

## ORIGINAL ARTICLE

# CURRENT STRATEGY FOR TREATMENT OF COMORBID STATES: COMPLICATED COMMUNITY-ACQUIRED PNEUMONIA WITH ARTERIAL HYPERTENSION

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## ABSTRACT

**The aim:** To optimize the treatment of CAP patients with hypertension, complicated by exudative pleuritis.

**Materials and methods:** The study included 43 CAP patients, aged 46 to 65 years, with viral lesions along with hypertension. The average age of the patients was  $52.5 \pm 4.5$  years. Verification of the CAP diagnosis and its formulation was performed in accordance with the order of the Ministry of Health of Ukraine No. 128 of 19.03.2007 "On the approval of clinical protocols of medical care in "Pulmonology" in all patients, pneumonia was complicated by exudative pleuritis, which was confirmed by X-ray examination.

**Results:** The use of combination drugs, namely, torasemide with prolonged effect and tivortin aspartate in the treatment of patients with community-acquired pneumonia, complicated by exudative pleuritis, combined with hypertension led to more significant positive changes in the values of saturation, blood biochemical parameters, as well as accelerated recovery of patients, which was confirmed by the positive dynamics of X-ray examination.

**Conclusions:** As a result of the treatment, all parameters of the quality of life of the patients were greatly improved, which resulted in a significant reduction in functional limitations and high social activity of the patients, which significantly reduced the cost of treatment.

**KEY WORDS:** community-acquired pneumonia, exudative pleuritis, hypertension, L-arginine, torasemide

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## INTRODUCTION

In clinical practice, the physician often encounters a combination of chronic cardiovascular disease, such as coronary heart disease (CHD) or arterial hypertension (AH) and acute respiratory system diseases: bronchitis or pneumonia. In comorbid states, the choice of adequate pharmacological therapy is of particular importance.

Currently, respiratory diseases remain very common and cause significant economic losses at the national level, ranking first in the number of days of permanent or total disability and mortality [1]. Thus, about two million people die annually of community-acquired pneumonia (CAP) worldwide [2, 3, 4]. In European countries the number of patients with CAP exceeds 4.2 million people per year [5]. With a significant percentage of development of complications and fatal cases, especially in the case of its combination with concomitant cardiovascular diseases, CAP remains a topical issue for physicians, despite the ever-increasing number of antibacterial, mucolytic, immunomodulatory drugs. In addition, the clinical course of CAP has changed markedly in recent years, and first of all it is associated with the increase of verified viral and bacterial infection as a possible etiological factor of the pathology. The study of the clinical course of CAP in patients with cardiovascular diseases, in particular, arterial hypertension (hypertension), shows a frequent complication by exudative pleuritis, which not only complicates the course of the disease, but also increases the cost of treatment.

On the other hand, cardiovascular pathology, such as coronary heart disease, hypertension, makes one of the leading places in morbidity ranking of the population of Ukraine [6] and is a high probability of severe complications, which can lead to disability of patients and have high lethality, so it is both medical and social issue. Therefore, it is easy to predict that the course of CAP in patients with coronary heart disease and hypertension will be more severe, with progressive signs of stagnation, which requires more careful prescription of drugs.

According to the reported data, vascular endothelial dysfunction is one of the leading causes in the onset and progression of ischemic heart disease and arterial hypertension [7]. The vascular endothelium is the only organ that regulates hemodynamics and perfusion according to the needs of each organ or tissue. The major role of endothelium is the release of biologically active substances, and the vascular tone (total vascular resistance, blood pressure); atrombogenicity of the vascular wall, platelet activity and coagulation, inflammation, oxidative resistance, as well as the integer layer structure of the vascular wall and manifestation of atherogenesis is dependent on the adequate functioning of the endothelial cells. Their impaired regulation leads to changes in the organs and systems that serve as the pathogenetic basis for many pathological processes, such as cardiovascular pathology. Therefore, the reduction of damage, correction and adequate functioning of the

endothelium is one of the most urgent issues of current therapy of vascular pathology. One of the drugs used in clinical practice for the endothelial function recovery is NO donors, in particular L-arginine, which led to a positive effect in endothelial dysfunction [8].

The accumulation of large amount of the cardiovascular pathogenesis data alters the treatment paradigms for these patients. Along with ACEI, beta-blockers, blockers of mineralocorticoid receptors, and even with minor signs of stagnation (hypokinesia) the use of diuretic therapy is rational. According to the European Association of Cardiologists recommendations (2012), diuretics can be used, when necessary, to relieve signs and symptoms of fluid retention, regardless of the functional ejection of the left ventricle indicator, whereby loop diuretics prescription is preferable to thiazide. Loop diuretics by their effect outperform other groups of diuretics, so their use is at the basis of treatment of congestion and edema in chronic heart failure. Currently, the advantage of slow infusion of diuretic over bolus intravenous injection has been repeatedly demonstrated for the prevention of ricochet syndrome. Thus, the diuretic should be selected so that its activity prolongs for the maximum possible period of time during a day. Torasemide, an advanced loop diuretic with prolonged effect, possesses relevant pharmacological characteristics.

Many publications report on the etiopathogenesis and treatment strategies of CAP; however, the issue of differential selection of CAP treatment for patients with various concomitant diseases is underestimated. For this reason, we draw the attention of family physicians to the CAP development, complicated by exudative pleuritis in patients with hypertension.

## THE AIM

The study was conducted to optimize the treatment of CAP patients with hypertension, complicated by exudative pleuritis.

## MATERIALS AND METHODS

The study included 43 CAP patients, aged 46 to 65 years, with viral lesions along with hypertension. The average age of the patients was  $52.5 \pm 4.5$  years. Verification of the CAP diagnosis and its formulation was performed in accordance with the order of the Ministry of Health of Ukraine No. 128 of 19.03.2007 "On the approval of clinical protocols of medical care in "Pulmonology" [9] in all patients, pneumonia was complicated by exudative pleuritis, which was confirmed by X-ray examination. Verification of the hypertension diagnosis and its formulation was carried out in accordance with the order of the Ministry of Health of Ukraine No. 54 of 14.02.2002 "On the approval of clinical protocols of medical care in "Cardiology" [9]. The diagnosis of CHD was confirmed on the basis of the WHO's standard cardiology questionnaire (Rose questionnaire) [10], the nature of changes in the resting electrocardiogram and in accordance with the recommendations of the VI National Congress of Cardiologists of Ukraine).

All patients were divided into three groups: Group I (Clinical group A) (n=17) involved standard complex treatment of CAP and concomitant hypertension, which included prescription of diuretic torasemide 5 mg 2 times a day per os; Group II (Clinical group B) (n=18) involved treatment complex consisted of administration of torasemide of prolonged effect (Britomar) at a dose of 10 mg a day; Group III (Clinical group C) (n=18) involved treatment complex with torasemide of prolonged effect (Britomar) 10 mg a day per os in combination with tivortin aspartate 4.2%, administered intravenously 100 ml 1 time a day for 10 days.

Patients underwent complete blood count and biochemical blood test, chest X-ray; the level of oxygen saturation in the capillary blood was determined by transcutaneous method using a pulse oximeter CMS50B *Pulse Oximeter*.

All studies were conducted according to a common scheme: at the time of admission to the clinic, on the 7<sup>th</sup> and 15<sup>th</sup> day of treatment. A version of the MOS SF-36 Common Questionnaire (MOS SF Item Short Form Health Survey) was used to study the dynamics of the quality of life of CAP patients at different stages of treatment. In addition to the MOS SF-36 questionnaire, tests were performed to assess the impact of ongoing therapy on the quality of life of CAP patients, with a global assessment of the status and quality of treatment for patients and physicians. The test results were based on a score system. Patients filled in the SF-36 questionnaire individually: before treatment at the time of admission to the hospital, at the end of inpatient treatment (14-16 days), within 1 month.

Statistical processing of the results was made on a personal computer using the standard MS Excell and Statistica for Windows. Version 6.0 software.

## RESULTS AND DISCUSSION

The analysis of the initial findings of the studies showed that all patients had significant saturation disorders, leukocytosis, ESR, distortion of leukocyte differential count; the X-ray examination revealed signs of exudative pleuritis, and biochemical studies revealed a slight increase of blood sodium and creatinine.

Within 5 days of treatment, patients of different clinical groups showed positive dynamics of clinical symptoms with amelioration of shortness of breath and cough, decreased purulence and volume of sputum, normalization of body temperature, overall health state, absence of pain in the chest, normal sleep. Improvement was accompanied by clinical benefits in physical functioning (PF).

The analysis of dynamics of rates in patients of different clinical groups showed that the saturation level in group A improved to  $94.67 \pm 0.82$ , but had no significant value compared with the score of  $92.11 \pm 0.23$  before treatment, while maintaining a significant deviation from the norm of  $98.53 \pm 0.12$ . Saturation level in clinical group B also showed a positive shift to  $95.21 \pm 0.51$  ( $p \geq 0.05$ ), which had a significant score compared to the score before treatment, but did not reach the normal value and still had a significant deviation. In clinical group C only, the saturation score reached  $97.83 \pm 0.34$ , which

almost coincided with the normal value of  $98.53 \pm 0.12$ , and had a significant deviation from the result of the score of  $92.11 \pm 0.23$  before treatment. X-ray examination showed the improvement in clinical group A on the 10<sup>th</sup> day on the average of  $12,88 \pm 0,33$ , in clinical group B on the 7<sup>th</sup> day, which accelerated recovery by the average of  $9,83 \pm 0.35$ , and in clinical group C exceeded the value of group A by almost 2 times, lasted for 5-6 days, on the average of  $5.37 \pm 0.36$  and had a significant deviation. The analysis of the dynamic pattern of saturation and a positive presentation in the lungs clearly demonstrates the advantage of prescribing combined therapy with torasemide and tivortin of prolonged effect for CAP treatment complicated by exudative pleuritis in combination with hypertension, which accelerates the recovery of patients. It should be noted that all these changes was accompanied by normalization of complete blood counts; in all clinical groups WBC count, ESR was normalized, but there were no significant deviations among these scores. No statistically significant deviations were observed in the biochemical blood test, in particular sodium presence. Patients before treatment had natriemia up to  $148.20 \pm 0.26$ , a significant deviation from normal rates, which was most likely associated with administration of diuretics of various pharmacological groups before hospitalization. The study of this parameter showed that in clinical group A it increased slightly to  $153.45 \pm 0.62$  ( $p \geq 0.05$ ), in clinical group B it was  $152.12 \pm 0.43$  and also had a significant deviation from the score before treatment, however, still had a significant deviation from the norm, and only in clinical group C, this score reached the norm of  $141,12 \pm 0,86$  and had a significant deviation from the score before treatment. In addition, in all clinical groups, normalization of blood pressure was observed, with changes without significant differences, but in clinical group B and C blood pressure scores were restored to the target figures more smoothly, preserving the natural daily rhythm of blood pressure, and did not have a zigzag pattern as in the group A.

The assessment of the dynamics of quality of life parameters of patients in clinical groups showed a significant improvement in all parameters of quality of life of patients in clinical group C. Moreover, tivortin therapy in combination with torasemide with prolonged effect (Group C) contributed to the improvement of the parameters of vital activity (VA) and physical functioning (PF), as well as the overall health (OH); the resulting data were significant, and only in clinical group A these parameters were not significant. To a lesser extent positive dynamics of treatment were related to these results in clinical group B, although the physical functioning (PF) had significant values as well. Patients in clinical groups B and C noted improvements in social functioning (SF), and this value was significant. All the obtained data favorably affected not only the quality of life of the patients but the compliance as well.

## CONCLUSIONS

The use of combination drugs, namely, torasemide with prolonged effect and tivortin aspartate in the treatment of patients with community-acquired pneumonia, com-

pllicated by exudative pleuritis, combined with hypertension led to more significant positive changes in the values of saturation, blood biochemical parameters, as well as accelerated recovery of patients, which was confirmed by the positive dynamics of X-ray examination, and to a large extent improved all parameters of the quality of life of patients, which was reflected in a significant decrease in functional limitations and high social activity of patients.

It should be noted that the findings of the studies confirm the prospectivity of use of combination drugs that affect different components of pathogenesis in comorbid states of patients, which will allow a physician in clinical practice not only to treat each patient individually, but also to reduce the cost of treatment and establish a high level of compliance.

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**Conflict of interest:**

*The Authors declare no conflict of interest.*

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