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Opinion

Metamorphoses of First Aid in Acute Inflammation in the Lungs

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First aid for acute inflammatory lung diseases is precisely the decisive factor that largely determines the results of subsequent treatment. At a time when the dynamics of inflammation in the lung tissue is accompanied by an increasing cascade of pathological mechanisms, the success of medical care for the patient will depend on how quickly and effectively the first therapeutic effects are able to slow down this process. This is especially important and indicative in the case of aggressive development of the disease.

Acute pneumonia (AP), which has been known to medicine for more than two millennia since its first description by Hippocrates, has always been regarded as a serious disease with high mortality. The problem of choosing medical care for this category of patients due to the lack of necessary scientific information has long been intuitive, not purposeful. However, ancient medicine, in conditions of scant scientific awareness, was able to find options for first aid methods for patients with AP, while focusing exclusively on the rapid clinical effect.

In different regions of the world, various methods were preferred as first aid for AP, which, at first glance, seem incomparable in their characteristics. Among such therapeutic techniques, one can distinguish bloodletting [1], cupping therapy [2], setting leeches [3], short-term cooling of the patient's body [4,5]. The centuries-old use of these methods of care is an indirect confirmation of their positive effect on the condition of patients. After all, if these procedures did not bring relief, it is unlikely that they could remain in the arsenal of practical medicine for thousands of years, right?

Currently, based on modern scientific information, it should be noted that the effect of the above-mentioned methods of first aid, despite the obvious defeat of the respiratory organs in AP, nevertheless does not have a direct effect on respiratory function, but is quite clearly directed at the cardiovascular system. Additional objective evidence of this effect of individual methods was obtained using comparative tests [6,7].

In the old days, not only the lack of medical knowledge created difficulties in the treatment of this category of patients, but also the lack of additional funds to consolidate and further develop the success of emergency procedures. In this regard, first aid methods played an extremely important role in the treatment process, and their use sometimes exceeded the permissible limits. The centuries-old history of first aid in AP preserves tragic evidence of the excessive use of such therapy, when the result negated the efforts made. One of the illustrative examples of such an outcome is the history of the illness and death of the first President of the United States of America.

According to the surviving evidence of that period, George Washington caught a cold and became seriously ill [8]. Although the final diagnosis was not established, but judging by the descriptions of the clinic of the disease, it was most likely about croup pneumonia. The president asked the manager (!) of his estate to give him a bloodletting (up to one pint), which did not bring relief. The doctors invited after that carried out several more bloodletting in a short period of time, bringing the total amount of blood removed per day to two and

a half liters. The patient's condition continued to deteriorate rapidly, and by the end of the second day after the first signs of the disease appeared, he died.

Of course, attention is drawn to the fact that the invited doctors continued bloodletting, hoping to get the necessary effect, and the confidence in this is illustrated by the fact of repeated repetition of the chosen technique for a short period. Such persistence could not have arisen without the previous positive experience of using this technique. However, gaps in the theoretical foundations of medicine of that period played a fatal role in the fate of the patient, because today even paramedics know that the loss of half the volume of circulating blood is incompatible with life.

Over time, medicine expanded and deepened its scientific knowledge and professional experience, but the old, time-tested methods continued to be used as first aid for patients with AP. Radical changes in the views on the principles of treatment of this category of patients arose and began to strengthen their didactic influence after the discovery and beginning of clinical use of antibiotics. Although it was initially known that antibiotics have an exclusively antimicrobial effect and are not able to have a direct effect on the inflammatory process, however, the first results of this therapy created the illusion of acquiring a universal remedy against bacterial inflammation.

Soon after the introduction of antibiotics into general medical practice, antibacterial therapy began to be considered as the main, and often the only treatment for patients with AP. In the professional literature, the treatment of this category of patients often appeared under the term "antibiotics alone". Accordingly, the training program at universities was reoriented, on which many generations of doctors were brought up. Against this background, the previous methods of first aid in AP have lost their legitimacy and have been ranked among the remnants of the past.

The first impressive successes of antibacterial therapy for a long time distracted due attention from the side effects of the new treatment method. Unlike the vast majority of pharmaceuticals that affect the structures and substances of the body itself, antibiotics suppress the bacteria present in the body, having an indirect effect on the mechanisms of the disease. At the same time, microbes, like the patient's body, are separate biological entities with the ability to adapt and change. This feature of the representatives of the microflora manifested itself more and more noticeably every year.

The long-term effects of the antimicrobial action of these drugs, which have now reached, from my point of view, a catastrophic level, are still not fully understood. Today, the most obvious consequences of antibacterial therapy are well known, such as the appearance and formation of a large group of resistant strains, as well as a constant decrease in the effectiveness of the drugs used with the need to develop and release their new generations. However, long-term use of antibiotics not only stimulated the ability of objects of a specific medical attack to survive.

The continuous suppression of the bacterial sector of the microbiota of the organism contributed to an increase in the role of other representatives of this community, among whom viruses were especially active. In recent years, expert assessments have begun to indicate an increase in viral diseases, and a decade and a half ago, attention was drawn to the fact that almost half of the cases of AP reported in the world are of viral origin [9-11]. However, antibiotics continued to be considered as the main means of treatment and attempts to accelerate the initiation of this therapy as a first aid option did not bring the desired results [12], which is quite logical, from my point of view.

Over a long period of antibiotic use, they have had a powerful didactic influence on the formation of modern medical ideas about the nature of AP, which was clearly manifested during the SARS-CoV-2 pandemic. The sudden appearance of a large number of patients with coronavirus inflammation of the lung tissue does not allow us to consider antibiotics as a therapeutic agent, much less the main one. However, a general understanding of the situation did not change the treatment strategy. The overwhelming number of patients with

pneumonia caused by COVID-19 continued to be stubbornly treated with antibiotics, although bacterial co-infection was reported only in isolated cases [13-16].

The dominant concept of the leading role of the pathogen in the clinical manifestations of AP today does not stand up to criticism when attempts to obtain clear differential diagnostic criteria between bacterial and viral forms of the disease are unsuccessful [17-19]. At the same time, the result of such studies once again gives reason to understand that the main factor determining the severity of clinical manifestations of AP remains the inflammatory process, leading to functional disorders of the affected organ.

In the light of the above, it should be noted that for many years, against the background of a decrease in the effectiveness of antibiotics, the need for additional treatments has been growing, which in the most difficult situations perform the role of first aid. Based on the currently established conceptual ideas about the nature of AP and continuing the purposeful fight against the causative agent of the disease, modern medicine interprets and corrects the manifestations of the pulmonary process by analogy with inflammation of other localizations.

Although the nonspecific nature of the etiology of AP involving a wide range of pathogens was known long before the era of antibiotics, never before, including several decades of antibacterial therapy, this disease was not classified as contagious, and the severity of the condition of these patients was not explained by sepsis and septic shock. Even during the current SARS-CoV-2 pandemic, the risk of coronavirus transmission from a patient to a healthy person does not necessarily mean the development of inflammation in the lungs, which occurs only in a fifth of the infected population [20-22]. The incidence of infected people is due to its own factors and mechanisms and cannot be explained only from the pathogen's point of view (as well as the lack of differential criteria between processes with different etiologies - see above).

Modern statistics and facts from everyday practice confirm the ancient formulation that people get pneumonia, not get infected. However, currently AP has become classified as an infectious process, and treatment is carried out on the basis of general therapeutic principles. The fixation of efforts on the diagnosis and suppression of AP pathogens ignores those factors and mechanisms that determine the specifics of the pathogenesis of the disease and its prognosis.

The ideas that have developed in recent decades about the features of the development and course of the inflammatory process in the lungs suggest, for example, as one of the main tests for the diagnosis of sepsis and septic shock in these patients, the presence of systemic arterial hypotension. Peripheral blood pressure indicators in patients with AP are used by analogy with the assessment of clinical situations in other localizations of inflammation [23-25]. At the same time, experts note that it is among septic patients with AP, unlike other categories, blood cultures in the vast majority of cases do not detect the pathogen [26,27].

However, in this regard, it should be recalled that systemic arterial pressure has a regulatory dependence on changes in blood circulation in the small circle of blood circulation. Arterial pressure in the vessels of the small circle usually does not exceed 15 mm Hg, remaining in normal conditions about 6-8 times lower than the pressure at the periphery [28]. At the same time, an increase in pressure in the pulmonary vessels by only 5 mm contributes to the occurrence of interstitial edema, and an increase by 10 mm is already fraught with severe pulmonary edema [29].

To avoid the consequences of a sudden increase in pressure in the pulmonary vessels, there are autonomous regulation mechanisms in the body that automatically reduce their load, allowing maintaining a quantitative ratio of cardiac output between the right and left ventricles and synchronicity in the work of the small and large circulatory circles. One of these mechanisms is the so-called discharge reflex that occurs in the baroreceptors of the pulmonary vessels, which was discovered and described by Schwiegk almost a century ago

[30]. The result of its action is, in particular, a reflex decrease in peripheral blood pressure, which instantly delays circulating blood at the periphery, reducing venous return and preventing pulmonary edema.

Consequently, the assessment of peripheral blood circulation without taking into account the relationship between the two circulatory circles gives a secondary result and distorts the conclusion. At the same time, the clinical manifestations of such a rapid reaction in the aggressive development of AP represent a picture of shock, the origin of which is pulmonogenic, not septic [31]. In recent years, the septic nature of shock has been considered in patients with viral pneumonia, although in these observations this diagnosis has no objective evidence. Current recommendations for urgent bolus infusion therapy in such patients with AP suggest a very likely subsequent use of vasopressors, since the effect of such a load on the pulmonary vessels leads to the opposite result from the expected [12,27,32-34].

The considered mechanisms of circulatory disorders in AP under the conditions of modern principles of their correction allow us to understand the reason for the frank confessions of some authors that the condition of many patients from this group continues to deteriorate after the start of inpatient treatment and despite this [35]. Moreover, the overwhelming number of patients with septic shock did not have it during hospitalization (!) and it developed already during treatment [25] and mortality among this contingent of patients can reach 91% [36].

The information given here shows that modern first aid for AP has the opposite direction of its action compared to the methods of ancient medicine. Therapeutic principles were determined in ancient times exclusively empirically and remained in demand for many centuries. Currently, medicine has significant advantages not only in the amount of scientific information, but also in the possibility of objective testing of previous methods of treatment.

The first step in this direction has already been taken by the author of these lines, and the results have convincingly shown that many of the ancient techniques are really able to bring the desired result. In this report, it is not possible to provide a detailed description of the results of the studies conducted, obvious objective evidence of the validity of the new strategy and the first impressive results of clinical trials. These materials are most fully and in detail summarized and published [37]. In conclusion, it should only be noted that the main obstacle to the application of pathogenetically based principles of treatment is the system of views on the essence of AP that has developed over the past decades, without changing which further progress in solving this problem is unthinkable.

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Conflict of Interest

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