

CLINICAL AND IMMUNOLOGICAL CHARACTERISTICS OF COMMUNITY-ACQUIRED PNEUMONIA IN PATIENTS WITH HEART FAILURE

**Ismatullaev Sohijon Kudratovich**

Termez branch of the Tashkent Medical Academy

Propaedeutics of childhood diseases, assistant of the Department of Pediatrics in childhood diseases and family medicine

**ANNOTATION**

Despite advances in its prevention, pneumonia remains associated with high morbidity, mortality, and health costs worldwide. Studies carried out in the last decade have indicated that more patients with community-acquired pneumonia (CAP) now require hospitalization. In addition, pneumonia management poses many challenges, especially due to the increase in the number of elderly patients with multiple comorbidities, antibiotic-resistant pathogens, and the difficulty of rapid diagnosis. In this new call to action, we present a wide-ranging review of the information currently available on CAP and offer some reflections on ways to raise awareness of this disease among the general public. We discuss the burden of CAP and the importance of attaining better, faster microbiological diagnosis and initiating appropriate treatment. We also suggest that closer cooperation between health professionals and the population at large could improve the management of this largely preventable infectious disease that takes many lives each year.

**Key words:** pneumonia, community-acquired pneumonia, pneumonia burden, pneumonia epidemiology.

**INTRODUCTION**

Community-acquired pneumonia (CAP) is a pulmonary infection (parenchyma or pleura) acquired outside the hospital[1]. CAP is a significant cause of inpatient hospitalization and mortality in children. The annual incidence of CAP requiring hospitalization is over 20 million[2]. In 2015, data from Asia showed that 15% of all fatalities in children under five years of age were caused by pneumonia, with an estimated 922000 children in this age group dying[3]. Similarly, global mortality is estimated at 14%, ranging from 2% of those treated as outpatients to 37% of those admitted to intensive care units (ICUs)[4]. In China, the incidence density of pneumonia in children under five years of age is 0.06 to 0.27% per year. According to a systematic review of data from the China Mortality Surveillance System from 2001 to 2015, the mortality rate for children under the age of five was 153.2 per 100000 live births[5]. Multiple microorganisms drive the pathophysiology of CAP. Classical typical pneumonia is caused by bacteria, while atypical pneumonia is caused by atypical pathogens, such as *Mycoplasma pneumoniae* (MP), *Legionella pneumoniae*, and *Chlamydia pneumoniae*. These three pathogens combined are responsible for 21% to 28% of adult CAP worldwide[6]. MP is one of the most common pathogens causing respiratory illness in adolescents and children, accounting for up to 40% of CAP in children above five years of age[7]. *Mycoplasma* is a small cell wall-deficient prokaryote. Microbes are cell-free and malleable organisms that can grow and proliferate in a cell-free environment[8]. According to the *Mycoplasma pneumoniae* pneumonia (MPP) diagnostic criteria of CAP in children, MP patients are classified as mild *Mycoplasma pneumoniae* pneumonia (MMPP) and severe

mycoplasma pneumoniae pneumonia (SMPP) (revised in 2013). Typical clinical symptoms, such as cough and fever, radiological findings, elevated inflammatory markers, and the detection of serum specificity MP-IgM antibody are the diagnostic criteria of MMPP. SMPP is defined as MPP with protracted fevers, worsening clinical symptoms, and persistent radiological features following a week-long routine of macrolide antibiotic therapy[9]. Similarly, SMPP is defined as a fever ( $> 38.5^{\circ}\text{C}$ ), persistent cough for more than two weeks,  $\text{CRP} > 40 \text{ mg/L}$ , radiological features showing consolidation in two or more pulmonary lobes, and extrapulmonary complications were the criteria to diagnose SMPP as per the algorithm of community-acquired pneumonia in children[10,11]. Consensus on the definition of SMPP is lacking because it can affect any part of the body, including the musculoskeletal system, neurological system, hematological system, and skin[12]. **Main.** However, MP infection most severely affects the respiratory system; hence, respiratory and metabolic acid-base disturbances may indirectly indicate severe disease. Therefore, prompt and effective treatment is recommended[13]. Moreover, immune evasion by specific pathogens via the transmission of host-derived lipid membranes can lead to uninhibited proliferation, resulting in overt clinical symptoms and a worsening disease course[14]. MP is contagious and can be transmitted through aerosols from coughing and sneezing, causing acute upper and lower respiratory tract inflammation[15]. These respiratory pathogens are ubiquitous on environmental surfaces, and mucous membrane contact with these contaminated surfaces aids in disease transmission. The propensity for children to play with toys and have poor hand hygiene make children a high-risk and susceptible group in daycare and school settings[16]. MP infection also causes nonrespiratory symptoms, including myocarditis, arthritis, and thrombosis, in newborns. If left untreated, multiple organ failures may ensue[17]. Acute myocardial injury in people hospitalized with community-acquired pneumonia (CAP) is caused by many different factors. These factors include type-2 myocardial infarction with or without prior coronary artery disease (CAD) due to an imbalance between demand and supply and non-CAD myocardial damage caused by toxins, direct myocardial infection, inflammatory mediators, and stress-induced cardiomyopathy[18]. MP-induced myocarditis is usually confirmed via an electrocardiogram (ECG), which shows conduction arrhythmias and myocardial atrioventricular block. Chest pain can be a sign of myocarditis or pericarditis and has been linked to anti-cardiolipin antibodies[19]. Although uncommon, the prevalence of myocarditis in children with MP ranges from 1% to 8%, and the prevalence rate is slightly higher in adults than in children[20]. Mycoplasma-associated carditis (myo- or pericarditis) is a rare condition that has affected 1%-5% of patients since Pönkä's study in 1979. However, individuals with mycoplasma carditis seem to be older on average. This study supports Pönkä's conclusion that the mean age was 32. This recurring finding is not fully understood. However, it may be related to the increased rates of mycoplasma infection in older persons appearing as pneumonia, which is more common in patients with carditis[21]. This study aims to assess the differences in the clinical characteristics of children diagnosed with CAP caused by MP and to further identify the cohort of patients who developed MP-induced myocardial damage and those without heart failure.

#### CONCLUSION.

Pneumonia continues to be a major global health problem and a significant cause of morbidity and mortality worldwide. Despite the wealth of information on pneumonia currently available, some of the recommendations for the management of CAP in international clinical guidelines are still based on expert comments; in fact, no guideline updates have been issued in

the past decade. The lack of specific evidence on the proper use of broad-spectrum antibiotics hampers the clinical management of pneumonia caused by MDR pathogens. Today, we have new technologies that could improve pneumonia management, but we must be sure to implement them in daily clinical practice.

The misperception of pneumonia among the general public is alarming. A great deal remains to be done to persuade people of the importance of healthy lifestyles and of the key role of vaccination for preventing pneumonia. To quote Chanderraj and Dickson once again, pneumonia continues to be a 21st-century problem treated with 20th-century therapies and diagnosed using 19th-century tools.

This call is addressed to the health authorities, urging them to attach more importance to pneumonia and to promote international and national projects, and to the scientific societies whose task it is to guarantee high quality standards among health professionals. It is also aimed at practitioners who have contact with patients and their families, because the provider–patient relationship is fundamental to the attempts to raise the public’s awareness of the importance of CAP and to involve it in its prevention.

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