

Conference Paper

Optimization of the Wound Repairation Process

Vlasov A.P.¹, Zaytsev P.P.¹, Anaskin S.G.², Vlasov P.A.¹, Grigoriev A.G.¹, Shevalayev G.A.¹, Korniletskiy I. D.², and Komochkina E.A.²

¹N.P.Ogarev Mordovia State University, Saransk, Russia

²National Research Nuclear University MEPhI (Moscow Engineering Physics Institute), Kashirskoe shosse 31, Moscow, 115409, Russia

Abstract

Nowadays, postoperative wound complications are quite frequent in surgery. Various medicines and physical methods are widely used to accelerate reparative regeneration (1,2). So far, the effect of oxygen air ions on the wound healing process has not been studied. Meanwhile, aeroionotherapy, characterized by an anti-oxidant action, can have an inducer effect.

The purpose of the research was to study the effect of oxygen air ions on the regeneration of tissue structures of a laparotomic wound.

Clinical and laboratory studies were conducted in 48 patients (divided into two groups) with acute peritonitis of appendicular origin. The patients of the basic group underwent aerionotherapy in the early postoperative period.

While using aeroionotherapy, the reparative process was faster and more perfect. The effect of oxygen air ions was accompanied by an acceleration of the inflammatory reaction course, which is manifested by the rapid migration of cellular elements to the wound surface and their differentiation into the connective tissues. This important fact explains the anti-inflammatory effect of such therapy, its capability to inhibit the alterative process and stimulate the reparative process. In the basic group, the intensity of biological consolidation was significantly different from that of the comparison group. Only 3 days after the operation, it was higher than the control value by 23.2%, after 5 days - by 37.7%, after 7 days - by 35.6% ($p < 0.01$).

Thus, the obtained data suggest that the negative oxygen air ions should have a rather pronounced regenerative effect.

Corresponding Author:

Vlasov A.P.

vap.61@yandex.ru

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1. Introduction

Nowadays, postoperative wound complications are quite frequent in surgery. Various medicines and physical methods (1,2) are widely used to accelerate reparative regeneration. So far, the effect of oxygen air ions on the wound healing process has not

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been studied. Meanwhile, aeroionotherapy, characterized by an anti-oxidant action, can have an inducer effect.

The purpose of the research was to study the effect of oxygen air ions on the regeneration of tissue structures of a laparotomic wound.

2. Materials and methods

Clinical and laboratory studies were conducted in 48 patients with acute peritonitis of appendicular origin, who were divided into two groups. The patients of the main group underwent aeroionotherapy in the early postoperative period. Aeroionization of the hospital ward was performed daily for the first 7 days after the operation with a dose of 20 biological units. The nature and rate of wound regeneration was assessed by wound-tensiometry and cytological examination of wound exudate. The follow-up periods were 1, 3, 5, 7 days.

3. Results

In studying the clinical progression it was identified from the wound exudate of neutrophilic leukocytes that their number in the patients of the comparison group 1 day after the operation was 114 ± 19.2 in 10 fields of vision, 3 days after the operation it increased by 71.3% ($p < 0.05$). Homogenization, swelling, fragmentation, pycnosis and complete destruction of the nuclei with formation of granularity were observed in many neutrophilic leukocytes.

After 5 days, the number of neutrophils increased by 2.3 times ($p < 0.05$). The majority of their nuclei increased in size, for some neutrophils they were loosened. Physiological degeneration of neutrophils was observed, which, in particular, was shown by the fragmentation and pycnosis of the the nuclei.

Only by the end of the observation period, the number of neutrophilic leukocytes decreased to 38.3 ± 4.8 . By this time there was a progressive decrease in their degenerative forms against the background of a decrease in the total number of neutrophils, which indicated the completion of the inflammation phase within this time period.

This is evidenced by the regenerative-degenerative index. 1 day after the operation, it was 0.27 ± 0.03 in the patients of the comparison group, after 5 days - 0.46 ± 0.06 ($p < 0.05$) and only 7 days later its value was approaching unity.

The content of lymphoid polyblasts ranged from 4.4 to 20.3 in 10 fields of vision in the first 5 days after the operation.

While using aeroionotherapy, the reparative process was faster and more perfect. The effect of oxygen air ions was accompanied by an acceleration of the inflammatory reaction course, which is manifested by the rapid migration of cellular elements to the wound surface and their differentiation into the connective tissues. This important fact explains the anti-inflammatory effect of such therapy, its capability to inhibit the alternative process and stimulate the reparative process. In the basic group, the intensity of biological consolidation was significantly different from that of the comparison group. Only 3 days after the operation, it was higher than the control value by 23.2%, after 5 - by 37.7%, after 7 days - by 35.6% ($p < 0.01$). (fig. 1).

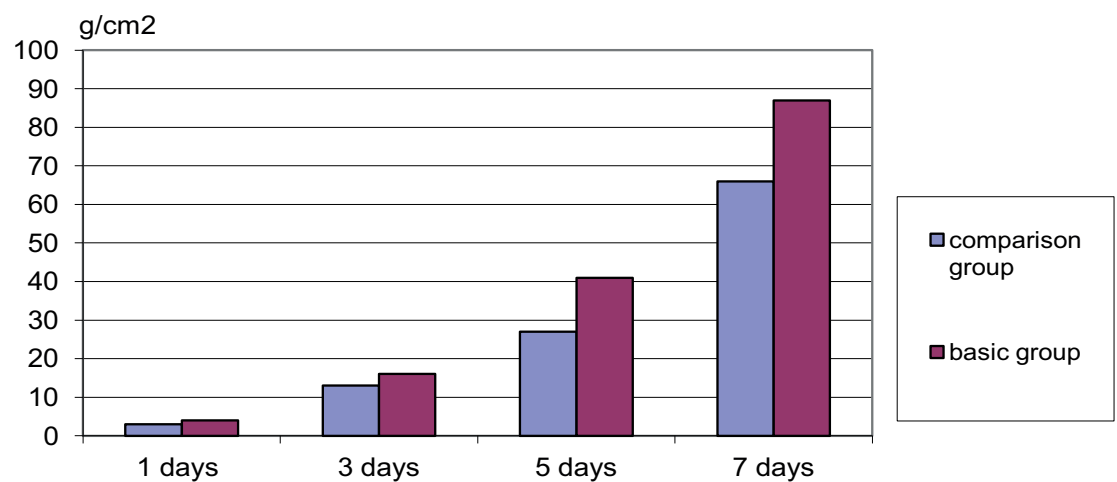


Figure 1: Progression in intensity of biological consolidation of wound edges in patients with acute peritonitis (g/cm^2).

Thus, the obtained data suggest that the negative oxygen air ions should have a rather pronounced regenerative effect.

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