

ANALYSIS OF THE RESULTS OF COMBINED LOCAL REHABILITATION OF PATIENTS  
WITH ACUTE EMPYEMA OF PLEURA

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**Summary:** The analysis of results of treatment of 66 patients with acute empyema pleura (AEP), complicating acute lung abscess. 21 patients local sanitation was performed using a 0.06% solution of sodium hypochlorite (SH) (group I) and 20 in combination with quantum intracavitary therapy (QIT) (group II); group III (25 patients) for local rehabilitation used a 0.01% solution of chlorhexidine. QIT leads to a reduction of the amount of substrate for microbial growth, has an antibacterial effect, increases resorbative effect of SH because of increased blood flow in the area of pathological focus in the lung and the pleura. Clinical outcomes in Group I: full recovery recorded in 15 patients, clinical recovery - in 2 patients, and the transition to a chronic pleural empyema - in four, one of them died. In group II, a full recovery recorded in 18 patients, the transition to a chronic form with bronchopleural fistulas (BPF) - at one, and the formation of dry residual cavity in the pleura - 1 patient. In-group III full recovery observed, given in 17, the transition to a chronic form - in five (in 3 of them with BPF) and three patients formed a dry residual cavity.

Key words: acute empyema pleura, a combined local sanitation, quantum intracavitary therapy, sodium hypochlorite.

Introduction. The high frequency of the transition to the chronic form of AEP, which arose as a result of purulent-destructive processes in the lungs, the presence of BPF are the result of mutual burdening pathological process in the lung and pleura, and represent a challenge in terms of selection local rehabilitation methods. The main conditions for success in the treatment of patients with AEP are timely diagnosis of bronchopulmonary complications abscesses and debridement of the empyema cavity [6] on the background of an adequate treatment of the underlying disease with using of bronchoscopy technologies.

Certain progress has been achieved by using VATS technology [3], but existing techniques limited to the use of mechanical and pharmacologic effects and on the pathological substrate, which is in empyema cavity. It should be noted the adverse impact of antibiotics on the pleural sheets when intracavitary the introduction that leads to compaction, slower straightening lung and eventually to the development of plevropnevmofibrozis. Furthermore, the use of VATS technology has some contraindications because of the need for one-lung intubations that under widespread process on breathing and grave General condition, may lead to a fatal outcome. In connection with this it seems appropriate improvement techniques of local rehabilitation of patients EIA,

environmental impact assessment in the direction of their minimal invasiveness, as they all boil down, at least, to access the cavity of the empyema.

In the work V.V. Alipov et al. (2016) it is shown that the use of low intensity laser irradiation in the treatment of superficial infected wounds is accompanied by increased antibacterial action of nanoparticles of copper and stimulation of the reparative processes [5]. However, attempts to use quantum methods directly in the area of the pathological process constrained by certain inconveniences of the means of delivery of a quantum of energy in cavity formation in the lung and the pleura [2]. In this respect, attract attention fiber optic quartz light guides, which allow you to make radiation energy through installed in cavity formation and drainage. The Foundation office to perform this study was the positive results of a combined quantum intracavitary therapy (QIT) patients with lung abscesses with peripheral localization [4].

The purpose of the study – improvement of local methods of rehabilitation of patients with acute pleural empyema.

Material and methods. We observed 66 patients with AEP complicating acute lung abscess. All patients were divided into three groups: Group I patients (n = 21) performed a local sanitation 0.06% SH solution; Group II (n = 20) after washing the empyema cavity SH QIT used, and in-group III (n=25) for local rehabilitation used a 0.01% solution of chlorhexidine (comparison group). In all groups according to the testimony used active aspiration (0,1-0,2 atmospheres) in an intermittent mode; two patients (II and III groups) used occlusion BPF with power reverse endobronchial valve. In addition, all patients received complex treatment including remedial bronchoscopy, antibiotic, detoxification, substitution and restorative therapy. The antibiotics were administered parenterally, with the sensitivity of pathogenic microorganism's detachable bronchi and the pleural exudates.

QIT was performed using the apparatus OVK-03 with a use of quartz light water introduced into the cavity of the empyema through the silicone tubes in the irradiation process, constantly changing the position of the optical waveguide. Irradiation was performed after debridement of empyema SH solution for 10 minutes, daily, No. 10, used III mode (wavelength of 310-600 nm (max 330-360 nm, power 30 mW) [1]. Before irradiation of empyema cavity y to improve the dispersion of rays filled with saline. In the presence of large BPF the patient was placed in a position opposite the drain.

Statistical processing of digital material was carried out by method of variation statistics using the software package «BIOSTAT» (Primer of Biostatistics, 4th Edition, S.A. Glantz, McGraw-Hill).

Results and discussion. As a result of the combination of local rehabilitation patients I and II groups on day 3 observed a decrease in body temperature up to  $36,7 \pm 0,2$  °C, in Group III by this

time it was  $37,6 \pm 0,1$  °C ( $p < 0,05$ ). Accordingly, the length Flow rate febrile period in these groups was  $3,0 \pm 0,2$ ;  $3,3 \pm 0,3$  and  $6,4 \pm 0,5$  days.

Indicators leukocytosis in 10-12 days in the I-th group of patients decreased by 36.8% in group II - by 46,7% ( $p > 0,05$ ) and group III - 22.7% (in relation to the indicators I and II groups,  $p < 0,05$ ). The magnitude of leukocyte index of intoxication Kalf-Caliph I and group II in the same period authentically restored to the level of the physiological norm, and in the comparison group, it decreased from  $3,89 \pm 0,41$  to  $2,40 \pm 0,33$  conv. u ( $p < 0,05$ ), restoring it to the level of the norm only occurred at the end of the third week. Execution for the local sanitation SH of empyema cavity led to an earlier reduction in signs of systemic inflammatory response as compared with the patients of group III.

Patients of group II marked the most pronounced positive clinical and radiographic dynamics; in adjacent to the wall of the empyema cavity affected area from exposure to light QIT by ultrasound reported a greater increase in blood flow rate, as compared with patients of III groups and I.

When fibroptic 4-5 th day from the beginning of the rehabilitation of the pleural cavity in 5 patients of group III showed signs of diffuse endobronchitis II degree of inflamed and 12 – local endobronchitis I degree. In group I, II endobronchitis, the degree of inflammation was observed in one person, all the rest had signs of local endobronchitis I level, and at the same time in the second group only six patients had signs of local endobronchitis I degree. This effect is apparently connected with the influence of the quantum radiation on the walls of the purulent cavity and the surrounding lung tissue, leading to improved circulation in the area of the pathological focus and, ultimately, enhancement of translocation of solution SH of empyemas cavity surrounding the affected lung tissue.

During the 1-day observation period recorded an increase of exudation-term pleural fluid of patients in group II and 30 ml / day, compared with other groups of patients, that is probably due to the influence of the quantum radiation on the walls empyemas cavity. But then for 3-4 hours we found a reduction in the daily production of pleural exudates in patients in group I at  $51,1 \pm 3,9$  ml / day ( $p < 0,01$ ), in Group II - on  $87,6 \pm 6,8$  ( $p < 0,001$ ) and group III - by  $36,4 \pm 3,1$  ml / day. The level of sediment in the supernatant of the pleural exudates in patients of group II was the lowest in relation to these indicators in both groups.

Bacteriological control of pleural exudate prior to the reorganization in all groups detected pathogenic aerobic microorganisms, mostly were *Staphylococcus aureus*, *Staphylococcus epidermidis*, *Streptococcus* spp. group viridans, *Pseudomonas aeruginosa*; *Proteus vulgaris*, of which 28% was observed in a monoculture and 72% – different association.

The result of the combined local rehabilitation using QIT pathogenic microorganisms in the pleural exudates disappeared by  $5.1 \pm 0.1$  days earlier than with the indicators of group III, and  $2.7 \pm 0.2$  days – in relation to the indicators of the first group. For the Association of microorganisms in group II patients disappeared, as a rule, up to 3 days of observation, while in group III, they were kept up to 7 days. The comparison of this fact with the results of the dynamics of production of pleural exudates demonstrates the reduction of pathological substrate for microbial growth and enhancing antibacterial action SH as a result of photochemical reactions in the area of pathological focus due QIT. The latter is confirmed by ultrasound examination of blood flow around the area of the pathological process, which showed an increase in the level of pulmonary blood flow in patients of group II.

We have recorded signs of stimulation of local immunity and desensibilising action QIT, as indicated by a significant decrease in levels of IgA and IgE in patients of Group II. Patients in groups I and II on 18-20 day recorded an increase in the level of IgM, having the property of binding microorganisms, which apparently has a value in terms of prevention of persistence of pathogenic bacteria in the area of the lesion and is a predictor obstacles the transition of the pathological process in chronic form.

The immediate results of treatment of patients in group I were: full recovery recorded in 15 patients, clinical improvement in 2 patients and the transition to a chronic pleural empyema – 4, BPF one of them, who died from progressing cardiopulmonary insufficiency. In group II recorded a full recovery in 18 patients, the transition to a chronic form with BPF – 1 and the formation of a dry residual cavity, in the pleura in 1 patient. In group III, complete recovery was observed in 17 of the transition in the chronic form – in five (three BPF) and three patients formed a dry residual cavity.

Conclusions. 1. Intracavitary quantum therapy leads to a reduction in the volume of substrate for microbial growth, it has a bactericidal action due to the presence of UV rays present in the spectrum of OVK-03 and enhances antibacterial effect of sodium hypochlorite due to increased local blood flow and the effects of photochemical reactions on the microorganisms and tissue structures in the area of pathological process.

2. Combined local sanitation using intracavitary quantum therapy leads to increased resorptive, antibacterial and immunomodulating action SH, enhances the effectiveness of bronchoscopes sanitation of purulent-destructive lesions in the lung and is accompanied by a reduction in the incidence of pleural empyema transition in the chronic form.

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