ENTERAL ANTIHYPOXIC THERAPY OF THE INTESTINAL FAILURE IN DIFFUSE PERITONITIS PATIENTS

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One of the main reasons which have a direct influence on the outcome of an open cavitary surgery in the abdominal cavity organs in the case of diffuse peritonitis patients is the intestinal failure which develops in the early postoperative period. One of the intestinal failure treatment techniques in the case of diffuse peritonitis is one or another type of gastrointestinal decompression. The most frequently used technique is a nasointestinal drainage used for the intestinal decompression, early enteral nutrition and introduction of pharmaceutical substances. Over the last few years, this concept of the intensive intestinal failure therapy has outlined a new approach which foresees an incorporation of pharmaceutical antihypoxic agents which actively stimulate organ metabolic processes in the intestine [1, 2, 3].

On the base of the pharmaceutical research and manufacturing enterprise "Astlek" we have developed an oxygenated water technology "OxyEnergy". This product is a specially prepared and purified water, enriched with pure oxygen molecules in the amount of 250000 ppm. This water has not been previously used for the treatment of intestinal failure patients.

The objective of the research was to improve the results of intestinal failure patients with diffuse peritonitis.

The research was conducted among 86 patients with diffuse purulent peritonitis who were treated in the General Surgery Unit of the Astrakhan State Medical Academy on the base of the State Budget Healthcare Institution of the Astrakhan Region "City Clinical Hospital №3" in Astrakhan. The age of the patients was between 19 and 82. Mannheim peritonitis index was 21.5 on average.

The following describes the treatment method for the intestinal failure with the diffuse purulent peritonitis, first developed by us. After the removal of the peritonitis source and sanitation of the abdominal cavity we placed a nasointestinal tube and removed intestinal contents, thus reaching complete decompression. Then the intestine was cleaned with a saline solution until the water was clear. During and after the operation we also introduced the oxygenated water in the amount of 100 ml by means of the nasointestinal tube, with the subsequent tube occlusion for the duration of 60 minutes. The oxygenated water was introduced twice a day every 12 hours in the course of 3–5 days [4].

In order to monitor the effectiveness of the technique, we analysed the acid-base balance and blood gas with the help of the Medica Edsy Blood Gas analyser (USA, selective electrode technique). The tests were taken before the introduction of the oxygenated water (initial indexes); 30 minutes after its introduction we analysed blood samples from the superior mesenteric vein and the central vein. 60 and 120 minutes after the introduction of the oxygenated water we took more blood samples from the central vein. We then calculated the arithmetic mean value by means of the method of moments to estimate the certainty value of the mean and relative values according to the Student's t-tests.

We applied this technique in the group of 46 patients with diffuse peritonitis. The obtained results were compared to the results of the other group of 40 patients who did not receive any oxygenated water. The groups were identical according to their gender, age, severity of the pathology and character of surgical procedures. There were no complications when using the above technique.

The research results are shown in Table 1.

The research showed that all the patients with diffuse peritonitis suffered from acidosis, hypercapnia and hypoxia before the oxygenated water introduction. There was a significantly faster reduction of the hypoxia symptoms in the group of patients who received the oxygenated water, which was confirmed by the

Table 1. *Indicators of acid-base balance and gas composition of blood in the groups*

Indicators	Group of interest (n-14)				Control group (n-15)			
	start	30 min	60 min	120 min	start	30 min	30 min	120 min
pH	7,27	7,38	7,30	7,32	7,26	7,23	7,1	7,16
pCO_2	45,5	44,4	38,5	35,4	51,2	51,0	50,5	45,4
pO_2	32±1,1	63±1,2	68±1,1	91±1,5	36±0,9	42±0,8	58±1,1	59±1,3
TCO_2 %	22,3	22,2	20,9	17,9	24,7	23,4	20,9	17,9
HCO_3 mmol/l	21	20,8	19,3	16,5	23,1	21,8	19,3	16,5
BE в mmol/l	-5,9	-6,1	-9,3	-12,0	-4,6	-6,2	-9,3	-12,0
BE ect mmol/l	-6,0	-6,1	-9,1	-12,2	-4,1	-5,8	-9,1	-12,2
SO_2 %	54,1±1,5	75,9±1,1	82,4±0,9	88,5±1,1	59,8±1,2	60,1±1,1	66,4±1,2	62,5±1,3
O_2 stand. %	12,1±0,3	15,4±0,2	16,8±0,4	22,1±0,3	12,2±0,4	13,9±0,4	12,8±0,3	11,1±0,2
R 1	40	49	30	34	51	45	30	32

Additional information: in the indicators pO_2, SO_2, O_2 standard accuracy changes ($p<0,05$)

increase in the oxygen partial pressure in the superior mesenteric and central veins.

The average duration of the nasointestinal tube presence and the relief of the intestinal failure in the main group was 3.8 days and 5.8 days in the control group. In the main group, 3 patients died from the progressing intoxication and multiple organ failure. 6 patients deceased in the control group. On average, the patients of the first group stayed 15.8 days in the hospital and those in the second group – 18.5 days.

In addition to the acid-base balance and blood gas tests, we also analysed other biochemical and immunological oxidative stress markers. The results of these tests were not included into this article, however, they correlated with the final research results.

This way, against the background of the combined therapy, the introduction of the oxygenated water by means of the nasointestinal tube in the case of patients with diffuse peritonitis makes it possible to relief the hypoxia of the intestinal wall and the intestinal failure symptoms within a shorter period of time. When using our technique, the nasointestinal drainage lasts 2 days less, thus reducing the complications connected to it. Our technique is simple, does not require any additional equipment and ultimately leads to a cost reduction due to the shorter stay of the patient in the hospital. Furthermore, our method reduces the lethality of patients with diffuse peritonitis.

REFERENCES

1. **Matkevich VA, Rozhkov PG, Simonova AIu, Kurilkin IuA, El'kov AN** Prevention of hyperhydration complications of intestinal lavage in acute poisonings by psychopharmacological agents]. Anesteziol Reanimatol; 2008 Nov-Dec;(6):31-3.
2. **Mironov A. V.,** Intestinal failure syndrome in patients with peritonitis: diagnostics and methods of the enteral correction. Author's abstract of dissertation for the Candidate of Medical Science M., 2011, pp. 11-12.
3. **Poryadkov L. F. et. al.,** The influence of the enterally introduced oxygenated water on the electrical activity of the small intestine of rats in the early postoperative period. Voprosy pitaniya, 2003. №1, pp. 6-9.
4. Treatment technique for the intestinal failure in the case of patients with diffuse peritonitis. / Topchiev M. A., Parshin D. S., Melnikov B. B., Kchibekov I. A., Shlyahta S. S.: Applicant for the patient and patient holder: State Budget Educational Institution for Higher Professional Education "Astrakhan State Medical Academy of the Russian Ministry of Health".- №2012140858(065917).- Priority from 24.09.2012