Clinical Laboratory Features of Atypical Pneumonia in Children

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ABSTRACT

Recent studies indicate an increasing role in the development of bronchopulmonary diseases in children of atypical pneumotropic pathogens such as Mycoplasma pneumoniae, Chlamydop hilapneumoniae, respiratory viruses, etc. The term "atypical pneumonia" (caused by these pathogens) was introduced 20-30 years ago due to their different from typical pneumonia caused by extracellular agents - streptococci, staphylococci, etc., course, as well as difficulty and the rarity of their detection in past years. Today the situation has changed. The technical and methodological possibilities of diagnosing these infections have appeared and approaches to the etiotropic treatment of diseases caused by them have been determined.

Keywords: Chlamydop hilapneumoniae, respiratory viruses

Recent studies indicate an increasing role in the development of bronchopulmonary diseases in children of atypical pneumotropic pathogens such as Mycoplasma pneumoniae, Chlamydop hilapneumoniae, respiratory viruses, etc. The term "atypical pneumonia" (caused by these pathogens) was introduced 20-30 years ago due to their different from typical pneumonia caused by extracellular agents - streptococci, staphylococci, etc., course, as well as difficulty and the rarity of their detection in past years. Today the situation has changed. The technical and methodological possibilities of diagnosing these infections have appeared and approaches to the etiotropic treatment of diseases caused by them have been determined. According to a number of authors, the proportion of Mycoplasmapneumoniae in the etiology of lower respiratory tract diseases in children ranges from 20 to 40% [1, 2, 8]. The pathogenesis of mycoplasmal pneumonia is distinguished by the intracellular location of the pathogen, which involves the use of antibiotics that penetrate the cells, creating high concentrations of the drug, as well as the use of immunomodulators [4, 7]. Immune disorders predominate in the T-system of immunity: there is a deficiency of T-cells, a decrease in the number of CD3+-, CD4+-lymphocytes, which is accompanied by an imbalance of cytokines, IgM-hyperglobulinemia [6, 7]. Immunological disorders in mycoplasma infection underlie the chronicity of diseases of the bronchopulmonary system [7]. Often, mycoplasma pneumonia is combined with herpesvirus infection, which dictates the need to include antiviral drugs [7]. Long-term persistence of the pathogen in the infected organism and mycoplasma carriage, characteristic of mycoplasmal infections, determine the need to use highly sensitive and specific diagnostic methods [3, 5].

Early recognition of mycoplasma pneumoniae is an important factor in the fight against Mycoplasma pneumoniae infection, since timely etiotropic therapy can have a

decisive influence on the course and outcome of the disease. Therefore, the study of the features of the clinical course of mycoplasmal pneumonia in children, the timeliness of their diagnosis and treatment have become very relevant in recent years.

Community-acquired pneumonia is the largest group of pneumonias with which every day a practical doctor has to deal with in outpatient practice and in a hospital. Despite the constant improvement of diagnostic methods and the availability of modern highly effective antimicrobial drugs, community-acquired pneumonia still occupies one of the leading places in the structure of morbidity and mortality from infectious diseases in developed countries. The most common cause of community-acquired pneumonia is Streptococcus pneumonia (20-60%) [3]. However, the increasing importance among the etiological factors in recent years is given to the so-called "atypical" pathogens, primarily Mycoplasma pneumoniae and Chlamydophila (Chlamydia) pneumonia. According to modern concepts, pneumonia is understood as an acute infectious disease of the lung parenchyma, characterized by the presence of a syndrome of respiratory disorders and/or physical data, as well as infiltrative changes on the radiograph [9].

The term “SARS” appeared in the 40s, long before the development of the last pandemic of “severe acute respiratory syndrome” (SARS), first noted in November 2002 in China, and was used for interstitial or segmental lesions of a milder course than bacterial pneumonia. [2,3]. The characteristic features of "SARS" were considered the impossibility of isolating the culture of the pathogen and the absence of a therapeutic effect from penicillin and sulfonamides.

Today, atypical pneumonia is called pneumonia caused by various pathogens, including viruses, rickettsia, mycoplasma, chlamydia, legionella. In recent years, of the etiological agents, mycoplasma and chlamydia have been given the greatest importance. Mycoplasma pneumoniae and Chlamydophila pneumoniae are intracellular pathogens and, according to some researchers, can persist for a long time in epithelial cells, lymphopharyngeal ring, contribute to allergies, cause a more severe course of nonspecific lung diseases and cause exacerbation of chronic bronchopulmonary pathology in adults [8]. Isolation of these pathogens using traditional bacteriological examination of sputum is impossible. Beta-lactam antibiotics and aminoglycosides are not effective in such pneumonias.

The aim of our work was to assess the clinical and laboratory features of the course of community-acquired pneumonia in children in modern conditions.

Etiology and pathogenesis of chlamydial and mycoplasma pneumonia.

Mycoplasma pneumonia

The etiological interpretation of mycoplasmal pneumonia was carried out in the 60s. Its share in the structure of community-acquired pneumonia according to different authors varies within 5-50% [4,8]. Most often, mycoplasmal pneumonia is diagnosed in children older than 5 years, reaching 20-30% of all etiologically verified community-acquired pneumonia [2,3,4]. Epidemiological rises in incidence are observed, which last for several months and are repeated every 3-5 years. Epidemiological outbreaks are typical for isolated and semi-isolated groups of the population, family cases are frequent [2,7,8]. The presence of seasonal fluctuations is recognized, namely, the high prevalence of infection in the autumn-winter period [4,8]. According to Russian researchers, mortality in mycoplasmal pneumonia is up to 1.4% [2]. Mycoplasma pneumoniae (M. pneumoniae) is the causative agent of human atypical pneumonia, acute respiratory diseases (ARI) of the upper respiratory tract (pharyngitis, acute bronchitis), as well as some non-respiratory diseases (meningitis, encephalitis, otitis media, etc.) [3,4,7 ,eight]. In recent years, the role of M. pneumoniae infection in the development of bronchial asthma and exacerbation of chronic obstructive bronchitis has been proven [8].

M. pneumoniae belongs to the genus Mycoplasma, family Mycoplasmataceae. It occupies an intermediate position between viruses, bacteria, and protozoa and is a

membrane-associated microorganism capable of self-replication and long-term persistence [3, 4, 5]. It is a small, polymorphic, prokaryotic microorganism containing RNA and DNA, having a three-layer cytoplasmic membrane instead of a cell wall, which causes resistance to various agents that inhibit cell wall synthesis, primarily to penicillin and other beta-lactams [3, 4, 8] , and the terminal structure, which plays an important role in the unique mobility and adsorption of mycoplasmas to the surface structures of host cells (erythrocytes, cells of the ciliated epithelium of the bronchi, etc.) [4, 5]. There is a lot of information about the formation of autoantibodies in mycoplasma infection, which is associated with the presence of cross-reacting antigenic determinants of M. pneumoniae and human tissues [5, 8]. It is assumed that the development of non-respiratory manifestations of M. pneumoniae infection is associated with the formation of autoantibodies. The source of infection are both sick and people with asymptomatic forms of the disease [4,5,7,8]. Mycoplasmas can be isolated within a few weeks from the nasopharyngeal mucus, the pathogen is transmitted by airborne droplets [4,5]. 1.2 Chlamydial pneumonia According to microbiological monitoring data, from 5% to 15% of community-acquired pneumonia is caused by Chlamydophila pneumoniae (formerly Chlamydia pneumoniae) (Chl. pneumoniae), and during the period of the epidemic, these figures can increase up to 25% with a mortality rate of up to 9.8% [2, 7, 8]. Chl. pneumoniae infection can acquire an epidemic character without losing the ability to exist in a subclinical form [1, 8]. Epidemiological outbreaks in isolated and semi-isolated groups, cases of intrafamilial transmission of chlamydial infection have been described [6,8]. The seasonal pattern of distribution has not yet been established. Chl. pneumoniae, originally identified as Chlamydia TWAR, was first isolated in 1986 on the island of Taiwan from the conjunctiva of a child with pneumonia, as well as in Finland and other European countries, the United States from patients with various respiratory diseases [1, 6].

According to the latest classification, Chl. pneumoniae belongs to the Chlamydiaceae family of the Chlamydophila genus and is the causative agent of respiratory infections (acute and chronic bronchitis and pneumonia). These are obligate intracellular gram-negative bacteria parasitizing on the mucous membrane of humans and animals, containing DNA and RNA, having a cell wall, ribosomes [1,8]. They are characterized by a two-phase development cycle, consisting of alternation of functionally and morphologically different forms - elementary and reticular bodies [8]. Elementary bodies are metabolically inactive, have infectious properties, are able to penetrate into a sensitive cell, where the development cycle of chlamydia occurs. Reticular bodies are metabolically active and ensure the reproduction of the microorganism. This form of intracellular existence is pathogenic, does not have infectious properties. Diseases caused by Chl. pneumoniae - anthroponotic infectious diseases affecting the respiratory system. The source of infection are sick and healthy (bacillus carriers). The latter act as a source of infection much more often [8].

The causative agent is released into the external environment with discharge from the nasopharynx when coughing, sneezing, talking. Typical age of patients: 0-6 months. and children older than 7-10 years [8, 9]. Clinical manifestations and diagnosis of pneumonia of mycoplasma and chlamydial etiology. The diagnosis of mycoplasmal and / or chlamydial pneumonia is often difficult, in 30-40% of cases it is established only at the end of the first week of illness and most often at first they pass under erroneous clinical diagnoses of acute viral or other bacterial infections. X-ray and immunological studies help in the diagnosis. Cultural diagnosis is difficult, since mycoplasmas and chlamydia, being intracellular pathogens, are not detected by microscopy of a Gram-stained sputum smear with a standard bacteriological culture of sputum or blood. Therefore, the diagnosis of mycoplasmal and chlamydial pneumonias is

based primarily on identifying the features of clinical and radiological data and is confirmed serologically or using polymerase chain reaction (PCR). The first step in diagnosing pneumonia is to differentiate between typical and atypical pneumonias. Usually, mycoplasma and chlamydial pneumonia begin with a respiratory syndrome, manifested by tracheobronchitis, nasopharyngitis, laryngitis; proceed with subfebrile body temperature, unproductive excruciating cough, poor auscultatory data; are characterized by the presence of extrapulmonary manifestations: skin (rash), articular (arthralgia), hematological (absence of leukocytosis and neutrophilic shift in the peripheral blood, accelerated ESR), gastroenterological (nausea, vomiting, diarrhea). [2, 7, 8]. X-ray morphological changes are characterized by increased lung pattern, peribronchial or subsegmental infiltration [2, 7, 8].

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