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

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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-

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Abbreviation used: LBO – large bowel obstruction.
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.)

<table>
<thead>
<tr>
<th>TNM</th>
<th>Main group (n = 47)</th>
<th>Control group (n = 55)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage IIA T3N0M0</td>
<td>17 (36.2%)</td>
<td>22 (40%)</td>
</tr>
<tr>
<td>Stage IIB T4N0M0</td>
<td>21 (44.7%)</td>
<td>23 (41.8%)</td>
</tr>
<tr>
<td>Stage IIIIB T3N1M0</td>
<td>5 (10.6%)</td>
<td>4 (7.2%)</td>
</tr>
<tr>
<td>Stage IIIIB T4N1M0</td>
<td>4 (8.5%)</td>
<td>6 (11%)</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Intestinal obstruction</th>
<th>Main group (n = 47)</th>
<th>Control group (n = 55)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Partial intestinal obstruction</td>
<td>37 (78.7%)</td>
<td>43 (78.2%)</td>
</tr>
<tr>
<td>Acute intestinal obstruction</td>
<td>10 (21.3%)</td>
<td>12 (21.8%)</td>
</tr>
</tbody>
</table>

Table 3. Distribution of patients dependent on tumor localization

<table>
<thead>
<tr>
<th>Tumor localization, from anal orifice edge (cm)</th>
<th>Main group (n = 47)</th>
<th>Control group (n = 55)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–5 (lower ampullar part)</td>
<td>5 10.6%</td>
<td>6 11%</td>
</tr>
<tr>
<td>6–10 (middle ampullar)</td>
<td>20 42.6%</td>
<td>22 40%</td>
</tr>
<tr>
<td>11–15 (upper ampullar)</td>
<td>22 46.8%</td>
<td>27 49%</td>
</tr>
</tbody>
</table>

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 (λ = 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.

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**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
The patients from control group (retrospective analysis) underwent urgent surgical treatment.

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 performed surgical treatment with tumor removal and constant stoma exteriorization. It’s necessary to note that in 5 cases in the patients with primary resectable 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

<table>
<thead>
<tr>
<th>Capacity of surgical treatment</th>
<th>Main group (n = 47)</th>
<th>Control group (n = 55)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary reparative treatment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Without exteriorization</td>
<td>35</td>
<td>77.4</td>
</tr>
<tr>
<td>With exteriorization</td>
<td></td>
<td>12.7</td>
</tr>
<tr>
<td>Without stoma</td>
<td>7</td>
<td>14.8</td>
</tr>
<tr>
<td>With stoma</td>
<td>42</td>
<td>76.5</td>
</tr>
</tbody>
</table>

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 9.6x10^{-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.
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

<table>
<thead>
<tr>
<th>Groups of patients</th>
<th>1-year survival</th>
<th>2-year survival</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total, %</td>
<td>Total, %</td>
</tr>
<tr>
<td>Main group (n = 47)</td>
<td>95.6 (45 patients)</td>
<td>87.2 (41 patients)</td>
</tr>
<tr>
<td>Control group (n = 55)</td>
<td>94.6 (52 patients)</td>
<td>80.0 (44 patients)</td>
</tr>
</tbody>
</table>

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)](image)

**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 photodestruction [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 polyectomy. 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 Nº 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