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THE COURSE OF NEONATAL PNEUMONIA IN NEWBORNS DEPENDING ON GESTATIONAL AGE AND BIRTH WEIGHT

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Abstract. The review of the literature based on modern domestic and foreign literature data presents information on pneumonia in newborn children. Controversial issues of classification and diagnostic criteria of the disease are discussed. Current information on the characteristics, epidemiology of neonatal pneumonia, etiology and specific risk factors of congenital pneumonia, pneumonia with early and late onset, including nosocomial and ventilator-associated pneumonia, community-acquired pneumonia in newborn children is summarized. Data on the frequency of respiratory and general clinical symptoms, results of image diagnostics and laboratory diagnostics of the disease are provided.
Keywords: pneumonia, newborns, etiology, risk factors, diagnosis, diagnostic criteria.

INTRODUCTION

Neonatal pneumonia (NP) is a term that unites possible types of pneumonia in children in the first 28 days of life. Pneumonia at this age can be intrauterine, congenital, early and late, aspiration, hospital, ventilator-associated and community-acquired, characterized by different routes, conditions and time of infection [1]. Congenital pneumonia (CP) is an infection that occurs during the intrauterine period of a child's development as a result of ascending infection through the chorioamniotic membranes or by the hematogenous (transplacental) route, usually manifesting itself in the first 72 hours after birth. CP is a consequence of infection of the fetus during pregnancy and usually represents one of the components of a severe systemic disease. Early NP develops within the first week after birth and is associated with intrauterine or postnatal exposure to the pathogen, or infection during passage through the mother's birth canal (intranatal infection).

MATERIALS AND METHODS

Late NP is characterized by nosocomial or home infection with pneumopathogenic flora and manifests after the 1st week of life [2]. Since hospital pneumonia is a disease that develops 48 hours or later after hospitalization, when pneumonia is detected in newborns in a hospital setting, aged over 2 days, it is quite difficult to carry out differential diagnostics between VP and nosocomial pneumonia [1]. Aspiration pneumonia (AP) is diagnosed in newborns when infiltrative changes in the lungs are detected during the first 72 hours after birth during an X-ray examination in cases of aspiration of meconium, blood or milk confirmed by laryngoscopy. Ventilator-associated pneumonia (VAP) refers to late pneumonia and develops in children on artificial ventilation (AV) for at least 48 hours [1–3]. Some authors suggest considering early NP as arising during the first 3 or 7 days of life, mainly within 48 hours, and late NP – at the age of 4 to 28 days of life. Congenital or intrauterine pneumonia is considered as a variant of early pneumonia. At the same time, intrauterine pneumonia of cytomegalovirus, chlamydial or mycoplasma etiology manifests at the age of over 7–10 days of life [4, 5].

RESULTS AND DISCUSSION

In the neonatal period, the immaturity and postnatal adaptation of the respiratory, cardiovascular and immune systems in full-term and especially premature infants, and various routes of infection determine differences in the epidemiology, risk factors, clinical course, and, as a consequence,

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diagnostic capabilities and outcomes of pneumonia compared to other age groups of children. Newborns are more sensitive to a wide range of pathogens that rarely cause lung damage at another age, such as Listeria monocytogenes, Candida fungi, and cytomegalovirus (CMV). Unlike pneumonia in older children, NP is often accompanied by severe pathological changes in other organs, primarily the cardiovascular system, which aggravates the severity of the course and prognosis. Diagnosis of pneumonia is complicated by the non-specificity of early clinical manifestations, low diagnostic value of physical symptoms, high frequency of possible concomitant non-infectious lung lesions, including respiratory distress syndrome (RDS), meconium aspiration syndrome, and emerging bronchopulmonary dysplasia (BPD) in children in the neonatal period [4].

Clinical symptoms of pneumonia in newborns are nonspecific. Respiratory symptoms include apnea (in 8–10% of premature and 30–40% of full-term infants), tachypnea (more than 60 breaths per minute at rest), detected in 60–89% of infants, retractions of compliant areas of the chest in 36–91% of patients, cough, which is noted with a frequency of 30–84%, and cyanosis in 12–40% of patients [2]. In VAP in newborns, the frequency of tachypnea and cyanosis may be higher (95–100%) [3]. Chlamydial pneumonia is characterized by a paroxysmal whooping cough-like (without reprises) cough of the staccato type (from the musical term staccato, Italian - abrupt) [4]. In severe respiratory failure (RF), one can notice the distention of the wings of the nose, as well as rhythmic movements of the head in time with breathing (V.F. Znamensky's symptom), which is associated with fatigue of the respiratory muscles and the inclusion of the sternocleidomastoid muscle in the act of breathing [5]. Pulmonary edema with increased permeability of the pulmonary vessels leads to the appearance of protein in the edematous fluid of the respiratory tract of newborns, which is clinically manifested by foamy discharge from the nose and mouth. The frequency of this symptom, first described by E.M. Kravets and received the corresponding eponymous name, in pneumonia in full-term children it can reach 10–12%, in premature children – 30–50% [2].

Bronchial secretions may be mucous, mucopurulent or purulent; an increase in the amount of secretions or their change to purulent is an important diagnostic sign of pneumonia development in newborns, which is easily noticed in intubated children [3]. Auscultatory symptoms are varied and include weakened or harsh breathing, localized or diffuse moist rales or crepitations. The frequency of wheezing detection ranges from 15 to 85% [4]. Signs of bronchial obstruction may be heard - prolonged expiration and dry wheezing, caused by obstruction of the airways by bacterial and inflammatory products, bronchospasm under the influence of inflammatory mediators [2]. The appearance of bronchial obstruction in oxygen-dependent premature infants, usually starting from the 3rd week of life, is suspicious for the development of BPD [1]. Percussion reveals a shortened percussion sound over the projection of infiltration in the lungs [3]. In this case, dullness of percussion sound was detected in 40% of full-term newborns with pneumonia [4]. Percussion is not recommended for children in serious condition and for premature infants, as this procedure can significantly worsen the child's condition, leading to intracranial hemorrhages [2].

Common symptoms of NP include increased (over 12%) initial weight loss, flattening of the body weight curve, fever (30–56%) or hypothermia (15%), poor sucking and refusal to breastfeed (30–50%), and diarrhea (10–15%) [11, 27–30]. Persistent fever is uncommon, but has been reported to occur in viral pneumonia [4]. Lethargy, muscle hypotonia, hemodynamic disturbances, gray skin color, jaundice, and hemorrhagic manifestations are also noted [1]. Untreated CAP usually progresses and is often complicated by persistent pulmonary hypertension with associated clinical and instrumental manifestations, including cardiomegaly [5]. In case of CP due to intrauterine infection

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with subsequent aspiration of amniotic fluid, in addition to the clinical signs listed above, symptoms of CNS damage due to asphyxia are often observed [3].

The diagnosis of NP is clinical and radiological. Changes in plain radiographs in these patients vary and include reticulogranular and/or focal infiltrates, bilateral linear shadows or diffuse decrease in pulmonary pneumatization; compensatory increased airiness may be detected in areas free of pneumonic infiltration [4]. The radiological picture of NP is practically indistinguishable from radiological changes observed in other respiratory diseases of newborns, primarily in RDS of newborns [2].

CONCLUSION

Pneumonia in newborns is a heterogeneous disease that has undergone pathomorphosis due to changes in the patient population as perinatal medicine has improved. Taking into account the time and conditions of the disease onset and its risk factors can be the basis for a modern classification of neonatal pneumonia, allowing for informed assumptions about the etiology, therapeutic and preventive strategies.

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