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COMPLEX TREATMENT OF COLORECTAL CANCER COMPLICATED WITH INTESTINAL OBSTRUCTION

In surgery, as well as oncology, the trend of complex treatment based on the concept of “rapid (enchanced) recovery”, the so called «Fast-Track Recovery» or «Fast-Track Surgery», is coming into force. It is founded on the modern high-technology approaches application in the treatment of obstructing colorectal cancer complicated with intestinal obstruction including the effective use of endoscopic stenting at the first stage (self-expanding silicone covered nitinol stent frame expanding bowel lumen in the tumour stenosis zone (CHOOSTENT M.I.Tech, South Korea [CY]), at the second stage of radical operation performance within a single hospitalization. Early endoscopic intestinal decompression as the first stage of “Fast-Track Recovery” concept realization in combination with the program of complex drug correction of homeostasis and intraparietal intestinal hemocirculation disturbances enable to eliminate morphofunctional disturbances of adducting intestinal portions on short notice and perform radical surgical treatment of colorectal cancer on the principle of routine intervention in the absence of problems with adducting intestinal portion and the possibility of reliable single-stage restoration of digestive tract continuity.

The given approach allows to rule out intermediate stages, to decrease the total duration of treatment and rehabilitation of patients, to obtain high quality of patient’s life in the intermediate and distant future. This trend in the practical health service is only coming into force, showing the positive aspects and prospects of usage, which enable to improve qualitative and quantitative indices of treatment of various diseases substantially.

Key words: stenting, laser vaporization, colorectal cancer, tumour recanalization

The urgency of the problem. Colorectal cancer is the most widespread tumour in colorectal surgery, the third common cancer and the second cause in the structure of oncological deaths [7]. The evolution from invariable bowel to diagnosed cancer is 10 years. The annual incidence in the USA is 145000 new cases, 5500 deaths from colorectal cancer (9-10% from other causes oncological mortality). The average morbidity risk during the life period is 1 per 18 Americans (5-6%). The incidence peak is the 7th decade of life; though 5% of patients are under 40, 10% are under 50. 90% patients have sporadic tumours, 10% have positive family history[1]. According to cancer register of the Republic of Belarus in the past decade colorectal cancer morbidity has increased 1,5 times (from 363 since 2001 to 528 in 2010) [4]. Up to 70% of patients with obstructing colorectal cancer complicated with intestinal obstruction are delivered to the in-patient department by emergency indications. As a result more than half of the patients are hospitalized in severe condition. The latter is due to accompanying cardiovascular and respiratory pathology [1, 2, 3, 8].

Obstructing colorectal cancer complicated with intestinal obstruction is the most frequent complication of colonic cancer. It develops in 26,4-69 % patients [5]. This complication is the most common for left colon tumours (67-72 %), which is related to the peculiarities of the local growth (endophytic, circular), the intramural lymphatic outflow specifics, as well as higher density of this localization tumour and smaller diameter of the bowel [6].

Surgical approach in obstructing colorectal cancer complicated with intestinal obstruction against the

background of cancer remains the hot topic. The choice of the surgical treatment and operation completion is under discussion, which requires further scientific search and study of the possibility of realization of new directions for solving the problem.

The aim of the investigation. To improve the results of complex treatment of obstructing colorectal cancer complicated with intestinal obstruction using “Fast-Track Recovery” technologies.

Materials and methods. At present in surgery, as well as oncology, the trend of complex treatment based on the concept of “rapid (enchanced) recovery” (the so called “Fast-Track Recovery” or “Fast-Track Surgery”) is coming into force. It is founded on modern high-technology approaches application including effective use of the main achievements of the VI technological setup of the civilization, which enable to minimize the duration of treatment, to decrease economic expenses, to maximize ultimate results, to ensure high quality of treatment. The given approach allows to rule out intermediate stages, to decrease the total duration of treatment and rehabilitation of patients, to obtain high quality of patient’s life in the immediate and distant future. Minimal invasive and low degree traumatic operative techniques application, viz endoscopic stenting, enables to provoke intestinal decompression within a single hospitalization following radical operation with primary anastomosis application. The given approach not only results in rapid recovery with substantial shortening of total duration of treatment and rehabilitation but also leads to considerable reduction in economic expenses for treatment, has a significant social effect

due to more rapid and significant quality of patient's life restoration.

After restoration of natural passage of intestinal contents and motor and evacuating function of the digestive tract, without discharging the patient from the in-patient department, the radical intervention with tumour removal and single-stage restoration of digestive tract continuity is performed.

The analysis of treatment outcomes for 88 patients with colorectal cancer complicated with intestinal obstruction under treatment in the colorectal department of Vitebsk Second Regional Teaching Hospital and abdominal department of Vitebsk Regional Clinical Oncological Dispensary from 1995 to February 2013 has been made. In the first group the patients (28) were operated for colorectal cancer complicated with intestinal obstruction using general approach (with application two- and more stage interventions). "Fast-Track Recovery" principle was used for the treatment in the second group of patients (40) (at the first stage minimal invasive "closed" stenting of obstructing tumour with resolution of intestinal obstruction episodes

was performed, at the second stage the radical operation with primary anastomosis application and restoration of digestive tract continuity was performed). In the third group of patients (20) "Fast-Track Recovery" principle was used for the treatment (at the first stage laser recanalization of obstructing tumour was performed by laser radiation with the wave length 1,064 mkm, maximal average power 60 watt, impulses recurrence frequency at maximal radiation power up to 50 Hz, maximal impulse energy 1,2 J, impulse duration 300 msec, laser danger class IV, maximal consumed power 2,5 kilowatt per second, at the second stage radical operation with primary anastomosis application and restoration of digestive tract continuity was performed).

The results of investigation and discussion. The first group included the patients treated for complicated colorectal cancer in the in the colorectal department of Vitebsk Second Regional Teaching Hospital from 1995 to 2005. The mean age of the patients was $65,2 \pm 2,5$. The structure of tumour lesion is presented in table 1.

Table 1

Tumour lesion structure of the first group patients

Tumour localization and shape	Patients number	%
Caecum cancer	2	7
Ascending colon cancer	1	4
Colon hepatic angle cancer	2	7
Transverse colon proximal cancer	1	4
Transverse colon cancer	1	4
Descending colon cancer	1	4
Sigmoid colon cancer	7	25
Sigmoid colon mesentery adenocarcinoma	1	4
Rectosigmoid cancer	1	4
Upper ampullar rectum cancer	9	32
Middle ampullar rectum cancer	2	7
Total:	28	100

Meanwhile, cancer of the left colon and rectum complicated with intestinal obstruction made up 75%. The structure of operative interventions for acute colonic obstruction in the first group of patients is

presented in table 2. In 75% cases the operation in the first group patients was completed with intestinal stoma exteriorization. The mean treatment duration in this group was $30,6 \pm 2,8$ bed days.

Table 2

Operative interventions in the first group patients characteristic

Operations	Patients number	%
Anterior resection of rectum	7	25
Abdominoperineal extirpation of rectum	1	4
Gartman operation	4	14
Abdominoanal resection	1	4
Right hemicolectomy, ileotransversostomy	2	7
Sigmoid colon resection	3	11
Relaparotomy, ileostomy	1	4
Transverse colon resection	1	4

Collateral ileotransversostomy, cholecystectomy	1	4
Left hemicolectomy	1	4
Double-barreled ileostomy, nasogastrintestinal probe decompression	1	4
Loop sigmoidostomy	1	4
Anterior resection of rectum	1	4
Rectosigmoidtransition, sigmoidostomy	1	4
Tumour removal, hysterectomy with uterine appendages, omentum resection, sigmoidostomy	1	4
Tumour conglomerate resection from the cecum and ascending colon, ileostomy	1	4
Total:	28	100

The second group included the patients treated for complicated colorectal cancer in the abdominal department of Vitebsk Regional Clinical Oncological Dispensary and in the colorectal department of Vitebsk Second Regional Teaching Hospital over the

period from 2011 to 2013. The mean age of the patients was $70,1 \pm 4,2$. Under further histological investigation all the patients were revealed moderately differentiated adenocarcinoma. The structure of the colonic and rectal tumours is presented in table 3.

Table 3

Tumour lesion structure of the second group patients

Tumour localization and shape	Patients number	%
Upper ampullar rectum cancer	3	10
Sigmoid cancer	9	30
Rectosigmoid cancer	12	40
Colon splenic angle cancer	6	20
Total:	30	100

The diagnosis of obstructing left colon (rectum) cancer complicated with intestinal obturation obstruction was made in all the cases. The conducted medical and diagnostic technique by Vishnevsky had no effect in all the cases. Following short-term (2 hours) preparation including potassium polarizing mixture transfusion, crystalloides and colloidal solutions (up to 2 litres in volume) and premedication (Promedol solution 2%-1,0 ml + Atropine solution 0,1% - 1,0 ml) all the patients underwent fibrocolonoscopy, which confirmed the diagnosis of left colon tumour. Instrumental bougienage of tumour stenosis zone with special guide of the average rigidity with soft J-shaped tip was carried out. Delivery devise for self-expanding tube prosthesis was placed through dilatation stenosis zone. Further a rigid guide was introduced into the bowel through the lumen of manipulation catheter for a distance of no less than 10 cm proximal to the upper stenosis edge. Self-expanding silicone covered nitinol stent 22 mm in diameter and 140 mm in length frame expanding the bowel lumen in the tumour stenosis zone (CHOOSTENT M.I.Tech, South Korea [CY]) was placed in the constriction zone through the rigid guide. The position of the stent in the bowel was

under control (figure 1). The overall colonoscopy procedure with stent placement lasted about 40 minutes ($37,6 \pm 4,13$ minutes). The manipulation was uneventful. Following the devise introduction control radiography of the abdomen was performed (figure 2). After the stent placement a siphon enema was given, which followed by abundant passage of gases and defecation. The patients were administered saline laxatives, vaseline oil. Potassium polarizing mixture with cardiac glycosides, crystalloides balanced polyelectrolytic mixtures, Reamberin were given by intravenous dripping. Cefazomine 1,0 was administered three times per day, Fragmin 2,5 was injected subcutaneously once per twenty four hours, the accompanying pathology was corrected. Intestinal obstruction episodes were arrested completely in all the patients by the end of the 24 hour period following the manipulation. Beginning with the second twenty four hour period the patients started receiving enteral feeding. After the complete clinical and metabolic compensation of the patients and complete restoration of motor and evacuating function surgical interventions were made. The following operations were performed (table 4).

Table 4

Kinds of operations in the second group

Operations	Patients number	%
Sigmoid colon resection	9	30
Low anterior resection of rectum	15	50
Left hemicolectomy, splenectomy	3	10
Subtotal colectomy, splenectomy	3	10
Total:	30	100

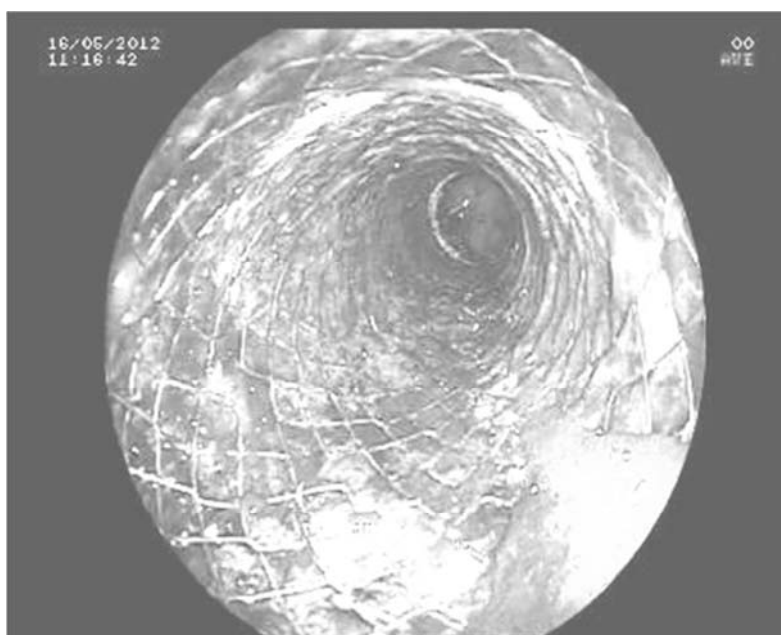


Figure 1. Dilated sigmoid lumen in the tumour zone following stent placement CHOOSTENT M.I.Tech, South Korea (CY).



Figure 2. Plan survey radiograph of the abdominal cavity immediately after self-expanding intestinal stent placement into the sigmoid colon.

All radical operations were completed with the formation of the primary anastomosis without colostomy exteriorization. The postoperative period was uneventful. The duration of treatment in this group was $19,7 \pm 2,1$ days of bed regimen (tabl.5).

The third group included the patients being treated for complicated colorectal cancer in the abdominal department of Vitebsk Regional Clinical Oncological

Dispensary and in the colorectal department of Second Vitebsk Regional Clinical Hospital over the period from 2012 to February 2013. The mean age of the patients was $62,4 \pm 7,32$. All the patients had signs of colonic obstruction – failure to pass feces and gases within the last 2-4 days, abdominal distension, pneumatosis coli (revealed by percussion and X-ray) with lumen dilatation 2-2,5 times, pneumatosis of the small intestine.

Table 5

Patients distribution by tumour process localization in the basic and control groups

Obstructing tumour localization	
Rectal cancer	6
Rectosigmoid colon cancer	6
Sigmoid colon cancer	4
Descending colon cancer	4

On admission to the in-patient department (up to 24 hours) all the patients underwent medical and diagnostic recto- or colonoscopy, under which after making the diagnosis of obstructing tumour of the colon and biopsy laser vaporization of the inner part of the tumour with digestive tube lumen restoration in the tumour zone up to 0,8-1 cm was performed. Following laser recanalization the patients were given a siphon enema, which resulted in effective antegrade colon emptying in 100% cases. The patients were administered laxatives and vaseline oil. The treatment complex included daily infusion therapy (crystalloid and colloid solutions, potassium polarizing mixture, according to indications – parenteral feeding preparations), Diavetol 15-20 mg/kg (by dry substance), Emoxipine 1,5-2,5 mg/kg, Pentoxifylline 0,2% solution 200-400 ml/daily and Reamberin 400-800 ml/daily (or Cytoflavin 10 ml of solution in 100 ml of 0,9% solution sodium chloride) were given intravenously. After 4-6 days without discharging the patient from the in-patient department in the state of clinical and metabolic compensation radical operation with primary restoration of digestive tract continuity was

performed (only in 1 patient tumour recanalization became ultimate symptomatic operation owing to the severity of background pathology with cardiovascular function decompensation). Sigmoid colon resection, low anterior rectal resection, left hemicolectomy with primary digestive tract continuity restoration using circular mechanic suture were made as radical interventions.

Under recto- and colonoscopy during the first stage of “Fast-Track Recovery” concept realization in the third group patients under endoscopic investigation colonic and rectal lumen constriction was found to vary from 5 to 8 mm (the average diameter in the stenosis zone was $7,32 \pm 2,11$ mm). While the extent of stenosis zone ranged from 5 to 100 mm (on average $7,12 \pm 1,97$ mm) (figure 3). Under laser vaporization of the obstructing tumour portion using laser apparatus “Photek LK-50” (“Mediola-Endo”) impulse regimen of energy generation was applied (wave length 1,064 MCM, power – 20-25 watt, impulses recurrence frequency at the maximal radiation power – up to 50 Hz, maximal impulse energy – 1,2 joule, impulse duration 300 msec).

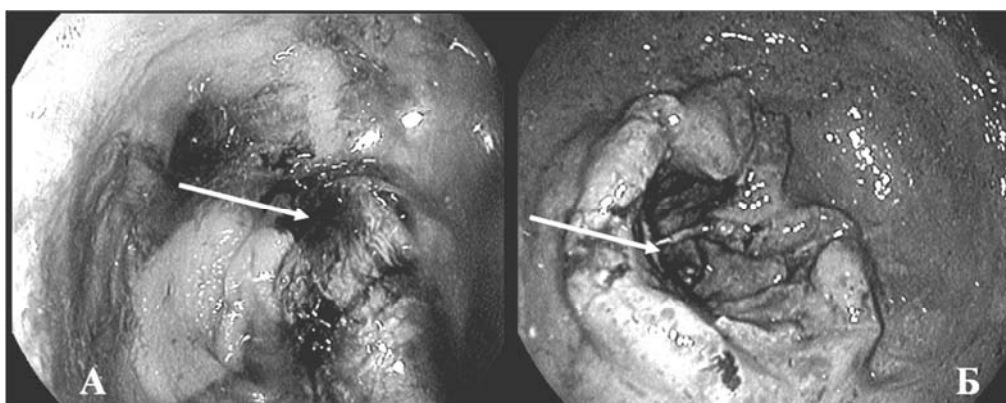


Figure 3. Obstructing cancer of the descending colon with lumen diameter in the constriction zone 5 mm (A) and obstructing cancer of the rectum with lumen diameter in the stenosis zone up to 6 mm (B). Colonoscopy findings. The stenosis zone is marked with arrows.

On practising the regimen of vaporization the most effective distance from the end of quartz optical fiber to the irradiated tissue was found to be 3-5 mm. Meanwhile, the treatment of the protruding tumour portion was conducted in scanning regimen along the perimeter of obstructing tumour tissue. The contact of the end of optical fiber with tissue resulted in optical fiber burning with further vaporization efficacy decrease.

The procedure of laser recanalization lasted from 25 to 65 minutes (on the average $40,0 \pm 11,4$ min.). Smoke generation and the excess motion (which demanded additional medical sedation in 1 case) had an adverse effect on the duration of the procedure. Laser vaporization of the inner tumour part was conducted

until digestive tube lumen restoration in the tumour zone to no less than 0,8-1 cm. In 5 cases (25%) repeated laser vaporization of tumour tissue was required to reach target size of recanalization. Even with incomplete restoration of colonic lumen in the tumour zone even within the first twenty four hours after the manipulation the patients had abundant passage of gases, 40% had unassisted stool. After twenty four hours all the patients had no clinical and roentgenologic evidence of colonic obstruction. The maximal recanalization effect was observed after 1-2 days following laser procedure (figure 4), which was due to gradual rejection of necrotic tissues into the bowel lumen. There were no hemorrhages related to devitalized tumour tissues rejection.

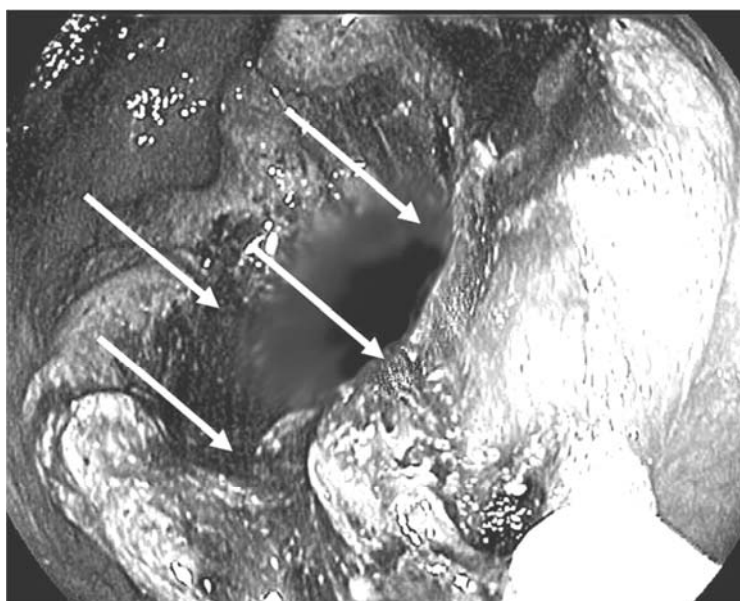


Figure 4. Sigmoid colon recanalization zone (the borders are marked with arrows)

Laser recanalization was technically complicated in cases of poor visibility of canal orifice in the tumour, in predominantly infiltrating character of its growth, impossibility to fix the endoscope on the axis with tumour canal, as well as marked morbidity in insufflation and “overinflation” of the overlying colon portions due to valve formation in the tumour canal zone.

The performed laser recanalization allowed an uneventful adequate preparation of the colon and routine sigmoid radical resection. After laser destruction and restoration of the colonic lumen in the tumour zone a siphon enema was given, which resulted in abundant defecation and passage of gases. The patients were administered laxatives and vaseline oil. The treatment complex included daily infusion therapy (crystalloid and colloid solutions, potassium polarizing mixture, according to indications – parenteral feeding preparations), Diavetol 15-20 mg/kg (by dry substance), Emoxipine 1,5-2,5 mg/kg, Pentoxifylline 0,2% solution 200-400 ml/day and Reamberin 400-800 ml/day (or Cytoflavin 10 ml solution in 100 ml 0,9% solution of sodium chloride). The latter enabled to reach clinical

and metabolic compensation and restoration of motor and evacuating function of the digestive tract in 90% cases within 2-3 days. All the patients started receiving enteral dietary feeding.

After 4-5 days without discharging the patient from the in-patient department in the state of clinical and metabolic compensation radical operation with primary restoration of digestive tract continuity was performed (only in 1 patient aged 83 tumour recanalization became ultimate symptomatic operation due to the severity of background pathology with cardiovascular function decompensation against the background of CHD, postinfarction major myocardiosclerosis with circulatory insufficiency 2A, aneurysm of ascending aorta, arterial hypertension 3 risk 4). In this group of patients sigmoid colon resection, low anterior rectal resection, left hemicolectomy with primary digestive tract continuity restoration by means of circular mechanic suture were made as radical interventions. The postoperative period was uneventful. All the patients were discharged from the in-patient department in the satisfactory state for rehabilitation under out-patient conditions. The mean bed

day (subject to the first stage of treatment) was $17,3 \pm 6,72$.

Thus, the first experience of application of new tactical approach in surgical treatment of colorectal cancer complicated with intestinal obstruction by means of self-expanding silicone covered stent (CHOOSTENT M.I.Tech, South Korea [CY]) and laser vaporization following radical operation performance with primary anastomosis placement allows to suggest the efficacy of radical complex treatment based on "rapid recovery" ("Fast-Track Recovery") concept.

Conclusion. Using endoscopic placement of self-expanding metallic colorectal stent and laser vaporization enables to perform early antegrade decompression of the digestive tract with rapid restoration of its mo-

tor and evacuating function and early clinical and metabolic compensation (without laparotomy and intestinal fistula formation) in obstructing colorectal cancer complicated with intestinal obstruction. The given approach allows efficient preparation of the patient for radical surgical treatment following primary and radical intervention. Significant decrease in patients hospital stay duration, no need for further surgical rehabilitation (in colostomy performance), high economic and social effect of "rapid recovery" concept use (due to saving financial expenses for treatment and rehabilitation, as well as earlier restoration of optimal life quality) make it possible to recommend wider application of surgical and oncological profile in the in-patient departments.

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КОМПЛЕКСНЕ ЛІКУВАННЯ КОЛОРЕКТАЛЬНОГО РАКУ, УСКЛАДНЕНОГО КИШКОВОЮ НЕПРОХІДНІСТЮ

У хірургії, а також в онкології набирає чинності тенденція комплексного лікування на основі концепції «швидкого відновлення», так званий метод «прискореного відновлення» («Fast-Track Recovery») або «прискореної хірургії» («Fast-Track Surgery»). Тенденція заснована на застосуванні сучасних високотехнологічних підходів у лікуванні колоректального раку, ускладненого кишковою непрохідністю, і включає ефективне використання ендоскопічного стентування на першому етапі (саморозширюючий нітіноловий стент з силіконовим покриттям, що каркасно розширює просвіт кишки в зоні пухлинного стенозу (CHOOSTENT MITECH, Південна Корея [CY]) та виконання радикальної операції на другому етапі – все в межах однієї госпіталізації.

Рання ендоскопічна кишкова декомпресія як перший етап першого етапу «прискореного відновлення» у поєднанні з програмою комплексної медикаментозної корекції гомеостазу та порушень інтрапарієтальної кишкової гемоциркуляції дозволяє в короткі терміни ліквідувати морфофункціональні порушення у привідній кишці і проводити при колоректальному раці радикальні хірургічні втручання за принципами планової хірургії в умовах відсутності проблем з привідною кишкою, що надає можливість виконання надійних одноетапних реконструктивних операцій для відновлення безперервності травного тракту.

Даний підхід дозволяє виключити проміжні етапи лікування, зменшити загальну тривалість лікування і реабілітації хворих, досягти високий рівень якості життя пацієнтів у ранньому та віддаленому періоді спостереження. Така концепція лікування поки є на етапі впровадження у практичну охорону здоров'я, проте вже сьогодні вказує позитивні аспекти і перспективи застосування, що дозволить істотно покращити якісні та кількісні показники лікування різних захворювань.

Ключові слова: стентування, лазерне випаровування, колоректальний рак, реканалізація пухлини

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