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Features of the Course of Viral Pneumonia in Young Children

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Abstract:
This article is devoted to the presentation of information available in the literature about the etiology, pathogenesis, classification, clinical picture of pneumonia in young children.

Keywords: children, pneumonia, diagnostics.

Introduction

Pneumonia is an acute infectious disease, which is characterized by focal lesions of the lung tissue with intraalveolar exudation, which is clinically manifested by intoxication, auscultatory in the lungs - by the presence of local changes and the presence of a shadow of infiltration on an x-ray of the chest organs.

Allocate a typical course of pneumonia, which is characterized by development against the background of febrile body temperature; atypical course of pneumonia, which is characterized by a slight increase or normal body temperature, but with a predominance of diffuse changes in the lungs.[1.3]

I. Risk factors for developing pneumonia in young children:

1. The presence of background diseases: bronchopulmonary dysplasia; prematurity; congenital heart defects.

2. Anatomical and physiological features of the respiratory system in children: not fully formed respiratory system in children; –narrow airways, resulting in a long-term –disruption of nasal breathing, most often the child's breathing is carried out through, which contributes to the penetration of infectious agents and cold air directly into the lungs and bronchi. It is no coincidence that many lung diseases in children begin with a seemingly “harmless” runny nose.

To prevent this from happening, children from an early age must be taught proper breathing through the nose; immature lung tissue that is less airy, which reduces gas exchange

–abundant blood supply to the respiratory mucosa, as a result of

–what comes its rapid swelling; immaturity of the cilia of the epithelium of the mucous membranes, resulting in

–they cannot cope with the removal of sputum from the respiratory tract, which leads to further infection; immaturity of the immune system.

3. The presence of chronic conditions: immunodeficiencies, cystic fibrosis , rickets, malnutrition, etc.

4. The presence of a syndrome of vomiting and regurgitation , which increases the risk of developing pneumonia due to aspiration of the contents into the respiratory tract.[1.3.4.7.8]

Etiological factors in the development of pneumonia in children

The causative agents of community-acquired pneumonia in children can be various viruses, bacteria, fungi and parasites.

1. The main causative agents of pneumonia in young children:

Children aged 1 to 6 months: 27 - the causative agent of a typical form of pneumonia: more often gram-negative bacteria - Proteus, Klebsiella , Escherichia coli, etc. and staphylococci, less often Moraxella cataralis , pneumococci and Haemophilus influenzae . - in causative agents of atypical pneumonia: more often Chlamydia trachomatis , less often Mycoplasma hominis , Pneumocystis carini.

Children from 6 months to 5 years: - The causative agent of a typical form of pneumonia: the most common cause of pneumonia in 50% - Streptococcus pneumonia and up to 10% - Hemophilicus influenza type b , rarely staphylococcus . - in causative agents of atypical pneumonia: rarely Mycoplasma pneumonia (up to 10%) and in 3-5% of cases - Chlamydia pneumonia .

In 50% of cases, pneumonia in this age group is caused by viruses. Purely viral pneumonias are rare, most often they are accompanied by a bacterial infection.

Table 1 ***The role of viral infection in community-acquired pneumonia in children***

Virus	Detection in community-acquired pneumonia
Respiratory syncytial	the most common causative agent of community-acquired pneumonia, detected in 2.4-39.4%
Human rhinovirus	3-100% of children with community-acquired pneumonia , often in association with other viruses (enteroviruses , etc.)
Flu (A and B)	2-14.1%
parainfluenza	0-17%
Adenovirus	0-18%
Human metopneumovirus	0.2-14.5%
human bocavirus	0-18.4%
human coronavirus	0.8-6.6%

**Clinical guidelines. "Community-acquired pneumonia in children" [1.4]*

Clinical manifestations of community-acquired pneumonia in children can be divided into: common symptoms: lack of appetite, fever with chills, cough, –shortness of breath (tachypnea) and / or dyspnea (violation of the frequency and depth of breathing); infrequent symptoms: soreness in the chest and abdomen, vomiting, in –young children - impaired consciousness, convulsions; lung percussion: local shortening of percussion sound; –auscultation of the lungs: fine bubbling rales or crepitus in the lungs, –a change in the nature of breathing over the affected area of the lung - weakened, hard or bronchial. One of the key signs of pneumonia is tachypnea and/or dyspnea. Criteria for tachypnea depending on age are presented in Table 2.

Table 2 ***Age criteria for tachypnea in children***

age	normal values (breaths per minute)	tachypnea (breaths per minute)
up to 2 months	30-50	over 60
2-12 months	25-40	more than 50
1-5 years	20-30	over 40
over 5 years	15-25	over 30

Laboratory diagnostics

1. Complete blood count (CBC).

Changes in indicators in the CBC depend on the causes of the disease. They have a low diagnostic value for making a diagnosis, and require measures to clarify the etiology of the disease.

2. Determination of the level of procalcitonin .

Procalcitonin (PCT) is a glycoprotein (protein-carbohydrate complex) that contains 116 amino acids. It is formed in human neuroendocrine cells (C-cells of the thyroid gland, lungs and liver), undergoes cleavage into 3 molecules: calcitonin , katacalcin , and the M-terminal peptide. During infection, the uncleaved molecule of procalcitonin is released into the bloodstream, while the level of calcitonin does not increase.

Procalcitonin is today a good indicator that complements clinical and biological studies of pathology. The method for determining procalcitonin is more sensitive and highly specific for bacterial infection. [5.7.9]

Instrumental research methods

1. X-ray of the chest in children.

To organize the diagnosis and therapeutic process, to differentiate the disease, it is necessary to know the localization of the process. When visualizing the lungs, the location of the changes is usually described with indication of lobes and segments.

X-ray examination is a reliable method for confirming the diagnosis, as well as to determine the extent of the lesion and possible complications of pneumonia.

Indications for a chest x-ray:

1. the presence of fever and cough;
2. typical percussion and auscultatory changes in the lungs;
3. shortness of breath and / or tachypnea ;
4. the presence of cyanosis.

2. Ultrasound examination of the chest organs

It is carried out in patients who need to control the course of pleurisy.

3. Pulse oximetry is a hardware method that allows you to set the level of saturation of arterial blood with oxygen.

It is recommended to carry out in all patients with community-acquired pneumonia to assess the severity of the disease and decide on the volume of therapeutic measures. Saturation of arterial blood with oxygen is normally 95%. Saturation values below 90% is an indication for transfer to the intensive care unit.

4. Spirography is a method of graphic registration of changes in lung volumes, used to study external respiration.[4.5.7.8]

Criteria for assessing the severity of pneumonia

The main indicators necessary to assess the severity of pneumonia:

–severity of toxic syndrome;

–degree of respiratory failure;

–the presence of extrapulmonary and pulmonary complications.

toxic syndrome

Diagnosis of toxicosis, as a non-specific systemic reaction of the body to the introduction of an infectious agent, includes an assessment of: the severity of damage to the central nervous system (CNS) (neurotoxicosis); –severity of respiratory failure; –severity of hemodynamic disorders;– hemocoagulation disorders.

The presence of pulmonary and extrapulmonary complications.

Children with pneumonia may develop complications such as:

Extrapulmonary complications:

–infectious-toxic shock;

– cardiovascular insufficiency;

– DIC ;

– respiratory adult-type distress syndrome (ARDS).

DIC - syndrome More often observed in pneumonia caused by gram-negative flora. The main criteria and clinical characteristics of DIC - syndrome in pneumonia are presented in table 3

Table 3 ***Clinical characteristics of DIC in children***

I phase a- hypercoagulation	Phase II a- transitional	III phase - hypocoagulation
microcirculatory disorders: - pallor or grayness of the skin with a marble pattern and cyanosis; - when taking blood from a peripheral vein, rapid needle thrombosis	- a hemorrhagic rash, ecchymosis is determined on the skin ; - hemorrhages on the mucous membranes; - possible vomiting of "coffee grounds"	a rapid increase in hemorrhagic syndrome with extensive hemorrhages on the skin or mucous membranes, the appearance of blisters with hemorrhagic contents; - gastric, intestinal, renal bleeding; - bleeding from the injection site
When conducting a " single-tube test", the clotting time is 4 minutes .	When conducting a " single-tube test", the clot formation rate is more than 8 minutes	No blood clot formation during the “ single tube test”

Pediatric pneumonia is responsible for the deaths of more than 800,000 young children worldwide each year, according to the United Nations Children's Fund (UNICEF). [1] These deaths occur almost exclusively in children with underlying conditions, such as chronic lung disease of prematurity, congenital heart disease, and immunosuppression . Although most fatalities occur in developing countries, pneumonia (see the image below) remains a significant cause of morbidity in industrialized nations.

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