



ISSN: 2277- 7695

TPI 2014; 3(7): 26-28

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www.thepharmajournal.com

Received: 25-07-2014

Accepted: 31-08-2014

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The influence of complex surgical treatment for endogenous intoxication dynamics in patients with acute intestinal obstruction

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Abstract

The results of complex surgical treatment of 202 patients with acute intestinal obstruction were analyzed. Established, that growth of enteroglia of intestine the value of endogenous intoxication increased. Using in complex treatment of antioxidant medications and lavage of small intestine caused of endogenous intoxication and postoperative complication decrease.

Keywords: intestinal obstruction, endotoxycosis, ceruloplasmin, hepatocytes, indicators of endogenous intoxication, Reamberin.

1. Introduction

Despite of modern technologies of diagnostic and treatment implementation the acute intestinal obstruction (AIO) is one of actual problems in urgent abdominal surgery which accompanied of high mortality 12-25% [1, 2]. Change in secretory, absorption and barrier function of small intestine caused of syndrome of enteral insufficiency development (SEI) which can leads to poliorganic failure and death in early postoperative period [3, 4]. Timely resolution of acute intestinal obstruction takes an important play in patients management. But many trials showed that after liquidation of strangulation the acute reperfusion damage of intestine wall developed and could cause of increase of the endogenous intoxication [5, 6].

AIO is accompanied by free radical oxidation. The accumulation of lipid peroxidation products caused of oxidative phosphorylation separation and inhibited of electron transfer in oxidative chain of mitochondria. It caused of energy-depended functions inhibition and poliorganic insufficiency development. In intoxication condition the energy chain of mitochondria lose its character of electron acceptor except of succinic acid which is member of Krebs cycle. Additional exogenic admission of succinic acid enrich of energy deficiency in human body [8].

Among of measures of SEI treatment in acute intestinal obstruction the important place is belongs of intestine drainage with intestinal therapy [7]. Thus, in postoperative period we should use complex treatment.

The purpose of study was to study of endogenous intoxication changes in patients with AIO during complex treatment with surgery, intestinal lavage and Reamberin solution.

2. Material and Methods

The results of examination of 232 persons, including 202 patients with ASIO aged 30 to 80 years hospitalized in Central City Clinical Hospital of Ivano-Frankivsk in 2008-2012, were analyzed. Among the patients were 98 men (48.5%), 104 women (51.4%) and 30 almost healthy individuals. Reasons of ASIO were strangulated hernia -56 (27.7%) patients, including postoperative 22 (10.8%) patients, strangulated intestinal obstruction - 44 (27.7%) patients, adhesive intestinal obstruction - 63 (31%) patients, intestinal obstruction with blockage - 17 (8.4%) patients. Assessment of endogenous intoxication (EI) was conducted by definition of parameters of leukocyte intoxication index (LII) Kalf, Calif, the index of intoxication (II) by Tarelkin method. The level of average molecular weight (AMW) by the Garbielyan method. The level of lipid peroxidation (LPO) - malonic aldehyde (MA) analyzed by the Korobeinikov tiobarbituric acid test and diene conjugates (DC) – by the UV absorption spectrum of heptane and izopropanol Gavrillov and R. Determination of ceruloplasmin was performed by the method Babenko. Statistical analysis of the survey results was performed using MS Excel 07

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based on MS Windows 98 and analysis program Analys+Soft, 2007. Inspection of the distribution of samples for normality was performed with the number of variations using the criterion of the Shapiro-Wilke. To test the hypothesis of equality of the average values Student-Fisher criterion was used for normal distributed samples and Wilcoxon-Mann-Whitney criterion for samples which distribution is different from the normal.

All patients were divided into 2 groups: basic and control. In postoperative period we used of nasointestinal intubation of small intestine with followed intestinal lavage, by 400 ml 0.9% NaCl solution 4-6 times a day during 2-3 days. With the aim to correct of metabolic disorders in the basic group patients we

used of Reamberin ("POLISAN") solution 400-800 ml (depending on severity), 2 times a day, i/v with the speed of 90 dr/min. prior to surgery and during the first 5 days of the postoperative period.

3. Results and Discussion

The progressive endotoxins in patients with AIO was accompanied with increase of LII, II, AMW, MD and DK, and with simultaneous depletion of antioxidation protection which expressed by decrease of activity of ceruloplasmin (CP), catalase (C) and iron saturation of transferrine (IST) (see Table 1).

Table 1: The Dynamics of Endogenous Intoxication Parameters in Patients with AIO

Norma n=30	Before treatment		5-7 th days of treatment		12-14 th days of treatment	
	Control group n=101	Basic group n=101	Control group n=101	Basic group n=101	Control group n=101	Basic group n=101
Leukocyte Intoxication Index (LII), U						
0,70 ± 0,007	4,37 ± 0,09	4,39 ± 0,08	2,10 ± 0,03	1,96 ± 0,03* -52%	0,97 ± 0,02* -79%	0,85 ± 0,01* -81%
Index of Intoxication (U)						
0,95 ± 0,02	9,71 ± 0,18	9,73 ± 0,18	3,82 ± 0,06* -60,7%	2,19 ± 0,03* -77,4%	1,84 ± 0,04* -81%	1,1 ± 0,02 -88%
Average Mass Molecules (U)						
0,27 ± 0,018	0,56 ± 0,01	0,55 ± 0,01	0,45 ± 0,008* -18%	0,39 ± 0,008* -30%	0,41 ± 0,006* -33%	0,31 ± 0,004 -44%
Malonic aldehyde (MA) (nmol/ml)						
3,46 ± 0,08	5,97 ± 0,10	5,94 ± 0,08	4,57 ± 0,05* -23%	4,18 ± 0,04* -30%	4,00 ± 0,06 -33%	3,35 ± 0,04 -44%
Diene conjugates (DC) (U)						
1,42 ± 0,04	2,64 ± 0,04	2,66 ± 0,04	1,80 ± 0,03* -32%	1,55 ± 0,02* -41,5%	1,53 ± 0,02* -42%	1,41 ± 0,02 -47%
Activity of ceruloplasmin (U)						
29,4 ± 0,88	19,61 ± 0,31	19,52 ± 0,27	22,26 ± 0,23* +13,5%	25,90 ± 0,26* +32,7%	25,56 ± 0,26* +35,4%	27,18 ± 0,21 +39,2%
Activity of catalase (mg H₂O₂/ml)						
12,75 ± 0,26	8,71 ± 0,13	8,71 ± 0,15	10,26 ± 0,14* +17,8%	11,46 ± 0,14* +31,64%	12,32 ± 0,11 +41,4%	2,70 ± 0,12 +24,7%
Iron saturation of transferrine (U)						
0,19 ± 0,002	0,144 ± 0,001	0,146 ± 0,002	0,158 ± 0,001* +9,7%	0,17 ± 0,001* +17,80	0,172 ± 0,001* +19,4%	0,182 ± 0,001 +24,7%

We observed of intoxication values increase in all patients with AIO at admission. In particular, the levels of LII, II and AMW were – (4,37 ± 0,09) U, (9,71 ± 0,12) U, (0,56 ± 0,01) U respectively, versus normal range (0,70 ± 0,007) U, (0,95 ± 0,02) U and (0,27 ± 0,008) U (p<0,05).

The analysis of lipid peroxidation and antioxidative protection showed of increase of MA level till (5,97 ± 0,10) nmol/ml, DC

– till (2,64 ± 0,04) U, norma - (3,46 ± 0,08) nmol/ml and (1,42 ± 0,04) U. Simultaneously the values of CP, C and IST decreased – (19,6 ± 0,31) U, (8,72 ± 0,13) mg H₂O₂/ml, and

(0,144 ± 0,001) U, norma – (29,4 ± 0,88) U, (12,75 ± 0,26) mg H₂O₂/ml and (0,19 ± 0,002) U respectively.

Thus, the severity of AIO course depends from time of enterergia formation which accompanied with intestine paresis,

intoxication and antioxidant deficiency.

Using of complex surgical treatment described above caused of gradual decrease of intoxication parameters: (LII, AMW, MA and DC) at 5–7th days respectively till $(2,10 \pm 0,03) U$ (-53%), $(3,82 \pm 0,06) U$ (-60,7%), $(0,45 \pm 0,08) U$ (-18%), $(4,57 \pm 0,03) \text{ nmol/ml}$ (-23%) and $(1,18 \pm 0,03) U$ (-32%), but to the normal level at 12–14th days this parameters didn't back ($p < 0,05$), except DC ($p > 0,05$).

The activity of CP, C and IST gradual increased, but didn't normalize: respectively $(22,26 \pm 0,23) U$ (+13,5%), $(10,26 \pm 0,14) \text{ mg H}_2\text{O}_2/\text{ml}$ (+17,8%) and $(0,158 \pm 0,001) U$ (+9,7%), ($p < 0,05$).

Additional use of Reamberin caused of more intensive decrease of intoxication parameters: (LII, AMW, MA and DC) at 5–7th days respectively till $(1,96 \pm 0,03) U$ (-55%), $(2,19 \pm 0,03) U$ (-77%) and $(0,39 \pm 0,008) U$ (-29%) with following normalizing at 12–14th days after treatment ($p < 0,05$).

Additional use of Reamberin caused of more intensive inhibition of lipids peroxidation parameters (MA and DC): $4,18 \pm 0,04 \text{ mmol/ml}$ (-30%) and $(1,55 \pm 0,02) U$ (-41,5%) with the normalization at the end of treatment ($p < 0,05$). Also we observed the growth of parameters of antioxidant protection (CP, C and IST).

The frequency of postoperative complications in basic group decreased for 1.2 times. Postoperative mortality in control group was 17.21% (17 patients: 7 males and 10 females); in basic group – 8.92% (9 patients: 3 males and 6 females). Term of hospitalization decreased from 19.6 bed-days (in control group) to 17 ones in basic group.

4. Conclusions

1. Use of intestinal lavage caused of decrease of endogenous intoxication, and stimulated of evacuatory function of intestine.
2. Additional use of Reamberin caused of energy potential activation in cells, acceleration of intestine passage and significant decrease of endotoxiosis grade.
3. The results could make a basis for complex surgical treatment of patients with AIO by use of antioxidative medication.

5. References

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