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On the need to revive first and emergency care for acute pneumonia.

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Introduction

The former term for one of the oldest nosologies known to medicine, “acute pneumonia” (AP), which specifically reflected the inflammatory essence and basis of the disease, has practically ceased to be used in recent decades. Today, the majority of patients with AP appear under the term “community-acquired pneumonia” (CP), and the remaining patients with acute inflammation of the lung tissue are defined as “nosocomial pneumonia”, “ventilator-associated pneumonia”, “COVID-19 pneumonia,” etc. First of all, attention is drawn to the disappearance from the names of all these variants of the disease of such an important and characteristic feature as an indication of the acute development of the process. This circumstance, like the very appearance of the above classification of the disease, is a very symptomatic fact for modern ideas about the nature of this pathology and the established traditions of its long-term treatment.

The emergence and long-term use of antibiotics played a decisive role in the development of the current situation with medical care for patients with AP. By the time of the first clinical use of penicillin (1), it was already known about the possibility of rapid development of bacterial resistance (2,3), the serious consequences of which were warned by the founder of this therapy, Alexander Fleming (4). However, the first successes of the use of penicillin had not only a positive, but also a negative effect, for a long time overshadowing the sense of professional caution and a balanced assessment of the true benefits of the new type of treatment. In clinical circles, the prevailing desire was to preserve the primary effect of antibiotics, which was steadily declining due to the development of microbial resistance. These efforts provided the impetus for the development of new antimicrobial drugs, but the final results of this multi-year process, quite naturally, led to results far from expected.

Today, among the consequences of antibiotic therapy, we have received not only an extensive group of resistant strains of microorganisms, which, finally, after almost 8 decades of practical use, were recognized as a global catastrophe (5). However, such an official statement about a long-obvious fact is considered as a formidable, but the only long-term result of antibiotic exposure. Such a clear manifestation of the action of antimicrobials as the constant change of AP pathogens, which began to be observed only in the era of antibiotics, has not yet attracted widespread attention of specialists, although the argumentation of this phenomenon has already been cited in available sources (6,7)

For obvious reasons, the most ignored aspect is the didactic effect of antibiotics on professional activity. It is not surprising that numerous cohorts of specialists who received firm instructions from the university bench about the dominant role of the pathogen in the emergence and development of AP, when antibiotics are presented as the main lifesaving remedy, today adhere to the concept of the disease "pathogen-antibiotic". At the same time, the synthesis of information obtained at the university meets the relevant recommendations and requirements in the course of practical activity. The limitation of professional understanding of the basics of the disease by etiology and complete inattention to a number of classical and fundamental materials of medical science are the main obstacle in solving the problem of AP, since the dominant idea of the disease in the thinking of experts determines further research directions. However, until now, this side effect of antibiotics has gone unnoticed in medical circles (7).

Some of the above provisions make it possible to explain and understand the currently established

principles of first and emergency medical care for patients with AP. In recent decades, the main efforts and proposed solutions have been aimed at identifying the causative agent of the disease as early as possible and purposefully prescribing antibiotics. One of the attempts to solve this problem was the above-mentioned classification of AP depending on the situation and circumstances of the occurrence of inflammation in the lungs. The identification of nonspecific inflammatory processes in lung tissue was based on differences in the results of bacteriological examination of patients who became ill in different conditions and under different circumstances, which allowed us to make an assumption about the optimal empirical choice of antibiotics and accelerate the achievement of therapeutic success. At the moment, it is already quite obvious that such an idea has not brought revolutionary results.

The desire and attempts to restore and maintain the former effectiveness of antibiotics consisted, first of all, in improving a variety of microbiological diagnostic methods, as well as in the search for differential diagnostic criteria depending on the pathogen. All these initiatives did not bring the expected results, and meanwhile the situation in this area of medicine began to change dramatically as a result of the steady growth of viral forms of the disease, the treatment of which continued to be carried out according to established standards. Only the development of the SARS-CoV-2 pandemic forced specialists to pay alarming attention to the dramatically changed conditions of inflammatory processes in the lungs, and this is because the main and so familiar therapeutic direction in the form of antibiotics turned out to be devoid of justified indications for its use in a large flow of such patients. The usual treatment regimen for patients with AP has reached a dead end. Has the usual treatment regimen for patients with AP reached a dead end? It depends from what point of view one evaluates the observed changes.

Meanwhile, if we carefully analyze current events and ongoing research, then in their manifestation and results we will be able to find factors and characteristics that have not attracted attention for many years, but which allow us to look at seemingly well-known elements and positions from a different point of view. For example, after repeated unsuccessful attempts at differential diagnosis of bacterial forms of AP depending on the pathogen, attempts to find differential criteria between bacterial and viral variants of lung tissue inflammation turned out to be equally unsuccessful (8-10). Clinical observations show the identity of the disease picture, regardless of the etiology of the process. The latter circumstance refutes the leading role of the pathogen in the development and dynamics of AP and indicates a violation of lung functions as a result of damage to its structures by the inflammatory process. This interpretation brings us back to the classical materials of medical science and, in particular, to the pathophysiology of inflammation.

Another argument against the leading role of the pathogen in the development of AP is the comparative materials of treatment of patients with bacterial forms of CAP and coronavirus pneumonia during the SARS-CoV-2 pandemic. For example, in recent years, for bacterial CAP, 80% of patients were successfully treated on an outpatient basis and only 20% required hospitalization (11,12). At the same time, the mortality rate of outpatients ranged from 1% to 5%, among hospitalized patients it increased to 10-12%, and among those transferred to the intensive care unit it already reached 30-50% (11-16). It should be recalled that in this case we are talking about patients who received etiotropic treatment in the form of antibiotics, which is so important in the modern understanding.

Another argument against the leading role of the pathogen in the development of AP is the materials of the SARS-CoV-2 pandemic. For example, a couple of decades ago, when AP was thought to be predominantly bacterial in nature, 80% of patients were successfully treated as outpatients and only 20% required hospitalization (11,12). At the same time, the mortality rate of outpatients did not exceed 1-5%, among hospitalized patients it increased to 10-12%, and among those transferred to the intensive care unit it had already reached 30-50% (11-16). It should be recalled that in this case we are talking about patients who received basic etiotropic treatment. During the pandemic, among those infected with coronavirus, 80% underwent this “meeting” on an outpatient basis, of which from 20 to 40% learned about infection only on the basis of tests, and in the remaining observations, patients received only symptomatic therapy on an outpatient basis. 20% of patients with COVID-19 pneumonia required hospitalization, of whom 5% were admitted to intensive care units (). Mortality was _____ in general wards and increased to ___ in intensive care units (). As can be seen from the presented materials, the distribution of patients according to treatment conditions and achieved results is quite comparable, regardless of the presence or absence of etiotropic therapy.

During the SARS-CoV-2 pandemic, practical medicine, due to the large flow of coronavirus pneumonia, suddenly lost the logical prerequisites for the use of antibiotics. An atmosphere of uncertainty and disappointment gripped even proven professionals (17-20). The fear of coronavirus was understandable. The loss of hope for the usual help of antibiotics has transformed into the prospect of a high probability of illness and the absence of any guarantees of cure in case of infection with coronavirus. During the most active period of the pandemic, few people paid attention to the fact that there were fewer cases and deaths than expected. Thus, up to 80% of people had contact with the pathogen in an outpatient setting, and from 20 to 40% of them had no clinical manifestations, having learned about their infection only on the basis of tests. Outpatients with signs of respiratory disease received only symptomatic medications without etiotropic therapy, and on average 20% of patients were hospitalized for pneumonia caused by COVID-19. Overall mortality among hospitalized patients ranged from 6% to 21% depending on the period of the pandemic (26–30). In the groups of the most severe patients admitted to intensive care units, mortality ranged from 39.5% to 53% (30-32).

As can be seen from the presented comparison of materials, regardless of the presence or absence of etiotropic therapy, the distribution of patients according to the conditions of treatment intensity and the results achieved is quite comparable. At the same time, on the one hand, a natural question arises about the real effectiveness and benefits of antibiotics for bacterial forms of CAP. On the other hand, widespread and inappropriate use of antibiotics could be observed during the SARS-CoV-2 pandemic. For example, in patients with COVID-19 pneumonia, bacterial coinfection was detected in a small proportion of cases, typically less than ten percent, but patients received antibiotics in 70–80% or more of cases (33–35). Such obvious inadequacy of professional decisions is the result of the didactic influence of antibiotics, which for many generations of doctors were considered the main and sometimes the only means of treatment. Moreover, not only during the pandemic, when the question of the effectiveness of treatment of coronavirus pneumonia was most acute, but also recently the search for the most active antimicrobial drugs continues (36-38), which reflects the absence of any positive conclusions from the lessons of the observed disaster.

If we take into account the fact that viral pneumonia has been increasing its share in AP for many years, and according to some data, for example, among children with CAP in the USA, it has already exceeded half of observations for several years (39), then persistent and widespread use antibiotics, which have long been known to have no antiviral quality of action, cannot be explained by anything other than their didactic side effect. One gets the very real impression that modern professional views on the nature of AP do not allow us to imagine the treatment of this disease without etiotropic drugs, among which antibiotics continue to play the main magical role.

The modern, well-established understanding of the leading role of etiotropic drugs in the treatment of AP explains the fact that the expected result of their use determines the strategy for helping this category of patients. For many years, starting a course of antibiotic treatment automatically implied, and continues to be widely followed, the principle of waiting at least 2–3 to 5–7 days for the outcome of this therapy (40,41). During this period, depending on the condition of the patients and the observed deviations in functional indicators, this basis of treatment is supplemented with corrective symptomatic and supportive therapy. The latter circumstance means that etiotropic drugs are considered not only as the basis for the treatment of AP, but also as first aid and emergency aid.

The above comparisons of the results of treatment of bacterial and viral forms of pneumonia showed that, regardless of the use of etiotropic drugs, approximately a fifth of patients require hospitalization. That is, we are talking about that part of the population in different regions of the globe that has an increased susceptibility to such diseases with rapid development of the process. At the same time, the results of the SARS-CoV-2 pandemic showed that it was not only about the spread of one pathogen, but also during certain periods of this disaster about the aggression of its individual strains. As can be seen from these data, the fundamental difference in the reaction to contact with the pathogen is not due to the virulence of the latter, but to the individual characteristics of the organism. This uniqueness was finally noticed by experts when analyzing materials about the pandemic (42-44), but this is only a minor positive signal that has not yet been reflected in modern medical care. Meanwhile, the noted factors make it possible to understand why repeated and various attempts at differential diagnosis of AP based on etiological criteria do not yield results, while pneumonia of various etiologies have such a similar clinical picture that it is almost impossible to distinguish them.

The widespread belief in the almost magical healing powers of antibiotics explains the fact that numerous attempts have been made to use them as quickly as possible in order to obtain a quick and reliable effect. It was not possible to achieve the set goals with the help of such first aid, but the desire to obtain the expected result in the event of the development of septic complications continues to be practiced, although without significant success (45-47). It should be noted that, according to numerous statistical data, the main and most common cause of sepsis and septic shock is AP (48,49). Thus, in the latter case, we are talking mainly about helping patients with AP, but at later stages of the disease, as an attempt to correct the ineffectiveness of the initial etiotropic therapy.

Currently, first and emergency care for AP have relatively unified general principles, which can be summarized as follows, based on our own experience in the application of fundamental materials of medical science, objective research and successful clinical testing of pathogenetic approaches to solving the problem (50). If the diagnosis of AP was carried out on an outpatient basis, then the further place of treatment for the patient is determined by the attending physician depending on his condition. The decision to continue further treatment on an outpatient basis is accompanied by an empirical choice of antibiotics and determination of the timing of re-examination. Complementary treatment methods are usually symptomatic and, to a certain extent, their application options depend on established rules and traditions.

The subjective nature of such a choice completely depends on objective indicators of the patient's condition and, if he is sent to a hospital, receives additional expert assessment. All these conclusions are made in the most acute period of the disease, when the mechanisms of the emerging inflammation continue its autonomous development, regardless of the causative agent of the process. The presence of pronounced functional impairment in the patient serves as a reason for oxygen insufflation and providing access to the venous bed with infusion of solutions. The latter measures may precede the start of antibiotic use and, in the most severe situations, begin by the time the patient is transported to the hospital.

The use of oxygen is aimed at increasing its concentration at the level of alveolar gas exchange, since it is believed that respiratory disorders are caused by inflammation of the alveolar tissue at the site of the lesion. In practice, as is known, this procedure usually does not make radical changes, since in this case the entire chain of gas exchange is not taken into account, when the main disturbances occur at the level of the pulmonary vessels as a result of their diffuse reflex spasm. Carrying out intravenous infusions during this period is accompanied by additional overload of the pulmonary circulation, which experiences it in conditions of a sudden relative excess of venous return, and can also stimulate the phenomena of edema and infiltration in the area of inflammation.

Concentrating efforts on neutralizing the causative agent of AP in recent years has become such a dominant strategy in the professional understanding of the nature of the disease that no one pays attention to the incorrectness of the principles for assessing the condition of this contingent of patients. The degree of functional impairment in patients with AP is determined on the basis of general indicators characteristic of peripheral inflammatory processes. For example, the uniqueness of the anatomy and function of the pulmonary circulation, which has an inverse proportion of its parameters in relation to the systemic blood flow, but at the same time is inextricably linked with it in case of damage to the pulmonary vessels, exerting a primary reflex effect on the general blood circulation, is completely not taken into account and is not properly assessed . The main omission in this case is the underestimation of the fact that AP begins with damage to the pulmonary vessels with their baroreceptor apparatus, in contrast to all other inflammatory processes, and changes in peripheral blood flow are initially secondary and are compensatory in nature.

An evidence-based description of the pathogenesis of AP and the reform of the doctrine of the disease have been repeatedly published in the author's articles, and the most detailed presentation is presented in the monograph (50). In this context, we are talking only about primary care for this contingent of patients, the narrow choice of which with the use of antipathogenetic methods explains the reasons for failure. In the initial period of the disease, the main goal of initiated therapy remains the empirical choice of an antibiotic and waiting for the first signs of its effect. At this time, intravenous infusions are carried out, the intensity of which increases depending on the severity of the patient's condition. With the current treatment strategy, patients with an aggressive onset of the disease are programmed to develop such severe complications as pulmonary shock, which today is interpreted as sepsis, acute respiratory distress syndrome and multiple organ failure.

Unintentionally erroneous therapy in the initial period of AP is a direct explanation for the frank admissions of some authors about the deterioration of the patients' condition during treatment and even the development of shock, which was not present at admission (40,51-). At the same time, current efforts to understand the cellular and molecular mechanisms of these complications and find ways to eliminate them reflect a questionably promising direction compared to early pathogenetic treatment and timely elimination of the sources of these severe and intractable conditions. . The main reason for such natural failures is the defects of the modern concept of the disease, on the basis of which the principles of treatment are formed, including inadequate imitation of first and emergency care.

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