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Prevention and Treatment Respiratory Complications in Patients Operated on Peritonitis

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Summary: The paper highlights the issues of prevention of respiratory complications in the early postoperative period using a portable nebulizer with the addition of sea salt.
Conclusion: Conducting of preventive measures using an ultrasonic nebulizer for the prevention of respiratory complications in the early postoperative period in patients with peritonitis was the obligatory method. Application of inhalation using an ultrasonic nebulizer provides deep penetration of dispersed particles in the tracheobronchial tree that provides a high preventive and therapeutic effect. Usage of sea salt for inhalation in the early postoperative period in peritonitis reduces respiratory complications by 1.7 times, which leads to rapid recovery of patients and has a significant economic impact.

Keyword: Rehabilitation, Peritonitis, Inhalation, Sea salt.

1. Introduction

In the structure of surgical diseases peritonitis takes one of the leading places. The problem of the treatment of peritonitis and its complications is a key issue of modern abdominal surgery. High mortality of 20 - 35%, which is held during the last decades, forces surgeons to seek new ways to fight for the patient`s [1].

Threatening complication in patients with peritonitis in the postoperative period is postoperative pneumonia, the frequency of which is 24 - 42%, which affects the postoperative period, and in the elderly can cause mortality. Up to 65% pneumonia occurs in the lower regions of the lungs. According to spirometry in acute surgical pathology diaphragmatic breathing is reduced to 10 - 20% after surgical intervention to another 10 - 20%, chest breathing to 5 - 15%. It is restored in 7 - 10 days after surgery. Studies indicate on the need for prevention of pneumonia as during inhalation anesthesia and surgery - dosed hyperventilation of the lungs, and in the postoperative period. This includes the use of inhalation techniques, breathing exercises with emphasis on diaphragmatic breathing, elimination of flatulence [2, 3].

One of the causes of pneumonia in the postoperative period in patients with peritonitis is microbial insemination of abdominal cavity from the gut, which penetrates into the systemic circulation is delayed, especially in the capillaries of the pulmonary circulation, and creates conditions for the appearance of nosocomial pneumonia [4].

In the departments of anesthesiology and reanimation incidence of nosocomial pneumonia in 6 - 20 times higher than in the departments of general clinical profile [5].

The aim of our work was to develop prophylactic agents for preventing respiratory complications in the early postoperative period by studying the impact of sea salt inhalation using an ultrasonic nebulizer in patients with peritonitis.

2. Materials and methods:

We have examined 165 patients with acute surgical pathology. Patients` age ranged from 18 to 93 years. Men were - 75, women - 90. By age patients were grouped as follows: to 30 years - 40 (24.2%) from 31 to 50 - 32 (19.4%) from 51 to 60 - 27 (16.4%), older than 61 - 66 (40%). 50 year-old and older patients were 96 (56.4%) of the total. In the stock of comorbidity most frequently were observed diseases of the cardiovascular system - 104 (63%), varicose disease of the lower limbs - 76 (46.1%), diseases of the respiratory system - 34 (21%), neuron-endocrine disorders - (diabetes - 20 (12.1%), obesity - 48 (29.1%). The term of hospitalization is: up to 6 hours – 22, to 12 hours – 25, to 24 hours, -20, up to 48 hours - 74,> 72 hours - 24.

65 patients were found with diffuse and 100-with total peritonitis. The structure of pathology in diffuse was as follows: acute phlegmonous appendicitis - 2, acute gangrenous appendicitis - 2, acute perforated appendicitis - 10, acute calculous cholecystitis - 12, salpingitis - 8, incarcerated hernia - 4, apoplexy - 20, others - 7.

The structure of pathology in peritonitis was as follows: acute perforated appendicitis - 7, acute calculous cholecystitis - 3, acute intestinal obstruction - 25, incarcerated hernia - 4, Crohn's disease - 3, perforative gastric ulcer and 12 duodenal ulcer - 28 injured organs of abdominal cavity - 11, perforation of the colon - 2, small intestine - 1 cancer - 16.

Patients were divided into two groups identical in age and severity of disease. The first group - 75 patients (after 50 years - 39 (52%)) who received standard therapy, and the second group - 90 (after 50 years - 57 (63,3%)), for which inhalation with the addition of sea salt was conducted. Standard respiratory prophylactic therapy included breathing exercises, massage and rubbing of chest. In the second group, except the standard preventive therapy, inhalation with the usage of portable ultrasonic nebulizer "ultrasonic vaporizer 402A" ultrasonic frequency of 1.7 Mhz was conducted. Maximum speed of spraying is 4 ml/min [6].

Inhalations were help with the addition of sea salt twice a day for 5 - 6 days. The solution for inhalations was prepared by diluting of 50 g of sea salt fov 1 liter of water.

Ultrasonic nebulizers created spraying by ultrasonic vibrations which provide average size of aerosol particles 0,5-5 microns, which is 50% better than in the compressor nebulizers. Due to the small size of aerosol particles aerosols reach shallow bronchi and bronchioles in higher concentration and this improves drainage function of the respiratory tract, reduces edema and inflammatory activity, improving microcirculation of the mucosa of the respiratory tract and the removal of bronchospasm [7].

To stimulate the cough reflex 5 - 10% of saline solution is applied. The criterion for evaluating the effectiveness of respiratory prevention was: general patient`s condition, complaints, auscultatory pattern in lung dynamics of intoxication the number of (leukocytes, leukocyte intoxication index) and systemic inflammation (body temperature, heart rate, respiratory rate).

To evaluate the effectiveness of the proposed method, patients` condition was evaluated for 1-st, 3-d and 5-th days of treatment. For 1 and 3 days of data physical examination and laboratory data performance did not differ. However, on the 5-th day the indicer in the second group which used inhalation as a method of prevention of respiratory complications significantly differed from the first, including patients noted improvement in general condition, auscultatory clearly bugged the vesicular breathing throughout the lungs. The number of leukocytes lowered to $11,2 \pm 1,3x10^9$ and leukocyte intoxication index decreased from $3,4 \pm 0,8$ to $2,7 \pm 1,3$. From the 3-d day normalization of body temperature, pulse and respiration rate was observed. Instead, the first group of patients on the 1-st, 3-d day physical examination data ascertained shallow breathing, breath weakened auscultator vesicular breathing in the lower lobes of the lungs. On the 5-th day weakened breathing was observed in most elderly patients. Complaints of general weakness, sweating, fatigue, intermittent cough were watched. Laboratory data indicated the existence of a general process? The number of leukocytes $11,8 \pm 1,2x10^9$ and leukocyte intoxication index $2,8 \pm 1,1$, that didn1t have

sufficient positive dynamics. Normalization of temperature, pulse and respiration rate came on the 5-th day.

In the first group respiratory complications occurred in 10 (13,3%) patients, postoperative pneumonia occurred in 7 of all (9,3%), effusion in 3 (4%) patients. In the second group complications were recorded in 7 (7,7%), pneumonia - 6 (6,6%), pleurisy - 1 (1,1%), respectively.

3. Conclusions:

1. Conducting of preventive measures using an ultrasonic nebulizer for the prevention of respiratory complications in the early postoperative period in patients with peritonitis was the obligatory method.
2. Application of inhalation using an ultrasonic nebulizer provides deep penetration of dispersed particles in the tracheobronchial tree that provides a high preventive and therapeutic effect.
3. Usage of sea salt for inhalation in the early postoperative period in peritonitis reduces respiratory complications by 1.7 times, which leads to rapid recovery of patients and has a significant economic impact.

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