

ENDOSCOPIC METHOD OF INTESTINAL DECOMPRESSION WITH THE USE OF ENTERO- AND COLONOSORPTION IN TREATMENT OF RECTAL CANCER COMPLICATED WITH INTESTINAL OBSTRUCTION

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The treatment of rectal cancer patients with large bowel obstruction (LBO) is a serious health care problem. That's why we have studied a possibility of conservative LBO treatment by the method of endoscopic recanalization. *Patients and Methods:* In the study there have been enrolled 47 rectal cancer patients with acute or partial LBO who were treated with endoscopic recanalization of lumen and following sessions of entero- and colonosorption. After enteric decompression there has been performed preoperative chemoradiotherapy session, and then — planned surgical treatment. *Results:* Decompression was successful in all 47 patients, however, it's necessary to note that experimental group has been composed in part from the patients with obstructing rectal tumors with exophytic or mixed growth types. In 5 patients there was a partial effect, and this allowed perform chemoradiotherapy and planned surgical treatment. *Conclusion:* It has been demonstrated that the use of proposed method of enteric decompression allows quickly eliminate the symptoms of intestinal insufficiency syndrome, perform adequate chemo- and radiotherapy in preoperative period directed on decrease of tumor volume and invasion, facilitate the performance of primary reparative operation and the course of post-operative period, and achieve a decrease number of obstructive resections without worsening the prognosis of the main disease. *Key Words:* intestinal obstruction, rectal cancer, sorbents, enterosorption, colonosorption.

The treatment of rectal cancer patients with large bowel obstruction (LBO) is a serious health care problem [1, 2]. LBO occurs in 20–60% cases of colon cancer complications [3–6]. In urgent surgery of LBO, post-surgical lethality is 2–3 folds higher than that upon planned surgery. For improvement of treatment quality in this group of patients, from the very moment of patient's hospitalization the physician should act according to accurate algorithm.

To provide an urgent help for LBO patient, one should take into account two important points: the severity of patient's state, and the degree of LBO [7, 8].

A convenient way of LBO resolution is colostoma exteriorization higher than the hindrance, or if possible, colostoma exteriorization with simultaneous removal of tumor [9, 10]. Meanwhile, one should consider that in any case colostomy is a mutilating intervention that deteriorates patient's quality of life. That's why the search for conservative and low-invasive methods for the removal of enteric insufficiency syndrome associated with LBO, in patients with rectal cancer for performance of respective chemo- and radiotherapy and further one-stage surgical intervention with gut restoration, is an actual task [11–14].

PATIENTS AND METHODS

In the study, the data of 102 patients from 45 to 84 years old suffering from rectal cancer (T3–4N0–1M0) complicated by acute or partial intestinal obstruction, have been analyzed. The patients were distributed in two groups (Table 1). The patients of the main group (47 patients including 22 men, 25 women, 10 from who with the patterns of acute and 37 with partial intestinal obstruction) firstly underwent recto-

scope-controlled endoscopy recanalization of lumen with the use of diathermocoagulation apparatus and conchotome. This allowed form a "tunnel" with the diameter of 1.5–2 cm. In the cases when recanalization procedure could not be performed due to absence of visual control toward intestinal lumen, then J-like 7–9 Fr conductor has been placed behind the tumor under X-ray control, and lumen has been bougienaged with its following recanalization (Fig. 1). The study protocol was approved by local Ethical Committee.

Additionally, drainage tube has been placed above obstruction for performance of colonosorption with sorbent suspension at the background of simultaneous administration of enterosorbents.

For evaluation of comparative efficacy of carbon and silicon-containing enterosorbents, the patients of the main group were distributed into two subgroups:

- patients who received entero- and colonosorption based on polymethylsiloxane (Enterogel) — 25 patients, i.e. 53.1 %;
- patients who received entero- and colonosorption based on carbon enterosorbent of IV generation (Carboline) — 22 patients, i.e. 46.9%.

Colonosorption has been performed twice per day via two cycle administration of suspension: 10 g of carbon sorbent or 1.5 table spoons of hydrogel of methylsilicic acid were mixed in 500 ml of water heated to 37.5 °C. Administration has been done through the tube placed below the tumor. The sorbent was exposed not less than for 10 min, then intestine has been emptied, and a new portion of suspension was introduced.

For hydrogel of methylsilicic acid as a sorbent, the dose of preparation was one table spoon (15 g) taken inside 3 times a day, 2 hours before or 2 hours after eating or drug administration; for Carboline — 2 tea spoons 2 times a day after eating or drug administration.

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Abbreviation used: LBO – large bowel obstruction.

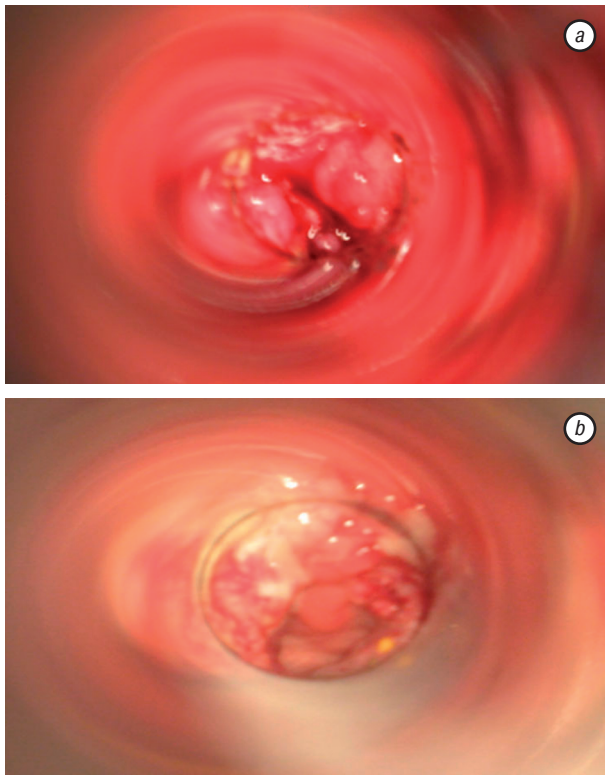


Fig. 1. Constrictive rectal carcinoma before and after recanalization

After recanalization procedure and entero- and colonosorption the patients received chemo- and radiotherapy (telegammatherapy course at the regimen TBD 40–60 Gy, SBD 2 Gy, in combination with tegafur administration at the dose of 300 mg/m² for 1–28 days), during which the cytostatic preparation was administered during eating for minimization of its sorption with enterosorbents.

Colono- and enterosorption were performed during 5–7 days after recanalization, then enterosorption has been continued till the day of surgical treatment for correction of systemic toxicity manifestations of chemo- and radio therapy, and in 3–4 weeks after treatment termination the planned surgical treatment has been performed.

The control group (55 patients, 30 women, 25 men) was composed from patients who received urgent surgical treatment with the following chemo- and radio therapy due to the partial (n = 43) or acute intestinal obstruction (n = 12).

Evaluation of treatment efficacy in the studied groups was performed with the use of the following parameters: level of medium molecular weight molecules, leukocyte intoxication index (LII), level of protein oxidative modification, number of primary reparative operations, survival, rate of complications.

Statistical analysis of the data was performed with the use of StatPlus2009 and Biostatistics (Tomsk, RF) programs. For comparison of the parameters between the groups, chi-square test or Fisher's exact test for category values were used. Cross tables 2x2, two-tailed *p* value were used. For analysis of survival, Kaplan — Meier method and log-rank test were applied. For evaluation of toxicity, NCI-CTC v.3.0 scale was used.

RESULTS

As one may see from Tables 1 and 2, the control and main groups are matched not only by gender and age, but also by stage of cancer process and degree of enteric passage disturbance. Distribution of patients dependent on tumor localization is presented in Table 3.

Table 1. Distribution of the patients by disease stage (TNM classification, 6th ed.)

TNM	Main group (n = 47)	Control group (n = 55)
Stage IIA T3N0M0	17 (36.2%)	22 (40%)
Stage IIB T4N0M0	21 (44.7%)	23 (41.8%)
Stage IIIB T3N1M0	5 (10.6%)	4 (7.2%)
Stage IIIB T4N1M0	4 (8.5%)	6 (11%)

Table 2. Distribution of the patients by the degree of intestinal obstruction

	Main group (n = 47)	Control group (n = 55)
Partial intestinal obstruction	37 (78.7%)	43 (78.2%)
Acute intestinal obstruction	10 (21.3%)	12 (21.8%)

Table 3. Distribution of patients dependent on tumor localization

Tumor localization, from anal orifice edge (cm)	Main group (n = 47)		Control group (n = 55)	
	n	%	n	%
0–5 (lower ampullar rectal part)	5	10.6	6	11
6–10 (middle ampullar)	20	42.6	22	40
11–15 (upper ampullar)	22	46.8	27	49

According to the data on the levels of medium molecular weight molecules, LII, levels of protein oxidative modification, in the patients of main group (either with acute or partial intestinal obstruction) the decrease of intoxication level has been achieved in shorter terms than that in control group (Fig. 2–7).

In 5–7 days after recanalization procedure, protein oxidative modification index in blood plasma of the patients of the main group decreased from 71.2 ± 2.5 to 41.5 ± 1.9 [normalcy — 27.3 ± 1.8 u.opt.dens./1 g protein ($\lambda = 370$ nm)] ($p < 0.05$) (Fig. 4).

Clinical monitoring has shown that in all 47 patients from the main group significant decrease of endogenous intoxication level at the background of complete intestinal decompression has been achieved what allowed to begin chemo- and radiotherapy at the 5th day after recanalization in the subgroup treated with carbon enterosorbents, and at the 6th day — in the subgroup treated with polymethylsiloxane-based enterosorbents.

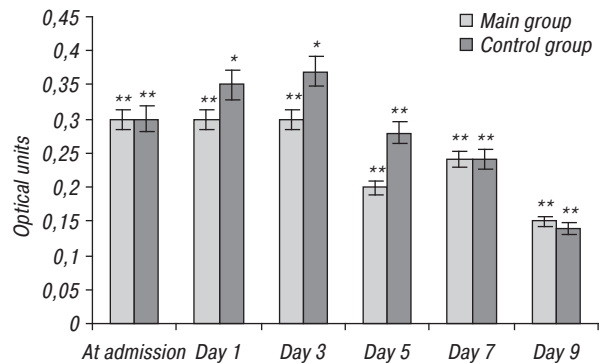


Fig. 2. Levels of medium molecular weight compounds upon partial intestinal obstruction. Note: The patients from control group (retrospective analysis) underwent urgent surgical treatment. Conventional designations for Fig. 2–7: *0.05 < *p* < 0.1 results are insignificant; ** 0.01 < *p* < 0.05 results are relatively significant; *** *p* < 0.01 results are significant

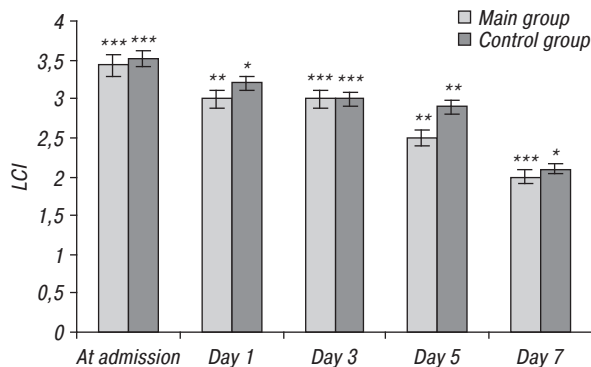


Fig. 3. Leucocytic index (LCI) intoxication upon partial intestinal obstruction. *Note:* The patients from control group (retrospective analysis) underwent urgent surgical treatment

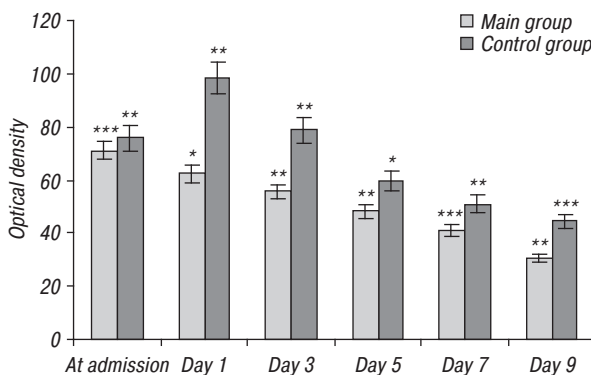


Fig. 4. The level of oxidative protein modification upon partial intestinal obstruction of cancer genesis. *Note:* The patients from control group (retrospective analysis) underwent urgent surgical treatment

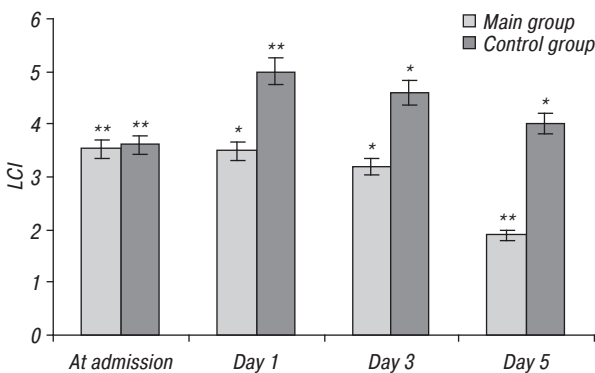


Fig. 5. LCI level upon acute intestinal obstruction. *Note:* The patients from control group (retrospective analysis) underwent urgent surgical treatment

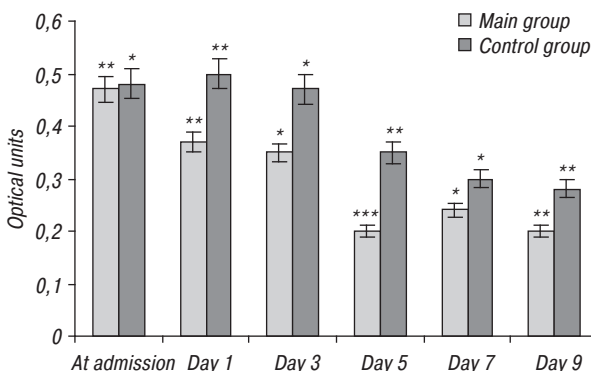


Fig. 6. Levels of medium molecular weight compounds upon acute intestinal obstruction of cancer genesis. *Note:* The patients from control group (retrospective analysis) underwent urgent surgical treatment

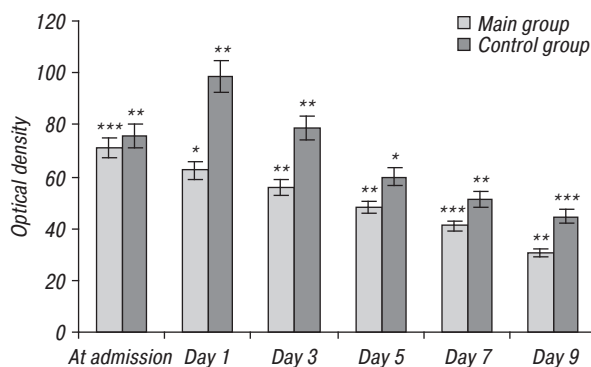


Fig. 7. The level of oxidative protein modification upon acute intestinal obstruction of cancer genesis. *Note:* The patients from control group (retrospective analysis) underwent urgent surgical treatment

During chemo- and radiotherapy in 5 patients, including 1 patient who received Carboline and 4 patients treated with silicon-containing enterosorbents, leucopenia of 1–2 grades has been recorded, and in 1 patient treated with Enterosgel there has been recorded enterocolitis that didn't require cessation of the therapy.

In 3–4 weeks after termination of chemo- and radiotherapy, all patients of the main group underwent radical surgical treatment. In 7 patients (14.8%) preventive colostoma has been applied due to intraoperative-detected prolapse in apparatus-placed anastomosis, and in 5 patients (10.6%) due to tumor expansion toward anal channel, and expressed associated pathology, there has been preformed surgical treatment with tumor removal and constant stoma exteriorization. It's necessary to note that in 5 cases in the patients with primary irresectable tumors, after performance of endoscopic lumen recanalization and chemo- and radiotherapy, the primary reparative operations were performed in 4 patients, and radical surgical treatment with stoma exteriorization — in 1 patient (Table 4).

Table 4. Comparative characteristics of capacity of surgical treatment in rectal cancer patients with intestinal obstruction

Capacity of surgical treatment		Main group (n = 47)		Control group (n = 55)	
		n	%	n	%
Primary reparative treatment	Without exteriorization of preventive stoma	35	74.6	10	18.1
	With exteriorization of preventive stoma	7	14.8	3	5.4
	Surgery with exteriorization of constant stoma	5	10.6	42	76.5

Statistical analysis of data from Table 3 has shown that $\chi^2=37.15$ at significance value of 0.005, exact Fisher's criterion was 9.6×10^{-11} , what points on the significance of comparison of the data between control and main groups. Comparative analysis of postoperative complications in the main and control groups is presented in Table 5.

Statistical analysis of complications in two groups was performed similarly with the use of cross tables 2x2. In this case chi-square was equal to 4.3 at confidence interval value of $p = 0.05$. Exact Fisher's criterion was equal to 0.016, evidencing on statistically significant difference in elevated frequency of postoperative complications in control group.

Table 5. The rate of postoperative complications after the performed treatment

Postoperative complications	Main group n = 47		Control group n = 55	
	n	%	n	%
Pouch leakage of colorectal, coloanal anastomosis	1	2.1	2	3.6
Anastomosis stricture	1	2.1	-	-
Commisural intestinal obstruction	1	2.1	-	-
Gut necrosis	-	-	1	1.8
Small pelvis hemorrhage	-	-	1	1.8
Colostoma prolapse	-	-	1	1.8
Recto-vaginal fistula	-	-	1	1.8
Intraperitoneal apostasis	1	2.1	-	-
Hospital pneumonia	-	-	1	1.8
Lethal outcome	-	-	1	1.8
Total number of complications	4	8.4	8	14.4

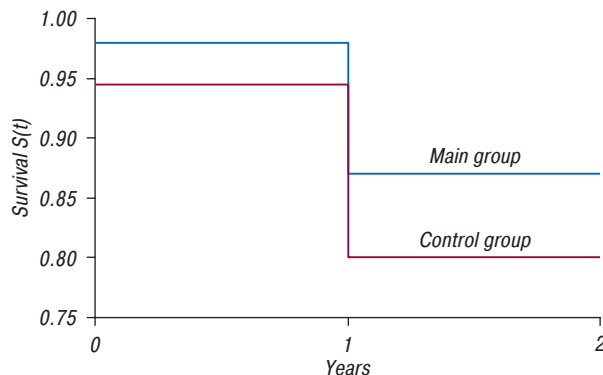
Upon 12 months follow-up median there has been found a tendency for elevation of recurrence-free two-year survival of the patients from the main group compared to control group (see the data on Fig. 8, Table 6). In 2 years recurrence rate in the main group was 2.1%, in control group — 1.8%.

Table 6. Survival of the patients from the main and control groups

Groups of patients	1-year survival	2-year survival
	Total, %	Total, %
Main group (n = 47)	95.6 (45 patients)	87.2 (41 patients)
Control group (n = 55)	94.6 (52 patients)	80 (44 patients)

Kaplan — Meier survival analysis is presented on Fig. 8. As one could see, patient mortality in control group is significantly higher that in the main group.

Unfortunately, short follow-up period (2 years) does not allow calculate median survival for both groups (survival was not lower than 0.5). Median follow-up is just 12 months.

**Fig. 8.** Survival of the patients (Kaplan — Meier survival curves)

DISCUSSION

At modern stage of surgery development when a large experience of LBO therapy has been accumulated as well as better understanding of its pathogenesis, Ukrainian and foreign surgeons accept the need of performance of **enteric decompression at acute obstruction level** using low-invasive technologies, in particular stenting and endoscopic recanalization of enteric lumen [15].

In multicenter randomized study performed in Netherlands (ISRCTN46462267), there have been enrolled 98 patients with sinistral colorectal tumors (from splenic flexure to upper ampullar rectum) and enterostasis manifestations. In 47 patients, stenting and following planned surgical treatment were performed, and 51 patients underwent urgent surgery. An analysis of treatment results didn't reveal differences in complications and mortality rates between the groups, and

it has been documented that the number of patients with stoma was significantly lower in the group with stenting (23:38). During the treatment the following complications were diagnosed: peritoneal apostasis (3 cases in group with stenting versus 4 cases in group with urgent surgical treatment); tumor perforation (6:0 respectively); pouch leakage (5:1), pneumonia (3:1), and wound infection (1:3). So, the results of the study **allowed conclude that stenting may be considered** as an alternative approach of urgent surgery, however without principle advantages [16].

Some authors proposed to perform endoscopic recanalization of obturating tumors with the use of methods of laser and electrocoagulation or photo-destruction [15].

However, Yu.V. Sineva et al. [17] consider that the performance of such curative procedures in patients with LBO is a very complex task. **Stricture formation by tumor if lumen < 0.2–0.3 cm prevents placement of decompression tube** higher than obturation place, while forced performance of the manipulations without strict knowledge on tumor lesion sizes the authors considered to be inexpedient due to dangerous complications.

A.M. Belyaev et al. [18] have described the following method of recanalization with the use of electrode, retractor for laparoscopy operation, forceps for hot biopsy and loop for polypectomy. **Using these instruments, tumor channel could be widened up to 1 cm, and success of the procedure is achieved in 2/3 cases.** In the half of patients primary-reparative operations have been done without registered pouch leakage. According to the authors opinion, such method has allowed to decrease the mortality to 5%, post-operative complications rate — to 10% compared to these in patients who underwent urgent surgical treatments.

A.V. Shelekhov et al. [19] have proposed to perform endoscopic recanalization of lumen by the method of monopolar diathermocoagulation via formation of channel with the use of clamp along the entire length of stenosed region. Following reparation of lumen was combined with the use of laser photodestruction alternating recanalization sessions with 48 h breaks. The author pointed on the possibility of recanalization with the use of colonoscope and **temporary stent deployment** as intratracheal tube № 10 (diameter of 13.6 mm) ("Portex", Great Britain). Such approach has allowed to decrease the number of obturating resections from 72.5 to 22.8%, and 5-year survival of the patients with stage II in the main group was 71.7%, and in control group — 50.2%.

In the cases when visual control of intestinal lumen is unavailable, we have develop the following approach: then J-like 7–9 Fr conductor has been placed behind the tumor under X-ray control, and lumen has been bougienaged with its following recanalization (in our study the patients with rectal tumors with exophytic or mixed growth types were enrolled). The procedure was supplemented with entero- and colonosorption with high-capable sorbents (polymethylsiloxane

or Carboline), which use is considered to increase significantly an efficacy of the procedure.

Our results are in agreement with the data of other studies devoted to the search of conservative methods of treatment of enterostasis.

CONCLUSIONS

The use of endoscopy recanalization of intestinal lumen upon acute or partial colon obstruction in rectal cancer patients in combination with entero- and colonosorption allows: quickly eliminate the symptoms of intestinal insufficiency syndrome; perform adequate chemoradiotherapy in preoperative period; facilitate the performance of primary reparative operation and the course of post-operative period; achieve significant decrease in the number of obstructive resections without worsening the prognosis of the main disease. Also, it has been shown that the use of carbon enterosorbents for IIS elimination and prophylaxis of systemic toxicity manifestations at the background of performed chemo- and radiotherapy is more effective than the use of enterosorbents on the basis of polymethylsiloxane.

REFERENCES

1. Information on the global colorectal cancer incidence: [Electronic resource] //International Organization on Cancer Research. URL:<http://globocan.iarc.fr/factsheet.asp#BOTH>. (Date of use: 03.09.2012).
2. Information on the global colorectal cancer incidence: [Electronic resource] //Ukrainian Cancer Register URL: <http://www.ucr.gs.com.ua/dovidb0/index.htm>. (Date of use: 03.09.2012).
3. Barsukov Yu, Kovalevskiy E. Diagnostics and therapy of colorectal cancer. *Vrach* 2006; **13**: 64–5 (In Russian).
4. Gaarin AM. Rectal cancer. Moscow: Meditsina, 1998. 246 p. (In Russian).
5. Dvoretzkiy SYu, Belyaev AM. Possibilities of nonstandard approaches to the therapy of acute rectal obstruction. *Med Acad Zh* 2007; **7**: 270–1 (In Russian).
6. Fedorenko ZP, Gulak LO, Gorokh EL, *et al.* Cancer in Ukraine, 2004–2005. Incidence, mortality, activity indexes of cancer service. *Kiev* 2006; **7**: 96 (In Ukrainian).
7. Fedorov VD. Clinical Surgical Coloproctology. Moscow: Meditsina, 1994: 34–39 (In Russian).
8. Aliev SA. The way for improvement of surgical treatment results of colon obstruction of cancer genesis. *Vestnik Khirurgii* 1998; **6**: 34–9 (In Russian).
9. Pakhomova GA. Subtotal colectomy in treatment of obturative obstruction of middle gut. *Probl. Coloproctol. Collection of scientific articles. Moscow: Meditsina, 2000: 376–80 (In Russian).*
10. Koryakina EV, Belova SV. Medium molecular weight molecules as integral index of metabolic imbalance (review). *Klin Lab Diagn* 2004; **2**: 3–8 (In Russian).
11. Shalimov SA, Koleskik EA, Grinevich YA. Modern Trends in Treatment of Colorectal Cancer. Kiev, 2005. 112 p. (In Russian).
12. Topusov EG, *et al.* The method of elimination of endogenous intoxication upon obturative rectal obstruction. *Russ Zh Gastroenterol Hepatol Coloproctol* 1997; **5**: 114 p. (In Russian).
13. Villar JM, Martinez AP, Villegas MT, *et al.* Surgical options malignant left-sided colonic obstruction. *Surg Today* 2005; **35**: 275–81.
14. Alcuntara M, Serra-Aracil X, Falcy J, *et al.* Prospective, controlled, randomized study of intraoperative colonic lavage versus stent placement in obstructive left-sided colonic cancer. *World J Surg* 2011; **35**: 1904–10.
15. Akperov CF, Pugachev OV, Achkasov Y, *et al.* Modern tendency of treatment of tumor bowel obstruction. *Russ Oncol J* 2010; **1**: 54–6 (in Russian).
16. van Hooft JE, Bemelman WA, Oldenburg B, *et al.* Collaborative Dutch Stent-In Study Group. Colonic stenting versus emergency surgery for acute left-sided malignant colonic obstruction: a multicentre randomised trial. *Lancet Oncol* 2011; **12**: 344–52.
17. Aliev SA. Alternative ways of treatment of complicated forms of colon cancer. *Surg J NI Pirogov J* 1998; **8**: 58–67 (in Russian).
18. Belaev AM, Zaharenko AA, Dvoretzki CJu, *et al.* Treatment tactic of patients with acute large bowel obstruction of cancer genesis with using endoscopic methods of recanalization. *Oncology* 2011; **12**: 620–30 (in Russian).
19. Rasulov RI, Dvornichenko VV, Chelehev A. Treatment of complicated rectal cancer. Novosibirsk, 2008. 153 p. (in Russian).