

# Opinion and Perspective: Acute Pneumonia and Non-Respiratory Lung Functions

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The modern systematic approach to the treatment of acute pneumonia (AP) was formed in recent decades by the use of antibiotics, but the hegemony of antimicrobial principles in the treatment of AP did not immediately arise as a result of the stunning initial effect of penicillin therapy. On the contrary, further multiplication of the role and value of antibiotics in the General medical complex is not entirely logical. The paradox of the situation is that the more antibacterial therapy lost its therapeutic activity, the more significant its perception as the main tool in the treatment of AP became.

It is quite natural that this focus mainly on pathogen suppression has narrowed the range of ideas about the nature of AP and its features. In recent years, the transformation of views on the problem of AP has reached, in my view, the ultimate distortion. Banal forms of bacterial inflammation in the lungs have become regarded as an infectious disease. At the same time, the epidemiology and features of AP have not changed in comparison with those characteristics that have been known to medicine for hundreds of years. Despite the designation of AP as an infectious process, the recommendations for ensuring epidemiological conditions for this disease remained the same.

At the same time, the value of antibiotics in the treatment of AP has reached its absolute value. In recent years, experts on this problem consider antibacterial therapy as a "cornerstone" in the complex treatment of this category of patients (1,2). No one was confused or discouraged by the fact that the "main medicine" for pneumonia is also the leading means of helping patients with many inflammatory processes that are radically different from AP. In mild forms of the diseases, the whole principle of treatment was actually reduced to the distribution of one drug between different nosological groups of patients. In the case of severe disease, the use of additional funds to help patients with AP did not have significant and specific differences from many other pathologies.

The noted features of the modern AP strategy are well known, as well as the results of its practical implementation, which are reflected in disappointing statistics. For example, in recent years, the death rate from AP among those admitted to intensive care units has reached 36-50% (3-5). These figures indicate that if the inflammatory process in the lungs requires intensive therapy, then every second or third patient is unsuccessful in such care. Although it is generally recognized that the pathogen of AP remains unknown in most patients, attempts to determine it do not affect the final result, and the choice of antibiotics remains empirical (2,6), treatment failures continue to be explained by the presence of virulent microflora (7). In other words, modern

ideas about the nature of AP are frozen on the "microbial" concept of disease, and the lack of arguments in favor of this theory is replaced by unproven assumptions.

Meanwhile, the above statistics are the result of the dominant principles of AP treatment today, which do not take into account a number of fundamental foundations of this disease and, in particular, the unique features of pulmonary circulation. Therefore, as long as approaches to the treatment of AP will repeat the basic principles of care for inflammatory processes of peripheral localization, it is hopeless to expect any success in this direction.

Biased views on the nature of AP and distorted approaches to providing medical care to these patients are becoming more obvious every year. Over time, there are only additional facts and arguments that indicate the need for detailed consideration of all the provisions of the problem. The recent dramatic events caused by the pandemic have quickly exposed many aspects of this problem, not only for specialists, but also for public assessment. Despite the apparent incompatibility between the "usual" forms of AP and coronavirus pneumonia, these lesions have many common features and close relationships and, in fact, are variants of the same pathology.

First, the main localization of the lesion in coronavirus infection, as well as the main cause of the severity of the disease and fatal outcomes are viral pneumonia. At the same time, the cardinal sign of this pathology is the defeat of the same organ structures as in bacterial forms of pneumonia (8-10), and a comparison of pathoanatomic findings between these variants of inflammation shows more pronounced changes in the vessels of the small circle in viral lesions (11,12). It is well known that there is a direct relationship between morphology and the function of any organ or tissue in the body. Therefore, localization of pathological tissue transformation is an indirect sign of the identity of pathogenetic mechanisms of disease development, regardless of the type of pathogen.

Secondly, unlike non-specific bacterial pneumonia, coronavirus lesions differ in their contagiousness and specificity of the pathogen. Despite the presence of a single pathogen, a coronavirus infection has an infinite number of manifestations from asymptomatic carrier to the development of terminal States, and so far no one explains this by differences in the virulence of the pathogen. There is no doubt that the variants of clinical manifestation are determined by individual characteristics of the body and repeat the variety of bacterial forms of AP.

Third, for many years the treatment of acute inflammation in the lungs was based on the etiotropic principle. If these efforts were not effective enough, additional methods of assistance were used. Throughout the entire period of antibacterial therapy, the number of patients with AP who need additional treatment has steadily increased, and among them the most unfavorable results were observed. Automatic transfer of General Therapeutic methods of treatment, such as infusion therapy and medication correction of blood pressure in pathology in the small circle of blood circulation, contradicts fundamental scientific data. However, in discussions on the topic of shock States, patients with AP are analyzed in the General mass of observations along with other nosologies, and non-respiratory lung functions are not even mentioned.

In the course of theoretical discussions, understanding and acknowledging one's own mistakes is usually achieved with great difficulty and long reflection, but the catalyst for this process can be sudden events that change the usual conditions. In this context, such an unexpected phenomenon is the beginning of a pandemic, in which practical medicine received a large influx of patients with viral pneumonia in a short time. Against the background of new medical conditions, the "cornerstone" of traditional treatment has fallen out of the General complex of medical care, and the new situation has shown that among the previously widely used complementary methods of treatment, there were no funds that could really help this severe category of patients.

In the initial stages of viral pneumonia modern medicine does not offer a reliable means of providing care to patients. If a patient with a positive test for coronavirus has respiratory symptoms, then hospitalization for observation and symptomatic means of assistance are recommended, and real support for this category of patients is considered only in case of critical situations in the form of resuscitation methods such as ventilation, positive expiratory pressure, membrane oxygenation (13,14).

The uncertainty of the situation and the impossibility of accurate forecasts even for the near future forces specialists to rely on the availability of breathing equipment and call for an increase in its production (15,16). However, current statistics show that increasing the availability of resuscitation equipment is unlikely to significantly improve results. For example, the overall mortality rate among hospitalized patients with coronavirus infection reaches 26% (13), but it increases to almost 90% among patients who were on artificial ventilation (17). Meanwhile, the lack of effective treatment of viral lung lesions is compensated by hopes for success in the development of antiviral drugs, which once again underlines how firmly rooted the foundations of the "microbial" concept of AP are and how these principles determine the future strategy for new conditions of the disease (18,19).

The long-term perception of microbial pathogens of pneumonia as the main and only cause of all complications and treatment failures formed the basis for a persistent selective understanding

of the causes and mechanisms of the disease development. These selective ideas about the nature of this nosology continue to determine the vector of search for solutions today and allow us to understand the continuation of the trend to preserve the previous set of therapeutic methods. For example, the analysis of treatment of viral pneumonia during the current pandemic, which was conducted by T. M. Rawson et al. (20), showed that bacterial or fungal co-infection was detected in only 8% of cases, and antibiotics were given to 72% of patients. Such widespread use of antibiotics reflects the prevailing psychology of views on the problem, and not the result of a balanced professional decision, since the lack of antiviral activity in these drugs is well known, and recommendations against their use in viral lesions remain in force.

Another example of continuing attempts at questionable patient care is the use of methods for replenishing the volume of circulating blood and providing medication for systemic blood pressure. In the context of the current pandemic, the number of cases of AP with bilateral and disseminated forms of inflammation has increased. With a larger volume of lung damage, the number of patients with impaired systemic circulation increases, which is the result of the body's efforts to relieve the small circle of blood circulation and avoid increasing pulmonary edema. Advice on prescribing liquid infusions and using vasopressors in this situation is based on monitoring indicators that are the consequence, not the cause, of current disease mechanisms and reflect only the assumptions of the authors of such recommendations (14). The results of an objective assessment of the effect of infusion therapy on the dynamics of AP are not given, since such studies do not go beyond the monitoring. At the same time, according to analytical reviews, after the start of infusion therapy, many patients with AP have a further decrease in systemic blood pressure, which forces the use of vasopressors and hormones (2,6,21).

The emergence of the coronavirus pandemic is a landmark event that was preceded by unambiguous signals of changing conditions for the development of AP. In the recent past, respiratory viral infections were the causes that prepared the basis for the development of bacterial inflammation (22-24). In the past couple of decades, a number of observed phenomena have clearly demonstrated the ability of viruses to independently cause epidemics of severe forms of pulmonary inflammation. An increase in the number of patients with severe viral pneumonia and an increase in their mortality were observed during the epidemics of SARS, MERS and several flu outbreaks.

Unfortunately, a number of these events, accompanied by a General emotional reaction and justified anxiety, did not have a didactic impact on the system of ideas about the nature of AP and did not lead to a correction of approaches to providing medical care to these patients. Antibiotics, long-term use of which, in my opinion, was one of the leading causes of perestroika among the etiological factors of the disease, continue to be considered as the leading treatment in this group of patients. Modern

results of persistent attempts to solve the problem with narrow etiotropic treatment clearly demonstrate the disadvantages of such assistance. Even successful suppression of pathogens does not bring some patients relief from the disease. One example of such dynamics of AP is the well-known observations of the so-called sterile pleural empyema, which emphasize the selective antimicrobial action of antibiotics and their lack of influence on the pathogenetic basis of the inflammatory process.

New circumstances in the context of a pandemic clearly emphasize the importance of pathogenetic mechanisms accompanying acute inflammatory processes in the lungs. Previous experience of applying the etiotropic principle of AP treatment raises serious doubts about the complete cure of patients with coronavirus infection in the case of successful development and use of antiviral drugs. Ways to influence the pathogenetic mechanisms of the disease are a potential option for real improvement of treatment results at the present time.

Confidence in the success of pathogenetically based principles of AP treatment stems from their representative testing, the results of which do not depend on time, as they are based on the fundamental materials of medical science (22,25). Today, fragments of this study have been prepared for public viewing. However, the presence of this data does not mean that it will necessarily be read and bring the desired result. Therefore, continuing efforts to provide medical care to patients with AP, it is necessary to assess in detail the importance of the lungs in the body not only as the main organ of gas exchange. Extrapulmonary lung functions play an important role in regulating homeostasis, and inattention to them can give the wrong direction to therapeutic efforts. The unique anatomical position of the lungs in the General circulatory system and their influence on the Autonomous regulation of blood flow has a special place and crucial importance. Today, in the period of severe clinical situations, information about these unique features of the organ should not remain unclaimed.

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