinical course of pneumonia in newborns is not always predictable and is accompanied by both pulmonary and extrapulmonary complications. For this reason, and due to the ubiquity of drug-resistant strains of pathogens, antimicrobial and supportive therapy for pneumonia is unsuccessful in 50% in the early and 20% of cases in the late neonatal period [3,7,8,10].

The purpose of the Study: To study the features of the etiology, clinical picture, diagnosis of pneumonia in newborns.

Material and Research Methods

The work was performed on the basis of the City Clinical Hospital No. 1 of the city of Tashkent. The studies were carried out with 52 newborns. Depending on the course, clinic and CNS lesions, according to the duration and nature of hypoxia, newborns were divided into 2 groups. Group 1 congenital pneumonia 26 newborns were admitted to the clinic from maternity hospitals and group 2 community-acquired pneumonia 26 newborns were admitted from home. When examining newborns, the somatic and neurological status was assessed daily throughout the entire period of inpatient treatment. For an objective quantitative assessment of the dynamics of the neurological status of newborns, the "Scoring of the severity of perinatal encephalopathy" was used, developed at the Research Institute of Pediatrics of the Russian Academy of Medical Sciences A.A. Stepanov [23]. It is based on an integrated assessment of the motor activity of innate reflexes and behavioral reactions of newborns, taking into account the quantitative characteristics of each newborn. The coefficient k was calculated individually at admission, after 5-8 days of treatment and before discharge (satisfactory condition at $k<0.5$; moderate $0.6<k<1.0$; severe at $k>1.0$).

Conducted clinical blood tests, biochemical, x-ray studies and concentrations of C reactive protein.

Research Results and Discussion

An analysis of the obstetric and gynecological history of the mothers of the children under study showed that the mothers of the examined children during pregnancy and childbirth had a high incidence of acute respiratory infections (42.3%) and carriers of TORCH infection (46.1%). In addition, they noted a aggravated course of pregnancy: in the form of preeclampsia in 42.3%, fetoplacental insufficiency (38.4%), 55.7% of cases, pregnancy proceeded against the background of anemia and 36.4% of polyhydramnios, and in 25% of cases, childbirth was allowed. by caesarean section, of which 46.1% due to placental abruption, 30.7% large fetus, 23% breech presentation.

Table 1: Risk Factors for Neonatal Pneumonia

	1-group		**2-group**		**General**	
Indicators	**(n=26)**		**(n=26)**		**(n=52)**	
	amount	**%**	**amount**	**%**	**amount**	**%**
Extragenital diseases in mothers	18	69,2	12	46,1	30	57,6
Maternal urinary tract infection	14	53,8	16	61,5	30	57,6
Pathology of pregnancy:						
a) toxicosis	10	38,4	12	46,1	22	42,3
b) preeclampsia	10	38,4	12	46,1	22	42,3
c) anemia	14	53,8	15	57,6	29	55,7
d) acute respiratory infection	12	46,1	10	38,4	22	42,3
e) fetoplacental insufficiency	11	42,3	9	34,6	20	38,4
Obstetric pathologies:						
a) without water period more than 18 hours	11	42,3	7	26,9	18	34,6
b) meconium water	8	30,7	10	38,4	18	34,6
c) pathological childbirth: (caesarean section, breech presentation, placental abruption, large fruit)	6	23	7	26,9	13	25
TORCH syndrome	11	42,3	13	50	24	46,1

Clinical manifestations of pneumonia in newborns were characterized by a complex of non-specific, as well as specific symptoms and syndromes of respiratory damage. These changes consisted of manifestations of intoxication, respiratory failure, dysmetabolic disorders and microcirculation disorders. When analyzing the clinical picture of newborns transferred from maternity hospitals with a diagnosis of congenital pneumonia, the most common concomitant symptom was intense jaundice (50%), which reached zone 4-5 on the Cramer scale, which corresponds to a severe degree of hyperbilirubinemia. Most newborns had signs of perinatal damage to the central nervous system (CNS). Birth trauma was detected in 27% of

children, hypoxic CNS damage in the form of signs of cerebral ischemia in 42.3%, and convulsive syndrome in 30.7%. In newborns of the 1st group of congenital pneumonia, signs of CNS depression were detected from birth, which, as ventriculomegaly developed, gradually transformed into symptoms of hypertension. Newborns of this group had CNS depression syndrome (46.1%) on the first day of life. The clinic was manifested by a state of general depression, intermittent convergent or divergent strabismus, medium- and large-scale horizontal and vertical nystagmus, muscle hypotension, hyporeflexia, and inhibition of all reflexes. On the checkup the attention was drawn to children's condition such as increasing in flexor muscle tone, a sharp weakening, soreness, a monotonous cry, marbled skin, differential cyanosis while the child is resting, a weak sucking reflex or lack of that reflex, regurgitation with a fountain, vomiting, persistence of oculomotor and autonomic disorders. These newborns were characterized by frequent large-scale tremor of the extremities, lability of the pulse and respiration. Their condition upon admission to the intensive care unit (ICU) was regarded as very severe k>1. When analyzing the clinical picture of the 2nd group, it was revealed that the newborns were admitted from pediatric areas in the vast majority of cases in a moderate, severe condition. Neonatal pneumonia in 27% of cases had an acute onset, clinically manifested by a wet cough and hard breathing (54%), symptoms of intoxication (73%). The presence of febrile fever in the first days of the disease was noted in 19.2% of cases, and in 80.8% of cases the disease proceeded without an increase in body temperature. Tachypnea and breathing with the participation of the auxiliary muscles of the chest were detected in 73% of newborns who fell ill at home. In 61.5% of cases, cyanosis of the skin and cyanosis of the nasolabial triangle was expressed. 46.1% of children had a combined infectious pathology in the form of catarrhal omphalitis, acute respiratory viral infection, conjunctivitis, catarrhal otitis media, neonatal jaundice. At the same time, in newborns, the clinic was manifested by general anxiety, spontaneous large-scale nystagmus, increased muscle tone of the flexors, high knee reflexes, increased proboscis reflex, Babinsky, Moreau reflexes. Against this background, there was a decrease in protective, search and sucking reflexes, as well as support reflexes, automatic walking and crawling. The condition of these children upon admission to the neonatal pathology department was assessed as k<1,0.

Table 2: Clinical Status of Neonatal Pneumonia in Newborns (M±m)

indicators	**1-group (n=26)**	**2-group (n=26)**	
Days of life			P
Recovery of unconditioned reflexes	16±1,3	10,3±0,5	<0,001
Persistence of cyanosis	15,3±1,3	10±0,6	<0,001
Sucking recovery	12±1,3	5,8±0,2	<0,001
Regurgitation regurgitation	9,2±1,0	6,3±0,4	<0,001
Persistence of tachycardia	9,2±3,6	6,5±0,5	<0,001
Persistence of bradycardia	10,6±1,3	5,2±0,4	<0,001
Recovery violation of thermoregulation	8,9±1,1	5,6±0,4	<0,001
Bed days	16±0,8	10,3±0,5	<0,001

Thus, prolonged intrauterine hypoxia caused damage to the lung, reduced the drainage function of the airways, led to a deficiency and insufficient activity of pulmonary macrophages, and was a favorable background for the development of pneumonia.

In the diagnosis of pneumonia in newborns, X-ray and laboratory examinations were of great importance. Changes in blood parameters reflected not only the infectious process (leukocytosis, neutrophilia with a shift to the left, an increase in the neutrophil index -90.3% of cases), but also reflected immunosuppression in some newborns (lymphopenia, neutropenia), as well as from the first days of the disease in some In children, the following changes were noted: anemia (80.7%), thrombocytopenia (50%), and an increase in C reactive protein (73%). An increase in the level of C-reactive protein over 6 mg/l is an early sign of a bacterial infection in term infants [2,4].

Table 3: Laboratory indicators in newborn neonatal pneumonia (M±m)

indicators	1-group (n=26	2-group (n=26)	p
Hemoglobin<100: on admission	148±10,2	144±8,2	>0,5
After 3-5 days	89,9±4,8	100±4,3	<0,01
Leukocytes:10^9 on admission	16,0±0,7	12,4±0,6	<0,01
After 3-5 days	12,1±0,7	9,7±0,6	<0,01
CRP on admission	16,2±0,5	12,5±0,6	<0,01
After 3-5 days	12,4±0,5	11,5±0,6	>0,5

X-ray studies often revealed bilateral focal pneumonia (34.6%), segmental (30.7%), lobar (11.5%) and right-sided focal (15.3%). Less often, left-sided focal pneumonia (7.6%). Bilateral small-focal inflammatory infiltrates were significantly more often ($p < 0.05$) detected in moderate pneumonia, and segmental in severe pneumonia ($p < 0.05$).

Thus, extensive inflammatory changes in the lung tissue in newborns were observed in the 1st group. In the 2nd group of early neonatal pneumonia, bilateral (65.4%) or right-sided pneumonia (34.6%) prevailed. This happened, as is known, due to the fact that the child's body is not able to restrain the inflammatory process within the boundaries of one segment. In addition, the constant horizontal position and wide bronchi with thin alveolar septa only contribute to the rapid spread of infection to new areas. In the x-ray picture, there were differences between these two types of pneumonia. Extensive inflammatory changes in the lungs - segmental and bilateral focal 30.7% and 34.6%, respectively ($p<0.001$) are typical for intrauterine pneumonia, and for early neonatal - bilateral in 65.4% and right-sided - 34.6% ($p < 0.001$).

The assessment of the main radiological sign - focal shadows, as we found in the 1st group of newborns, the specificity was 96%, the sensitivity was 26.4%. In the 2nd group of newborns, there was a similar picture - the specificity of this symptom was also high and amounted to 98%, but the sensitivity was only 16.5%.

This indicates, first of all, that this symptom cannot be the main criterion for diagnosing intrauterine and early neonatal pneumonia, since its sensitivity is low, with very high specificity [22,24,25]. This given radiographic sign is of greater diagnostic value, as it reflects the stage of the inflammatory process - edema and hyperemia [25,29].

All newborns in the hospital underwent a bacteriological examination of the pharynx, navel and stool under conditions that maximally exclude the possibility of microflora contamination. The results of the ongoing etiological monitoring made it possible to identify the following features of the colonization of the microbial flora in the children examined by us. So, in the 1st group, Strafilacoccus`aureus (42.3%) was often sown in smears, Staf.haemoliticus (26.9%) was in second place and Strep.epidermis (15.3%) was in third place. In addition, Enterobactor aerogenes was inoculated in 7.6% of children. This gives us reason to conclude that staphylococci remain the pathogenic microflora of the urogenital tract of mothers.

It is necessary to pay attention to the fact that in the cultures from the eyes of the newborns of the 1st group, Staf prevails. Haemoliticus, in crops from the navel - Strep.epidermis, and often sown from the pharynx - Strafilacoccus` aureus.

In newborns of the 2nd group, bacteriological studies revealed the following features: The most frequently sown microorganism, both from the pharynx, navel, and from the eyes, was Strafilacoccus aureus (53.8%). In second place in terms of sowing frequency was Staf. haemoliticus (15.3%), and yeast fungi (11.5%) were the third most frequently sown. The sown spectrum of pathogens in newborns admitted from home and pediatric sites is diverse, which apparently reflects the living conditions and nursing of this group of newborns.

Conclusion

Thus, prolonged intrauterine hypoxia causes damage to the lung, reduces the drainage function of the airways, leads to a deficiency and insufficiency of the activity of pulmonary macrophages, and this is a favorable background for the development of pneumonia.

Predisposing factors, such as the frequency of acute respiratory infections, carriage of TORCH infection, aggravated pregnancy: in the form of preeclampsia, threatened miscarriage, chronic hypoxia, fetoplacental insufficiency, anemia and pathological childbirth is also a favorable background for the development of pneumonia.

The data obtained indicate that the duration of hypoxia, the state of health, the course of pregnancy and childbirth in the mother determine the severity of pneumonia and affect the severity of clinical, etiological and neurological patterns in newborns.

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