

Functional State of the Respiratory System in Patients with Abdominal Sepsis

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Abstract:

The results of clinical examination of the respiratory function of patients with abdominal sepsis are presented. Disorders of the functional state of the respiratory system in such patients are found to have a restrictive character. A conclusion is drawn concerning the necessity to correct medical treatment of such patients including oxygen therapy into the protocol of treatment.

Key words: Abdominal sepsis, pathogenesis, respiratory function.

Introduction

Abdominal sepsis (AS) is accompanied by shock or close to shock condition of the patient, and one of its signs is tachypnea and organic or multiple organ dysfunction (hypoxemia, impairment of consciousness, poly- / oliguria, hyperlactatemia, etc.). These changes in the body connect with the development of hypoxic conditions and are caused by three factors: decreased level of pO_2 , long stay under conditions of oxygen deficiency, and individual susceptibility to oxygen insufficiency [2, 4]. Stimulation of the respiratory center by the impulses coming from the vascular chemoreceptors (mainly sinocarotid and

aortic zones) with changes of the blood chemical content (decreased level of pO_2 , accumulation of hydrogen ions and carbonic acid), results in hyperventilation, which is indisputable positive reaction to hypoxia, but it has negative outcome as well, as it is accompanied by carbonic acid excretion, its reduced level in the blood and development of hypocapnia [1, 3]. At the same time, considering severity of the condition of such patients, comprehensive examination of the functional state of the respiratory system in case of AS is not adequate.

The aim of the study is to find disorders of the functional state of the respiratory system in patients with abdominal sepsis.

Material and methods

Seven patients with AS (I group) [2], nine patients after planned surgery on uncomplicated hernias of the anterior abdominal wall or varicose veins on the lower limbs (II group) have been examined. The control group (III group) included 12 healthy and practically healthy volunteers. Anamnesis of all the patients was not complicated by bronchial-pulmonary pathology. Hemodynamic parameters were detected on 2-3 day after operation enabling to reduce a direct influence of surgery on the functional state of the respiratory system. Examination and estimation of the respiratory function (RF) were conducted with standard respiratory maneuvers on a portable computed spiograph. In our research, we followed generally accepted international and domestic bioethical norms. The results obtained were processed with the following creation of computed database and further statistical processing by means of the methods of variation statistics applying the software package Primer of Biostatistics v.9.8.

Results and discussion

The results of RF examination are presented in the table 1. Appropriate calculated data in all the groups differ unreliably ($p>0.05$) and correspond to the age and gender norms. The index of the vital capacity of the lungs was sharply reduced in the II group of patients, but in the patients with AS it was three times as low as compared to the control group hardly reaching 38.2% out of the calculated standard index. Forced vital capacity (FVC) of the lungs was the lowest in the group I; it was twice less than that of the group II. The muscular apparatus tonus participating in respiration was sharply reduced, lung excursion decreased, permeability of the bronchial tree deteriorated on all the levels. Practically all the indices of the functional state of the respiratory system in patients with abdominal sepsis were much less pronounced than in surgical patients from the II group of the study.

All the patients of the groups examined had already received the lessons of respiratory exercises in the complex of post-operative rehabilitation before the stage of the study. Duration of Stange's test was the longest in the III group (control group) and constituted 39.08 ± 3.65 , which was reliably different from the rest of groups by this index ($p<0.05$). Hench's test was also the longest in the group of healthy and practically healthy individuals concerning the I group ($p<0.05$) and a little less in the II group ($p>0.05$).

pO_2 index at rest prevailed in the III group and II group as compared to the patients of the I group ($p<0.05$). With the dynamics of pCO_2 at rest a reliable difference was found in the I group ($p<0.05$) and III group ($p<0.05$) as compared to the biggest value in the II group. After oxygen inspiration the following pO_2 dynamics was observed: the result was higher in the III group as compared to the I one ($p<0.05$), without substantial differences in the II group. pCO_2 variation after oxygen is characterized by reliable differences in the II group

concerning the I one ($p < 0.05$), but without substantial variations in the rest of the control group examined ($p > 0.05$).

According to the level of pO_2 and pCO_2 gases in the arterial blood reliable arterial hypoxemia against mild hypocapnia occurs (adaptive respiratory alkalosis with metabolic acidosis due to alveolar hyperventilation against the ground of pronounced tachypnea). Dynamics of pO_2 and pCO_2 indices after hyperventilation test and respiration with 100% oxygen during 5 minutes are most likely indicative of prevailed disorders of ventilation-perfusion and metabolic correlations in genesis of hypoxemia, and respiratory alkalosis was not characterized by the tendency to normalization.

Conclusion

The found disorders of the functional state of the respiratory system in patients with abdominal sepsis are indicative of the necessity to correct medical treatment of such patients considering functional changes of the respiratory function and oxygen therapy inclusion into the therapeutic protocol of such patients as a compulsory component.

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Table 1: The level of gases in the blood (oxygen and carbon dioxide) in patients with abdominal abscess

Indices	Patients with abdominal sepsis (I group) n=7	Patients with other surgical pathology (II group) n=9	Practically healthy - control (III group) n=12
Stange's test (s)	12.85±3.81*	29.36±1.24*	39.08±3.65
Hench's test (s)	8.93±0.53*	21.38±2.84	25.63±3.73
pO ₂ at rest	53.64±3.28*	69.04±5.02	73.51±2.67
pCO ₂ at rest	30.63±2.70*	49.26±3.07	40.47±1.68*
pO ₂ after oxygen supply	64.32±1.94*	70.37±3.75	75.76±1.52
pCO ₂ after oxygen supply	31.66±2.58*	41.26±3.89	38.35±1.73

Note. * – (p<0.05) reliability according to the given index between the groups examined concerning the biggest value.