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ABSTRACT

of the dissertation for the degree of Doctor of Sciences

MODERN APPROACHES TO ANTERIOR AND LOW ANTERIOR RESECTION SURGERY IN BENIGN AND MALINGNANT RECTAL LESIONS

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Field of science:	Medicine
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GENERAL CHARACTERISTICS OF THE WORK

The urgency of the research. Early diagnosis and effective treatment of benign and malignant tumors of the rectum is one of the unresolved issues of modern coloproctology. This fact is explained by the increase in the incidence of cancer in the general structure of colorectal tumors and the unsatisfactory results of treatment. Among malignant tumors, the incidence of colorectal cancer varies from 9.0% to 19% in developed countries. Every year, the incidence of colorectal cancer worldwide is 18,000 people per 100,000 population, with 800,000 people.[1,2,3,4]

The highest incidence of RC was recorded in the Czech Republic (54 per 100,000 population), and the lowest in Central African countries (4 per 100,000 population). While the incidence of colorectal cancer has been rising in recent years in Japan, a number of Asian countries, and Northern and Eastern Europe, the rate has begun to decline in North America. In the last ten years, the incidence of colorectal cancer in the CIS countries, including ours, has reached its peak, increasing from 10.4 to 14.3 per 100,000 population [5,6,7.]

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Polyps with different pathohistological structure are found in 70% of the population. Adenomas make up 10% of these polyps. Most polyps are s-shaped and localized in the rectum (77.1%). Polyps are located in 42.7% of the s-shaped intestine, 19% in the rectum, 15.3% in the ascending ileum, 7.6% in the descending duodenum, 7.8% in the rectosigmoid region, and 3.8% in the spleen curvature. Polyps are most common between the ages of 50 and 60. Approximately 23-41% of patients with flat and large bowel polyps are completely healthy. There is information in the literature that 27.8-35% of adenomas that cannot be removed endoscopically and are widespread. Adenomas have been shown to turn into cancer in 90% of cases. Invasive cancer is more likely to develop from large and large adenomas. There is ample evidence in the literature that these types of adenomas, including polyps that cannot be removed endoscopically, can be removed with major surgical interventions (in anticipation of oncological principles). [8,9,10,11]

If in Brazil (Haber R. GAMA) radiation therapy is preferred in the treatment of RC, in the United States, Turkey, as well as in our country, multidisciplinary treatment (radiotherapy, surgery, if necessary, postoperative chemotherapy) is preferred. Depending on the stage of the cancer, short (Swedish protocol) and long-term radiation therapy before surgery is accepted almost all over the world. TME to be performed in patients receiving such a course of

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treatment is considered the "gold standard" in the treatment of colorectal cancer[12].

Complete removal of the rectum with the tumor, the surrounding adipose tissue, and the mesorectal fascia is called TME. If the CRM status (distance to MF in tumor tissue) is 1 mm <, the probability of local recurrence increases from 5.8% to 16% and the ability to remote metastasize from 12.7% to 37.6%, despite the high quality of TME [13,14,15.]

Therefore, preoperative CRM status assessment by MRI is of exceptional importance. In patients with positive CRM status (CRM 1mm <), the only way to avoid CRM status negative (CRM 1mm>) The role of preoperative radiation therapy has already been proven by numerous studies. local relapse, distant metastasis, survival without recurrence, and actual survival) Many randomized studies on the proximity of laparoscopic TME results scientific researches were carried out (ALACART, AGOZOC, KOCHREIN) [16,17.]

Univariate analysis of factors affecting the urogenital system shows that damage to the autonomic nerve elements during TME

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leads to urinary incontinence (40-80%) and the development of erectile dysfunction (65-90%). [18,19.]

The lack of a unified idea and classification system that explains nerve damage in detail in modern times, the lack of description of neuroprotective techniques and techniques during laparoscopic surgery, proves the need to systematize the principles of uniform treatment of anterior and lower anterior (TME) resection and conduct new research.

The purpose of the research: to assess the feasibility of the use of laparoscopic technology in anterior and lower anterior (TME) resection operations in benign and malignant tumors of the rectum and to increase the effectiveness of treatment by applying modern treatment methods.

The objectives of the research:

1. To study the quality of TME depending on the clinical and morphological features of the tumor in both groups of patients and to study the effect on the results of treatment

2. To study the factors affecting the quality of TME in both laparoscopic and open group and to analyze the impact of these factors on the effectiveness of the treatment.

3. To compare the near and far results of TME performed in both groups of patients

4. To compare the near and far results of complex treatment in both groups of patients who underwent anterior resection

5. Qualitative and quantitative study of perfusion of the large intestinal segment by green indigo (ICG) angiography in patients in the laparoscopic group

[18] Maas C., Moriya Y., Steup W. Et all. A prospective study on radical and nervepreserving surgery for rectal cancer in the Netherlands // Eur J.Surg. Oncol. 2010, 26(8), 751-757.

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6. To study modern aspects of neuroprotective surgery during anterior and inferior rectal (TME) resection of the rectum, comparative study of nerve variations

7. Comparative study of factors influencing the technical protection of autonomic nerve elements in malignant and benign derivatives of the rectum

8. To investigate the role of different levels of pelvic nerve damage in the occurrence of urogenital complications in the postoperative period in both groups of patients

9. To develop a modern complex differentiated approach to the treatment of benign and malignant tumors of the rectum on the basis of the results obtained by comparative analysis of the impact of various clinical and morphological factors on the near and distant results of complex treatment.

Research methods - Anamnestic, general clinical-laboratory and instrumental (CT, MRI, colonoscopy, urofloumetry, morphology), statistical.

According to the results of preoperative MRI examinations, patients are divided into 3 groups according to whether they can be operated on or not.

1. Resectionable tumors - the cancer is quite far from the mesorectal fascia. No risk of CRM positivity (T1-T3a)

2. Patients with limited likelihood of resection - there is minimal invasion of the mesorectal fascia, or the cancer is approaching a distance of 1 mm (T3b-d).

3. Non-resectable patients (non-resectable) CRM median zero or invasion of adjacent organs (T4a-b)

The prefix "c" (clinical) is used if the stage of the disease is determined by preoperative and intraoperative examination methods (pathohistology does not apply here), and the prefix "p" (pathohistological) is used if the results of histological examinations are known. RO resection is considered if tumor cells are not found at the borders during pathohistological examination of the extracted material, and R1 resection is found if it is found. There are 3 cases according to the quality of TME. 1) the integrity of the high-quality

(Grade 3) mesorectal fascia is almost intact. 2) medium quality (Grade 2) mesorectal fascia is damaged in several places. 3) low-quality TME (Grade 1) mesorectal fascia is sufficiently damaged, sawn like a saw, the muscular layer of the intestine is visible.

When evaluating the immediate results of operations, the duration of operations, the amount of blood lost during the operation, the time of enteral feeding, the time of the first defecation, the need for narcotic analgesics, the degree of physical activity, pain syndrome, etc. investigated.

The following indicators were analyzed to assess the long-term results of operations.

1. Local relapse - the development of a tumor in the lymph node at the site of surgery or projection. Timely diagnosis of this type of complication with the help of MRI, USM, endoscopic blood oncomarkers (CEA, CA 19-9) is important.

2. General survival - patients remaining from the day of surgery to the present day (including patients with recurrence).

3. Survival without relapse - life without relapse from the day of surgery to the date of the event.

4. Leatality - the percentage of patients who die from cancer

The basic provisions of the research

– Material removed after TME is both visual-macroscope both should be evaluated histologically and the quality (high-Grade 3, medium-Grade 2, low-Grade 1) described.

– In benign tumors and cancers of the rectum that cannot be removed endoscopically, all factors affecting the quality of the TME, including laparoscopic or open TME surgery, should be considered after the determination of CRM.

– Treatment of RC should be multidisciplinary (surgeon, radiologist, chemotherapist, radiation therapist). A treatment plan should be developed after a thorough evaluation of patients with preoperative MRI, CT, and colonoscopy. Preoperative radiotherapy should be an integral part of treatment, depending on the stage of these localized cancers.

– All patients in stage I with TME decision, including patients with polyps that cannot be removed endocopically, selected patients in stage II and III, laparoscopic TME, and a special group of patients in stage II and III (depending on the surgeon's decision) may undergo open TME surgery.

– Tumor regression rate, CRM-median, proximal and distal boundaries of resection, local recurrence, distant metastasis, laparoscopic and open TME in survival, as there are no statistically significant differences in terms of surgical and oncological results between anterior resection operations ($p < 0.05$), straight Laparoscopic technology can be used with great success in benign tumors and cancers of the intestine, rectosigmoidal, distal 1/3 of the S-shaped bowel, which can not be removed endoscopically.

– Lack of postoperative pain syndrome (absence of surgery), rapid recovery of physical activity, short start of enteral nutrition, shortening of defecation, reduced duration of intensive care, rapid onset of bowel function, short stay of patients in hospital, laparoscopic anterior and lower anterior resection is clearly superior to open surgery. Therefore, whenever possible, operations should be performed laparoscopically.

– Identification of vegetative nerves is possible in laparoscopic operations, as well as identification of nerves in open lower anterior resection operations. In special cases, nerve identification can improve the functional outcome of operations. Therefore, in addition to medial-lateral dissection, mobilization of the spleen curvature, pelvic dissection, and staple anastomosis, it is very important to add a stage of nerve identification to the stage of surgery during TME.

– Qualitative and quantitative assessment of the colon segment by ICG angiography is very important for the prevention of anastomotic suture occlusion in anterior and lower anterior resection (laparoscopic and open) operations.

Scientific novelty.

The efficacy of TME in both laparoscopic and open groups was studied comparatively as single-factor and multifactor, and the role

of these factors in the occurrence of local relapses and distant metastases was investigated.

In our country, the possibility of application of laparoscopic technology in anterior and lower anterior resection operations in benign and malignant tumors of the rectum has been scientifically demonstrated and the place (application possibilities) of azinvasive technology in the complex treatment has been studied.

In both the open and laparoscopic groups, the technical feasibility of pelvic nerve protection was studied comparatively, depending on the age and sex of patients, depth and localization of nerve invasion, type of surgery, whether or not radiation therapy was performed, and anatomical variations of pelvic nerves. Technical techniques have been developed to preserve nerve elements during anterior and lower anterior resection operations in all patients without increasing the duration of surgery.

In order to predict nerve injury, we have developed a classification of nerve protection operations. Attempts have been made to compare and analyze the functional outcomes of oncology in laparoscopic and open surgery of RC.

TR and T1/2max were used to quantify left perfusion of the large intestine.

The practical significance of the work The possibility of laparoscopic TME in benign and malignant tumors of the rectum has been shown. The results obtained during laparoscopic TME did not differ significantly from the results obtained from open TME (in terms of local recurrence, distant metastases) and azinvasive technology in selected patient groups.

safety and efficacy have been shown. During both laparoscopic and open surgeries, it was considered necessary to forget about important criteria - TME quality (macroscopic, microscopic), CRM status, the effectiveness of preoperative radiation therapy. The inclusion of neuroprotective surgeries in medical practice (both laparoscopic and open surgeries) will sufficiently prevent postoperative urogenital disorders. Recognition of anatomical variations of the pelvic nerves and the new classification of nerve

injuries help the surgeon to predict the severity of postoperative urogenital injuries and to protect the nerves with appropriate techniques during surgery. Quantitative study of colonic perfusion has taken important steps in the prevention of anastomotic occlusion.

Application of the work in scientific and experimental medicine. 1 application act was prepared on the applied treatment methods. The results of the research are successfully applied at the Department of Surgical Diseases I, "Elmed" Medical Center, "American Hospital" in the Republic of Turkey on the basis of the Clinical Medical Center, which is the base of AMU. Excerpts from the dissertation have been published in various popular publications.

Work approbation The results of the dissertation were presented at 8 scientific conferences and symposiums. The results of the dissertation work were presented at the conference dedicated to the 80th anniversary of the Azerbaijan Medical University, the Scientific Conference organized by the Ministry of Defense, the conference held at the Hilton Hotel, the conference organized at the Azerbaijan State University of Economics, the Eurasian Congress of Surgeons, the Turkish Hospital (Istanbul). Presented at the symposium, conferences and symposiums organized by the Republic of Turkey (Antalya).

Preliminary discussions of the dissertation were held on 24.11.2019 (protocol 24.11.2019), and the scientific seminar was held on 17.05.2021.

Publication. 39 scientific works on fragments of the dissertation, including 26 articles, 13 theses were published, reports were presented at various conferences and symposiums.

Volume and structure of the dissertation. The dissertation covers 446 computer pages. It consists of an introduction, literature review, research materials and methods, discussion of research results, conclusions, conclusions, practical recommendations. The dissertation is illustrated with 132 tables, 30 diagrams and 92 pictures. The bibliography consists of 387 sources. 29 of them were Vatan and 358 were foreign authors.

CONTENT OF THE WORK

The study showed the possibility of using laparoscopic technology during anterior and lower anterior resection in benign and malignant tumors of the rectum, rectosigmoidal and S-shaped distal 1/3, the results were compared and analyzed by traditional methods. Patient groups were divided as follows: 1) 47 patients underwent laparoscopic TME with diagnosis of RC, 56 patients underwent open TME. 2) 53 patients underwent laparoscopic anterior resection in malignant tumors, 45 patients with open anterior resection, 3) 22 patients underwent laparoscopic surgery in benign rectal tumors, 20 patients underwent open surgery; 4) 25 patients with laparoscopic anterior resection and 21 patients with open anterior resection (147 patients in LG, 142 patients in AG) in benign tumors of the distal 1/3 of the rectosygmoidal and S-shaped intestine (Table 1).

When analyzing patients, their age and sex, stage and localization of the disease, histological structure of the tumor, neadjuvand treatment regimens were taken into account.

Research design *Table 1.*

Contingent of research	**Rectum (n=145)**	**Benign (n=42)**	**LTME (n=22)**
			OTME (n=20)
		Malignant (n=103)	**LTME (n=47)**
			OTME (n=56)
	Rectosigmoidal (n=144)	**Benign (n=46)**	**LAR (n=25)**
			OAR (n=21)
		Malignant (n=98)	**LAR (n=53)**
			OAR (n=45)

We anatomically divided the rectum into 3 regions: the lower rectum (0-6cm), the middle rectum (7-12cm), and the upper rectum (12cm>). The localization of the derivatives was also carried out in accordance with this division (Table 2).

Distribution of patients according to the localization of RC according to the distance from the anal canal *Table 2.*

Distance from anus	LTME (N=47)		OTME (N=56)	
	Abs	%	Abs	%
0-6 sm	13	27,7	16	28,6
7-12 sm	18	38,3	22	39,3
>12 sm	16	34,0	18	32,1
$\chi 2$; p	$\chi 2$=0,042; p = 0,979			

Note: A parameter for statistical analysis of p-studied traits using Pearson's polychoric correlation index.

In the LTME and OTME groups, 3 (6.4%), 2 (3.6%), 11 (23.4%), 10 (17.9%), 29 (61.7%) in the T3 stage, 29 (61.7%) in the T1 stage, 36 (64.3%) and 4 (8.5%) and 8 (14.3%) patients were studied in the T4 stage (p = 0.668). In the LTME and OTME groups, the first stage was 7 (14.9%), 5 (8.9%), the second stage was 12 (25.5%), 16 (28.6%), the third stage was 28 (59.6). %) and 35 (62.5%) patients were examined (p = 0.637). We considered it expedient to classify patients in stage T3 and T4 in a separate subgroup (Table 3).

Subgroups of RC in T3 and T4 stages *Table 3*

T (mm)		n	LTME n=33		n	OTME n=42	
			Abs	%		Abs	%
Pt_3	Pt_{3a} (<1)	29	6	18,2	36	7	16,7
	Pt_{3b} (1-5)		6	18,2		8	19,1
	Pt_{3c} (5-15)		8	24,2		11	26,3
	Pt_{3d} (>15)		9	27,3		10	23,8
Pt_4	Pt_{4a} (i.h.)	4	1	3,0	8	3	7,2
	Pt_{4b} (i.n.)		3	9,1		5	11,9

Morphological structure and degree of differentiation of RC in LTME and OTME groups *Table 4*

Morphological features of the tumor		LTME n=47		ATME n=56	
		Abs	%	Abs	%
Adenocarcinoma	High degree diff Moderate degree diff Low degree diff	13 27 5	27,7 57,4 10,6	16 31 7	28,6 55,4 12,5
Mucous cancer (kolloid)		1	2,1	1	1,8
Ovarian cancer		1	2,1	1	1,8
$\chi 2$; p		$\chi 2 = 0,134$; p = 0,998			

Pathohistological examination of surgical materials revealed adenocarcinoma of various degrees of differentiation in most cases (Table 4).

Depending on the location of the cancer, patients were grouped in the anterior resection groups as follows. In the LAR group, 1) 21 patients were diagnosed with cancer of the distal 1/3 of the S-shaped bowel, 2) 32 patients were diagnosed with cancer of the rectosigmoidal region. In the OAR group, 18 patients were diagnosed with 1) cancer of the distal 1/3 of the s-shaped bowel, and 2) 27 patients were diagnosed with cancer of the rectosigmoid region. In the LAR and OAR groups, 2 (3.8%), 1 (2.2%), 6 (11.3%), 4 (8.9%), 37 (69.8%), 29 (29.8%), 29, 29 (64.4%), and in the T4 stage, 8 (5.1%) and 11 (24.4%) patients were examined (p = 0.674). In the LAR and OAR groups by stage, stage I 3 (5.7%), 2 (4.4%), stage II 16 (30.2%), 12 (26.7%), stage III 34 (64.2%)), 31 (68.9%) patients were examined (p = 0.879). The morphological structure and degree of differentiation of cancer in anterior resection groups are shown in Table 5.

Table 5

Morphological structure and degree of differentiation of cancer in anterior resection groups

Morphological features of the tumor		LAR n=53		OAR n=45	
		Abs.	%	Abs.	%
Adenocarcinoma	High degree diff	15	28,3	13	28,9
	Moderate degree diff	23	43,4	21	46,7
	Low degree diff	11	20,8	8	17,8
Mucous cancer		4	7,5	3	6,7
$\chi 2$; p		$\chi 2$=0,199; p = 0,978			

Haggit and Ki-Kuchi classifications were used in the study of adenomatous polyps that could not be removed endoscopically and were suspected of invasiveness in both anterior and inferior anterior resection groups (Table 6). In this case, patients were divided into groups according to the severity of dysplasia (mild, moderate, severe), the size of the base of the polyp, the presence of lymphavascular invasion.

Table 6

Distribution of patients according to the frequency of adenomatous polyps in the anterior and lower anterior resection groups

Polypin histology type			Laparascopic group (LG) n=22		Open group (OG) n=20	
			Abs	%	Abs	%
Severity of dysplasia	Light		1	4,5	-	-
	Medum		1	4,5	1	5,0
	heavy		4	18,2	3	15,0
Invasive cancer	Haggit 1,2,3		2	9,1	2	10,0
	Haggit 4		3	13,6	4	20,0
	Lymphavascular invasion		4	18,2	3	15,0
	Wide-based polyps	1sm	1	4,5	-	-
		2sm	2	9,1	2	10,0
		3sm	4	18,2	5	25,0
$\chi 2$; p			$\chi 2$= 2,450; p = 0,964			

Polypin histology type			Laparascopic group (LG) n=25		Open group (OG) n=21	
			Abs	%	Abs	%
Severity of dysplasia	Light		1	4,5	-	-
	Medum		2	8,0	1	5,0
	heavy		4	18,2	4	19,1
Invasive cancer	Haggit 1,2,3		3	12,0	2	10,0
	Haggit 4		4	16,0	4	20,0
	Lymphavascular invasion		4	18,2	3	15,0
	Wide-based polyps	1sm	1	4,5	-	-
		2sm	2	9,1	2	10,0
		3sm	4	18,2	5	25,0
$\chi 2$; p			$\chi 2$= 2,450; p = 0,964			

We found that in patients with anterior and lower anterior resection diagnosed with cancer (a total of 201 (69.5%) patients), the highest incidence in the age-gender distribution was between 60-69 years (p = 0.961) in LG and AR, respectively. 18 (38.3%), 23 () 41.1% and 20 (37.7%), 23 (51.1%). We found that patients with anterior and lower anterior resection (88 (30.4%) patients) diagnosed with adenomatous polyps that could not be removed endoscopically and were suspected of invasiveness had the highest morbidity between the ages of 40-49 (p = 0.645).). A number of nuances have been taken into account when implementing TME.

1. Antopometric indications of the pelvis - removal of the rectum without damaging the mesorectal fascia in the narrow pelvis requires a great deal of experience and skill from the surgeon. In patients with a wide pelvis (> 11 cm), the probability of MF injury (up to the muscular layer of the rectum) was 10% in both groups, and 66.7% in narrow pelvis (> 5 cm).

2. Location of the rectum in an anatomically difficult area - the rectum is surrounded on all sides by branches of the hip vessels, anteriorly in contact with anatomically important organs (bladder, prostate, uterus, seminal vesicles, urinary tract). Nerve fibers surround the rectum like a spider's web. It is sometimes impossible to remove the rectum located in such a complex zone in accordance with the principles of TME. 17.0 ± 11.6% in the LTME group and 14.9 ± 10.7% in the OTME group had a positive CRM related to surgery.

3. The features of the anterior-lateral (around 2 and 10 clockwise) and posterior vascular bundles must be taken into account when performing TME. Incorporation into the wrong anatomical area results in rupture of this nerve bundle, resulting in genital and urinary disorders. Urogenital disorders of one form or another were reported in 25 (46.6%) patients due to nerve damage during TME. In 11 (44.0%) patients, nerves were damaged during pelvic dissections.

4. Wrong movements back, side and forward in the dissection zones are not important oncologically, but can lead to serious surgical complications. Improper posterior dissection during

posterior dissection can damage the presacral fascia and cause severe bleeding. Improper lateral movements during lateral dissection can lead to damage to nerves, blood vessels, and urinary tract. The surgical clearance of 1 mm <was highest during anterior (28.6% in the LTME group, 25.6% in the ATME group) and least during posterior dissections (5.4% in the LTME group, 4.2% in the ATME).

5. The presence of large tumor tissue in the mesorectal tissue is an additional obstacle to the proper implementation of TME. Grade 3 TME quality was 41.7% in T3 T4 derivatives in LTME group, 71.4% in T1T2 derivatives, 43.8% and 60.0% in ATME group.

Depending on the degree of damage, we have shown 3 types of TME quality.

1) good (high) Grade-3 (49 (47.6%) for both groups)

2) sufficient (average) Grade-2 (33 (32.0%) for both groups)

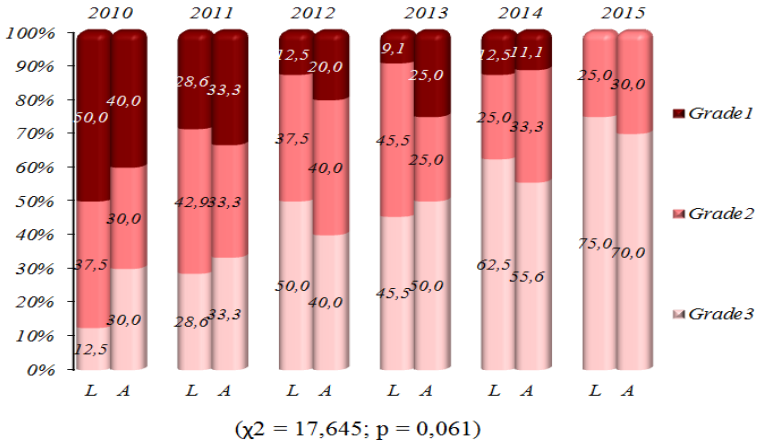
3) insufficient (bad) Grade-1 (21 (20.4%) for both groups)

1. Grade 3 The fascia covering the intestine and mesorectal tissue is smooth, the defects are not macroscopically noticeable. The mesorectal tissue is evenly distributed over each surface, and in the area of the tumor tissue (including the distal zones) there is no contraction (compression) of this tissue (as if the mesorectal tissue covered the tumor in a thin layer). In this quality TME, small defects in the fascia and defects at a depth of 0.5 cm are allowed. Grade in LTME - 3 23 (46.4%), and in ATME in 26 (48.8%) cases.

2. Grade 2 The absence of mesorectal fascia in some areas of sufficient (medium) quality TME-extracted material is noteworthy. Mesorectal tissue is clearly visible in these areas. Mesorectal tissue is uneven, in some areas there are contractions (defects) and cuts, but the muscle layer is not visible. Grade in LTME - 2 15 (31.1%), and in OTME in 18 (31.9%) cases.

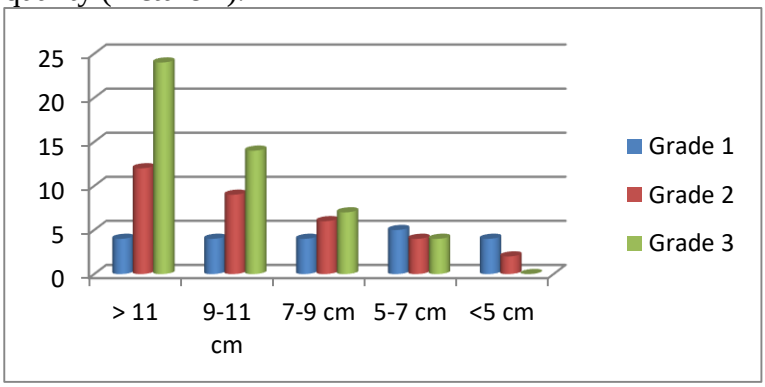
3. Grade 1 TME of insufficient (poor) quality reveals large defects in the mesorectal fascia, the mesorectal tissue is uneven, the amount is small, the mesorectum is extrapolated, the muscle layer is visible and defects are noted. Low-quality TME (grade 1) mesorectal fascia is severely damaged, perforated mesorectal tissue extensive defects in mesorectal fascia appear deep lesions (muscle layer) in mesorectal tissue. Grade in LTME - 1 9 (21.4%), and in OTME in 12

(19.1%) cases. No statistically significant differences were observed between the groups (p = 0.952).



Picture 1. Dependence of TME quality on clinical experience

In no case (laparoscopic and open groups) in the anatomically narrow pelvis in the study groups was it possible to obtain Grade 3 TME quality (Picture 1).



Picture 2.Influence of pelvic anthropometric indicators (for both groups) on TME quality

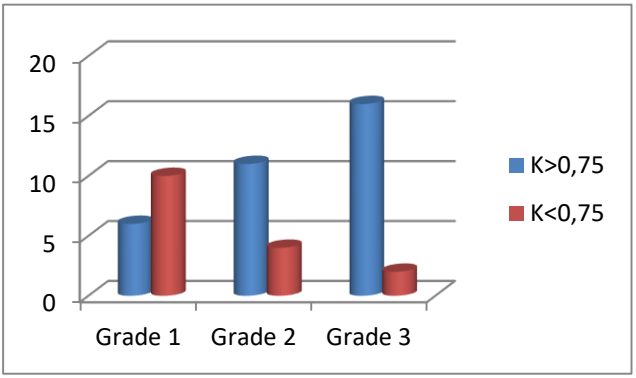
In a comparative study of the effect of cancer stage on TME quality in the LTME and OTME groups, we found no statistical differences (p = 0.734). In the I, II, III stages of LTME group, the

quality of Grade-3 TME was 71.4%, 41.7% and 46.4%, and in OTME group the corresponding indicators were 60.0%, 43.8% and 45.7%. In the relevant groups, Grade-2 TME quality was 14.3%, 33.3%, 35.7% and 20.0%, 25.0% and 37.1%, and Grade 1 TME quality was 14.3%, 25.0 %, 17.9% and 20.0%, 31.3%, 17.1%.

The effect of clinical experience on TME quality in selected patient groups in 2010-2015 was investigated (Figure 3). In the first years, low, medium and high quality TME in the LTME and OTME groups were 50%, 37.5%, 12.5% and 40%, 30% and 30%, respectively, in the last years of the study the corresponding indicator was 0%, 25%, 75% in the LTME and OTME groups and 0%, 30%, 70% ($p < 0.05$).

When studying the Hirsch index ($k = d / l$), we obtained similar results. (where k is the transverse dimension of the pelvis and l is the longitudinal dimension of the oman (Picture 3).

Patients were divided into 2 subgroups: patients with a coefficient of 0.75 <were grouped into the narrow pelvic group, and patients with k> 0.75 were grouped into the normal pelvic group. (23 patients in the laparoscopic group and 26 patients in the open group).Our observations show that in cases of k <0.75, 18% of both groups, and in cases of k <0.75, 44% of Crad-3, TME quality was achieved. By knowing the crunch index in advance, it is possible to get information in advance about the level of TME quality (Picture 2).



Picture 3. Variation of TME quality depending on Hirsch index

The following was taken into account when pathohistologically assessing the quality of TME.

1. Damage to the mesorectal fascia by the surgeon (in the LTME and OTME groups, this figure was 15.4 ± 10%, 16.7 ± 8.8%, 18.8 ± 9.8% and 12.5 ± 8.5%, 13.6 ± 7.5%, 13.7 ± 8.8, respectively, in the upper, middle and lower derivatives. % was).

2. During the spread of tumor tissue in the mesorectal tissue, the mesorectal fascia is more or less invasive. In such cases, the surgical clearance was less than 1 mm in 10 (30.3%) patients in the LTME group and 14 (31.8%) patients in the OTME group in stage II and III. These patients were in the T3 and T4 stages (Figure 6).

3. Approximation of tumor deposits to MF was found in 4 (18.1%) patients in the LTME group and 6 (25%) in the OTME group. In general, tumor deposits were observed in 46.8% and 42.8%, respectively.

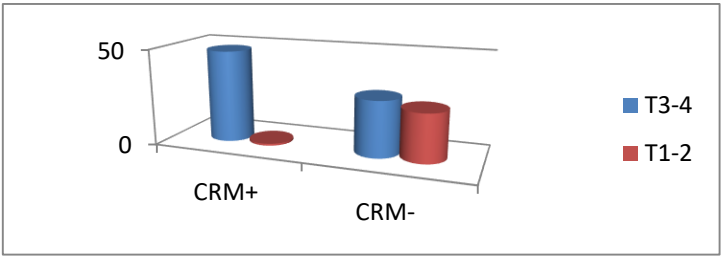
4. MF with tumor emboli (surgical clearance is positive). It was found in 10 (2.2%) patients in the LTME group and 11 (19.6%) in the OTME group.

Lymph nodes in the mesorectal tissue were positive for surgical clearance in 13 (27.6%) patients in the LTME group and 16 (28.5%) in the OTME group.

Given the relationship between the quality of the TME and the radicality of the surgical intervention, the study of the relationship between these parameters is of particular interest. Thus, errors in TME technique directly affect the status of CRM. However, low quality TME does not mean that CRM is completely positive. Low-quality TMEs in stage T1 and T2 derivatives do not always result in local recurrence of the tumor. On the contrary, despite the high quality performance of TME, CRM can be seriously positive, especially in T3 derivatives. Therefore, it should be borne in mind that there can sometimes be a direct correlation between the quality of TME and the status of CRM, and sometimes an inverse correlation, and this nuance should be taken into account when choosing treatment tactics. When examining the TME quality of

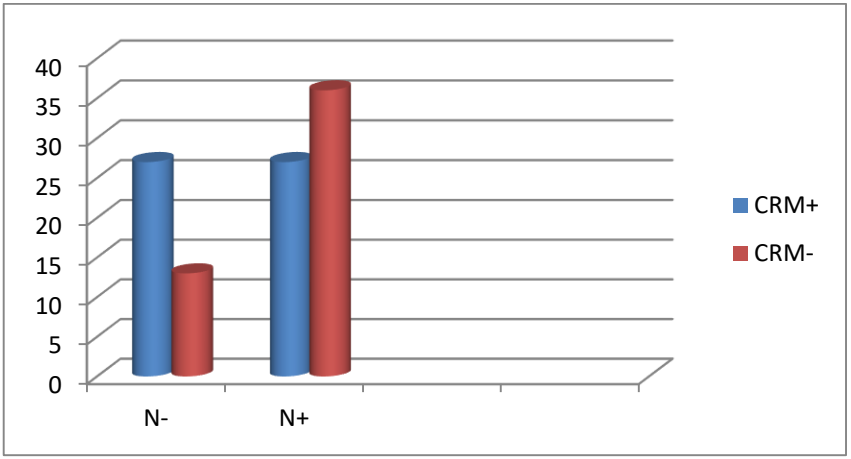
CRM status, it was found that the depth of invasion, metastatic lymph nodes, tumor localization, and size were important ($p < 0.05$).

When examining the invasive depth CRM effect, we found that the probability of CRM positivity was minimal in T1, T2 derivatives and maximum in T3,T4 derivatives (Picture 4).



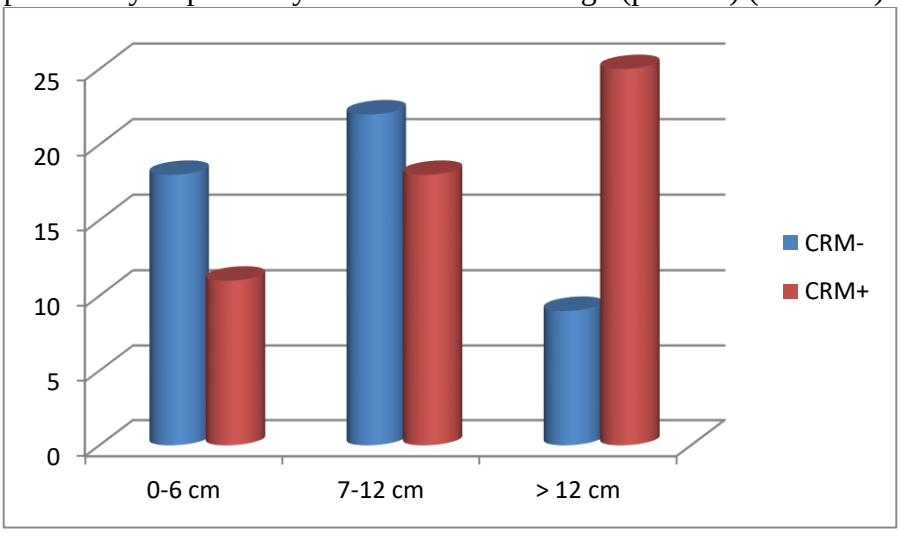
Picture 4. Dependence of CRM status on invasive depth

The presence of metastases to regional lymph nodes indicates the spread of the tumor process, which in turn affects the quality of surgical interventions. Metastases to the mesorectal lymph nodes were observed in 61.1% of both groups in the control groups (Picture 5).



Picture 5. Effect of regional metastases on CRM status

When examining the effect of tumor localization on CRM status in both groups, we found that in low-lying derivatives, the probability of positivity of this indicator is high (p <0.05) (Picture6.).



Picture 6. Influence of derivative localization on CRM status

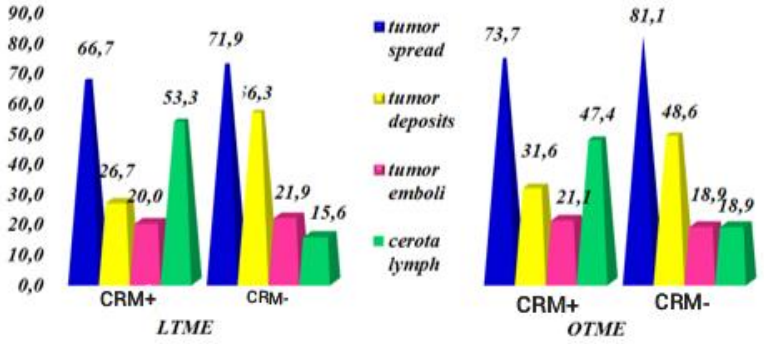
Our observations show that as the tumor size increases, the likelihood of CRM being positive increases (p <0.05) (Table 7).

Table 7

Distribution of patients according to tumor diameter in both groups

Tumor dimensions	LTME n=47				OTME n=56			
	CRM+ n=16		CRM- n=31		CRM+ n=33		CRM- n=23	
	M	%	M	%	M	%	M	%
1-3 sm	1	6,3	11	35,5	1	3,0	9	39,1
4-6 sm	8	50,0	15	48,4	15	45,5	13	56,5
> 6 sm	7	43,8	5	16,1	17	51,5	1	4,3
$\chi 2$; p	$\chi 2$=0,454 p = 0,797		$\chi 2$=1,865 p = 0,394					

A comparative analysis of factors affecting CRM status in the laparoscopic and open lower anterior resection groups found that direct tumor invasion had the greatest effect ($p<0.05$) (Picture 7).

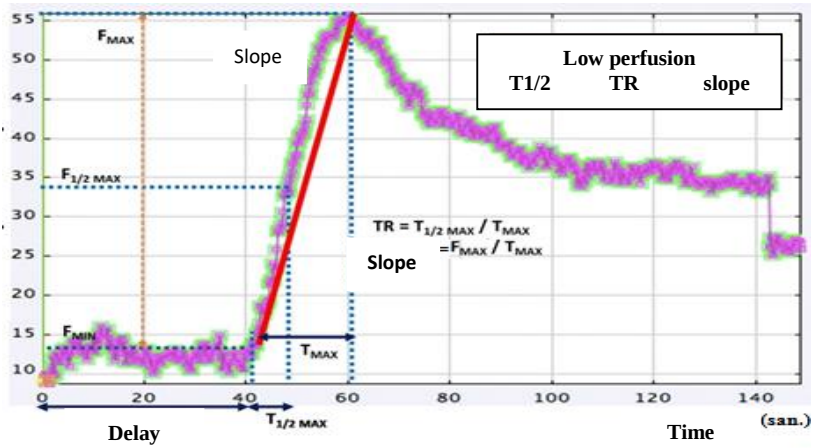


Picture 7. Influence of invasive factors on CRM status

In order to determine the border of perfusion in the large intestine during TME, the border was first recorded by clipping the border with the naked eye, and then JCG angiography was performed. In the JCG fluorescence mode of the laparoscope, perfusion of the large intestinal segment was observed for 2 min (sometimes 4 min if good perfusion was not obtained). After that, the perfusion of the intestinal segment was evaluated qualitatively and quantitatively by a special method.

Our observations show that in 8 out of 28 patients (29.6%) there is a difference between the visible perfusion border and the JCG fluorescence border. This difference was found to be about 1.5-3.0 cm. Although JCG was performed, the reason for the occurrence of anastamosis-related complications (anastomotic insufficiency (2 patients) and stenosis (1 patient)) in 3 patients was, in our opinion, due to our inability to quantify perfusion.

Fluorescence factors and perfusion factors were used to estimate perfusion in the large intestinal segment using graphical curves. Fluorescence intensity factors include minimum (F min) and maximum (F max) fluorescence intensity, base intensity (▲ F), and fluorescence difference in the direction of fluorescence (slope = ▲ F / ▲ T = F max / Tmax). Indicators such as time (Tmax = ▲ T) and time (1/2 T max) and time ratio (TR = 1/2 Tmax / Tmax) spent on the maximum half of the increase in fluorescence investigated and analyzed. Anastamoses were predicted using appropriate clinical factors and perfusion factors to assess the effectiveness of the JCG perfusion stages (Picture 8).



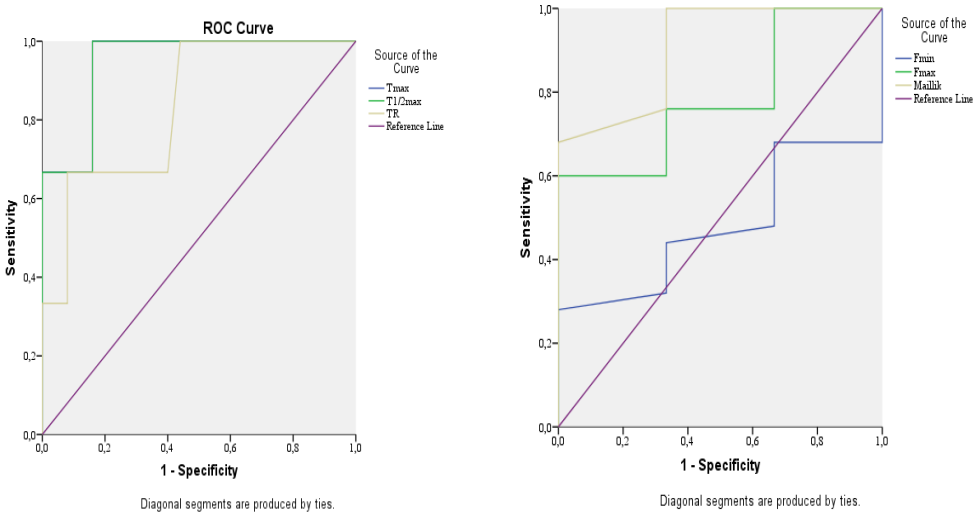
Picture 8. Fluorescence curve (For quantitative analysis of perfusion Fluorescence curve during JCG angiography)

Fluorescence intensity (density), TR time ratio, ▲ F / ▲ T fluorescence slope were considered important quantities. The graph showed the association of poor perfusion with T1 / 2 max, TR and fluorescence inclination

The effect of perfusion parameters was calculated using Fiser Snedecor analysis. FSI = 41.1 for Tmax T 1/2max, 95% EI - 32.2-49.9 ($p < 0.001$), FSI = 11.5 for Fmax, 95% EI 0.0-24.8 ($p = 0.035$), and for inclination FSI = 16.9, 95% EI - 4.5-29.4 ($p = 0.011$).

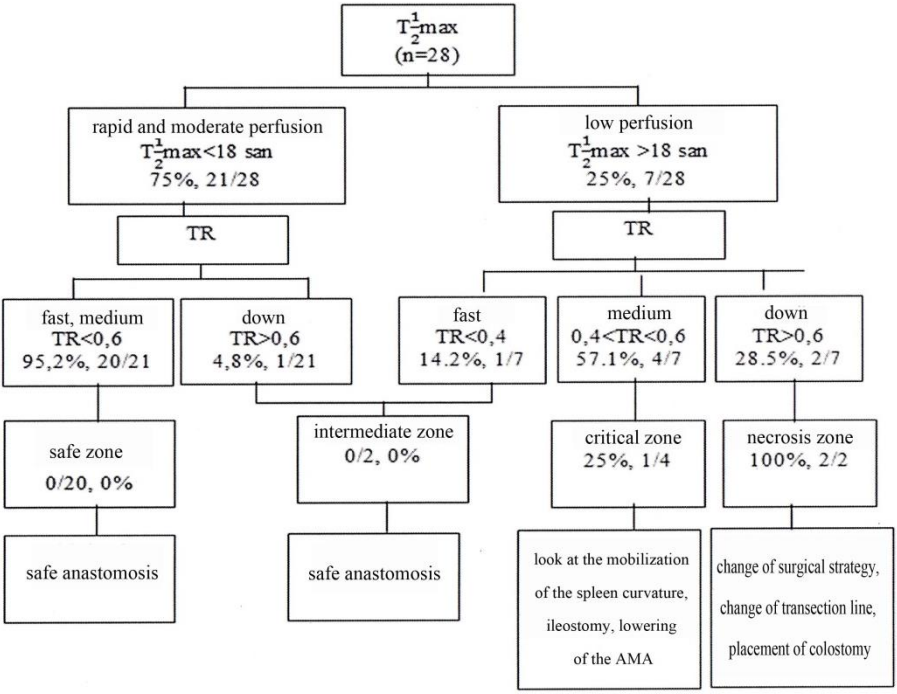
JCG perfusion is the most effective quality indicator used during LTME to safely place anastomoses. With JCG imaging, it was possible to avoid incorrect transection in 29.6% of cases. It is impossible to be sure of the reliability of the anastomosis only on the basis of quality indicators. In this case, the complications associated with the anastomosis are 12.1%. Anastamoses can be predicted using perfusion factors such as T ½ max, TR and F max.

Of the patients under our observation, 75% were patients with T ½ max <18 s and 25% were patients with T ½ max> 18 s. Patients with rapid and moderate perfusion accounted for 95.2% (TR <0.6), and patients with low perfusion had 4.8%. Anastamoses were safely placed in both groups of patients (safe and intermediate zone). During the ROC-curve statistical analysis of perfusion factors, T1 / 2 max and TR values were found to be significant (p = 0.911, p = 0.110, p = 0.23, respectively) (Picture 9).



Picture 9. ROC Curve analis

Table 8. Algorithm for predicting the completeness of colorectal anastomoses during TME



In 14.2% of patients with low perfusion TR <0.4, anastamosis was safe in these patients, and in 25.0% of patients with moderate perfusion (57.1%) (0.4 <TR <0.6) (critical zone) anastomosis complications were observed. Low perfusion was observed in 28.5% of patients under our observation. In both of these patients (2/2), anastomosis was observed in the patient. When Tmax 51.5>, T1 / 2max 19.8>, and the slope is 1.7 <, the probability of complication also increases. These indicators are considered independent criteria and are of particular importance in the prediction of anastomosis failure (Table 8).

The following indicators were investigated when comparing the close results of operations in the laparoscopic and open group.

1. intraoperative satisfaction (p <0.001)
2. operation time (p <0.001)
3. intraoperative complications (p> 0.05)

4. need for narcotic analgesics in the postoperative period (pain intensity) ($p < 0.001$)

5. period of onset of intestinal peristalsis in the postoperative period ($p < 0.001$)

6. enteral feeding time ($p < 0.001$)

7. first defecation ($p < 0.001$)

8. length of hospital stay ($p < 0.003$)

Laparoscopic and open group comparative analysis of all these indicators revealed statistically significant differences ($p < 0.05$) (Table9). The most important indicators that determine the oncological effectiveness of the performed surgery are local relapses, distant metastases and survival.

Comparative study of close results of TME for both groups *Table 9*

Indication	Group	N	Mean	Std. Error	Min	Max	P_F	P_U
İntraoperati and satisfication	OTME	56	338,2	11,5	190	480	<0,001	<0,001
	LTME	47	231,9	11,8	110	380		
Operating time	OTME	56	276,1	2,4	240	310	<0,001	<0,001
	LTME	47	340,0	4,7	280	390		
The need for narcotic analgenics	OTME	56	120,0	2,4	90	150	<0,001	<0,001
	LTME	47	72,6	1,0	60	80		
Peristaltic onset time	OTME	56	61,4	1,1	48	72	<0,001	<0,001
	LTME	47	47,6	1,1	36	60		
Enteral feeding time	OTME	56	60,4	1,2	48	72	<0,001	<0,001
	LTME	47	43,9	1,0	30	54		
First defecation	OTME	56	95,5	2,1	72	120	<0,001	<0,001
	LTME	47	60,1	0,9	48	72		
Total ward days	OTME	56	22,8	0,8	13	31	=0,001	=0,001
	LTME	47	18,9	0,7	12	26		
Postoperativ e ward days	OTME	56	12,8	0,4	8	18	=0,001	=0,003
	LTME	47	10,9	0,4	7	15		

During the first 3, 6, and 12 months after surgery (follow-up every 6 months), patients undergo clinical examinations, blood tests, determination of oncomarkers in the blood (CA19-9, CEA), USM of the abdomen, CT of the chest and abdomen, and MRI of the small pelvis. examination, colonoscopic examinations. CEA and CA19-9 were elevated in 85.7% of patients with local recurrence and in 90% of patients with distant metastases. CEA and CA 19-9 31.5 ± 8.7 ng / ml and 85.7 ± 7.8 n / ml, respectively, during local recurrence in LG, and 34.7 ± 25 during local recurrence in AG, respectively. , 3 ng / ml; 77.8 ± 16.5 n / ml, and 31.7 ± 8.3 ng / ml during distant metastases; It was 71.4 ± 12.5 n / ml. Local recurrence of the tumor in the anastomosis area was noted in 4 patients. Of these patients, 2 (4.25%) were in the laparoscopic group and 2 (3.57%) were in the open group. In 3 of these patients, rectal extraction (1-laparoscopic group, 2-open group) was performed with a single colostomy, and 1 patient refused the operation. In these patients, local relapses were recorded within 12-28 months. The operations were carried out with great success. Radical surgery was not possible because other recurrences spread to the back of the rectum and invaded the occipital bone (8 patients). 5 of these patients (2-laparoscopic, 3-open) colostomy (when there are signs of impermeability) opened alternative courses of treatment. The remaining 6 patients refused such treatment and ended their lives due to the progression of the tumor. Thus, 3 out of 15 patients with local relapse underwent radical surgery, 1 patient refused surgery, the remaining 5 patients underwent colostomy, and 6 patients underwent alternative treatment (and treatment rejection) for one reason or another. Thus, in the first 36 months, the probability of local recurrence in laparoscopic and open TME groups was 14.8% and 14.2%, and the differences between the figures were not statistically significant ($p > 0.05$).

Distant metastasis was observed in 36 months at 6.3% in the laparoscopic group and 7.7% in the open group. Although there is a difference between the numbers, they are not statistically accurate ($p > 0.05$). Overall, the recurrence rate was 21.1% in the laparoscopic group and 21.3% in the open group (Table 10).

Table 10.

Frequency of local residives and distant metastases in both groups

	LTME n=47	p%	OTME n=56	p%	$\chi 2$	p	OR	95% LB	95% HB
Local residive	7	14,9	8	14,3	0,008	0,931	1,05	0,35	3,15
Far mts	3	6,4	4	7,1	0,058	0,810	0,89	0,19	4,18
Total	10	21,3	12	21,4	0,000	0,985	0,99	0,38	2,55

Note: OR- statistical indicator for comparison and statistical evaluation of the obtained indicators, the criterion of conformity of x2 pyroson.

Recurrence of the disease was observed between 8 and 36 months. The highest recurrence of the disease was observed at 13-18 months (6.4% in the LTME group and 5.4% in the OTME group) (Table 11).

Duration of residives *Table 11*

Recurrence period	Laparascopic gruop n=47		Open group n=56	
	Local	Distant	Local	Distant
not	40 (85,1)	44 (93,3)	48 (85,7)	52 (92,9)
8-12	–	1 (2,1)	1 (1,8)	1 (1,8)
13-18	3 (6,4)	1 (2,1)	3 (5,4)	2 (3,6)
19-24	2 (4,3)	–	3 (5,4)	1 (1,8)
25-30	1 (2,1)	–	1 (1,8)	–
31-36	1 (2,1)	1 (2,1)	–	–
$\chi 2$; p	$\chi 2$=2,157 p = 0,827	$\chi 2$=2,231 p = 0,693		

When examining the dependence of local relapses and distant metastases on CRM status, we found that most local relapses and distant metastases were recorded in patients with CRM-positive. In the LTME group, 5 (31.3%), 2 (12.5%), respectively, in the OTME group, 6 (18.2%) and 2 (6.1%), and in patients with negative CRM,

the corresponding indicators were 2 (6, 5%), 1 (3.2%) and 2 (8.7%), 2 (8.7%). The difference between the groups was not statistically significant (p = 0.376, p = 0.640). The most effective treatment to prevent local relapses is preoperative radiotherapy. After radiation therapy, CRM remained positive in 16 (32.0%) patients in both groups. Of the patients who received long-term radiotherapy (50 (62.5% in total)), 7 (14.0%) were radioresistant and 11 (22.0%) were partially radiosensitive. Of the radioresistant patients, 6 (12.0%) had partial radiosensitivity and 5 (10.0%) had local recurrence (11 patients in total). These patients recurred during the first 36 months (p <0.05). Of the 7 patients with a positive CRM status, 6 (85.7%) had a local relapse during the first 36 months. 1 patient without local recurrence (OTME) had CRM positivity associated with tumor embolism and deposit, and the tumor itself had a high degree of differentiation. Of the 289 patients under our supervision, 80 (27.6%) underwent preoperative radiotherapy. Adding preoperative radiotherapy to surgical treatment has three main meanings: reducing local recurrences, reducing the size of large colorectal cancers to an operability, and increasing the chances of sphincter-protective surgery in low-grade cancers (Table 12).

Table 12.

Tumors due to prolonged radiotherapy in both groups of patients tissue responses

Answers	Laparoscopic group(n=22)		Open group(n=28)	
	Abs.	%	Abs.	%
Fully radiosensitive	4	18,2	5	17,9
Partial radiosensitive	15	68,2	19	67,9
Radioresistent	3	13,6	4	14,3
$\chi 2$; p	$\chi 2$=0,005; p = 0,998			

In patients receiving long-term radiotherapy, complete radiosensitivity was recorded in the laparoscopic group at 18.2% and

in the open group at 17.9%. A standard TME was performed on all patients.

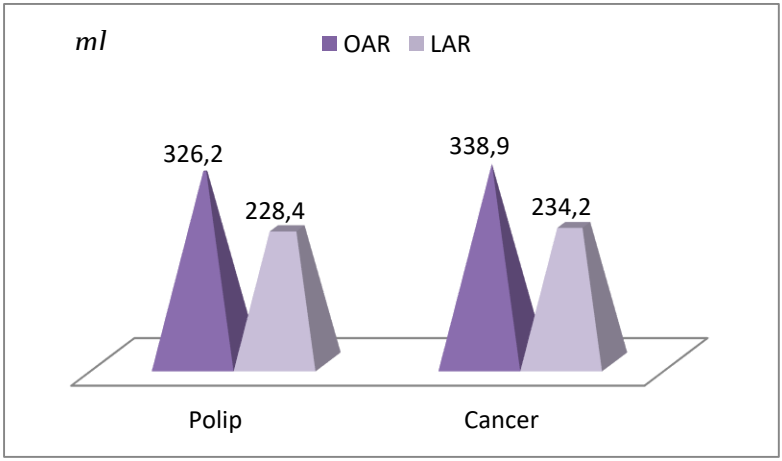
No local recurrence or distant metastasis was reported during follow-up (33 patients in total) after anterior and lower anterior resection in patients diagnosed with polyps. Complications of one form or another have been reported in patients with bilateral ileostomas (31.7%).

Unilateral analysis of factors affecting the results of treatment of RC (comparative analysis) *Table 13*

Göstərici		Laparoscopic	Open	P
		n (P±mp%) / M (min – max)	n (P±mp%) / M (min – max)	
TME quality	Grade 3	23 (48,9±7,3%)	26 (46,4±6,7%)	0,952
	Grade 2	15 (31,9±6,8%)	18 (32,1±6,2%)	
	Grade 1	9 (19,1±5,7%)	12 (21,4±5,5%)	
CRM pozitivity	high 1/3	2/13 (15,4±10,0%)	2/16 (12,5±8,3%)	0,751
	medium 1/3	3/18 (16,7±8,8%)	3/22 (13,6±7,3%)	0,859
	low 1/3	3/16 (18,8±9,8%)	3/18 (16,7±8,8%)	0,771
CRM median	high 1/3	1,3 (0,7-2,0)	1,2 (0,6-1,8)	0,259
	medium 1/3	1,4 (0,6-2,1)	1,2 (0,7-1,9)	0,126
	low 1/3	1,1 (0,5-1,6)	1,2 (0,4-1,8)	0,214
Tumor regretation rate	1	9 (19,1±5,7%)	13 (23,2±5,6%)	0,925
	2	24 (51,1±7,3%)	25 (44,6±6,6%)	
	3	8 (17,0±5,5%)	10 (17,9±5,1%)	
	4	6 (12,8±4,9%)	8 (14,3±4,7%)	
Resection border(proximal)	high 1/3	12 (7,0-17,0)	14 (10,5-22,5)	0,529
	medium 1/3	17,5 (11,5-22,7)	18,0 (13,5-25,7)	0,185
	low 1/3	22,2 (16,5-26,8)	24,2 (18,0-28,5)	0,221
Resection border(distal)	high 1/3	5,5 (4,5-6,5)	5,6 (4,6-6,8)	0,852
	medium 1/3	3,6 (2,8-4,7)	3,8 (3,0-5,5)	0,106
	low 1/3	1,9 (1,0-3,0)	2,0 (1,2-3,5)	0,174
Lymph nodes		14,8 (10-19,0)	15,2 (12-22)	0,157
Local residive		7/47 (14,9%)	8/56 (14,3%)	
Distant metastasis		3/47 (6,3%)	4/56 (7,1 %)	
Survive		81%, (71,5%)	80%(68,7%)	

Complications caused by both the effect of intestinal juice and technical reasons when placing a bilateral ileostomy were accompanied by redness of the skin in one form or another. Cuzi changes (slight redness, cuzi peripheral necrosis, mild peristomal inflammatory changes) were not considered. A comparative analysis of a number of indicators in TME groups (laparoscopic, open) is shown in Table 13.

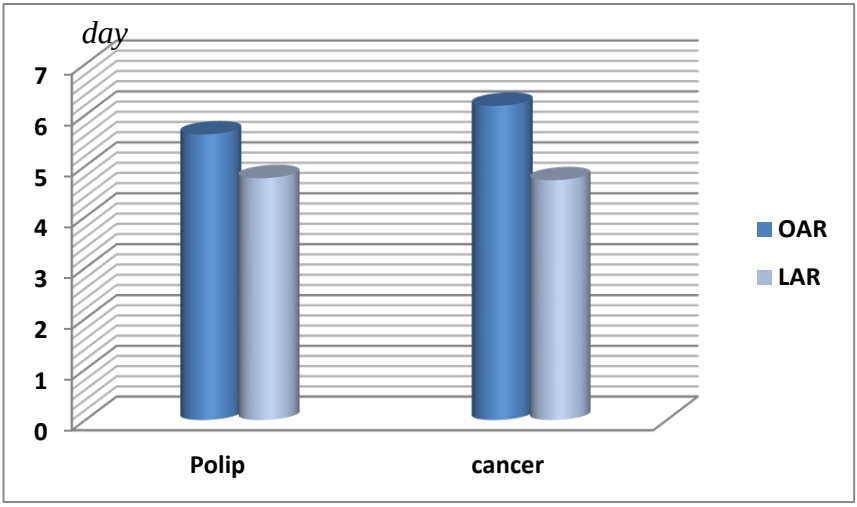
A statistically significant difference ($p < 0.05$) was found in patients with laparoscopic and open anterior resection, regardless of the nature of the tumor (polyp or cancer) and location (s-type or rectosigmoidal). No patient underwent preoperative radiotherapy. In the comparative analysis of the amount of blood lost during the operation in the anterior resection groups (benign tumors), we found that the amount of blood lost in the OG is greater than the LG. (326.2 ± 15.1 and 228.4 ± 14.00, respectively.) This trend has also been observed in patients diagnosed with cancer. (respectively 234.2 ± 10.1 ml in OG and 338.9 ± 14.1 in OG) ($p < 0.001$) (Figure 10).



Picture 10. Diagrammatic representation of the amount of blood lost during surgery during anterior resection

The first act of defecation was of particular importance because none of the pre-resected patients had a bilateral ileostomy (Picture 11). In

patients diagnosed with polyps and performed open and laparoscopic anterior resection, the first defecation is faster in LG (4,076 ± 0.52), in OG, it occurred later (5.62 ± 0.57 days). This dynamic was observed in patients diagnosed with cancer (6.18 ± 0.39 days in the open group and 4.72 ± 0.31 days in the LG, respectively) (p = 0.255).



Picture 11. Diagram showing the first deflection in patients with anterior resection

Table 14.

Indicators of 3-year non-residives and actual survival of patients with laparoscopic and open pre-resection

Cancer stages	LTME (n=45)			OTME (n=36)			χ^2	p	OR	95% LB	95% HB
	n	abs	%	n	abs	%					
$T_{1-2}N_0M_0$	3	3	100,0	2	2	100,0	–	–	–	–	–
$T_2N_{1-2}M$	5	5	100,0	3	3	100,0	–	–	–	–	–
$T_3N_0M_0$	12	11	91,7	9	8	88,9	0,288	0,592	1,38	0,07	25,43
$T_3N_{1-2}M_0$	19	17	89,5	15	13	86,7	0,081	0,777	1,31	0,16	10,56
$T_4N_{1-2}M_0$	6	4	66,7	7	4	57,1	0,048	0,826	1,50	0,16	14,42
Total	45	40	88,9	36	30	83,3	0,526	0,468	1,60	0,45	5,74

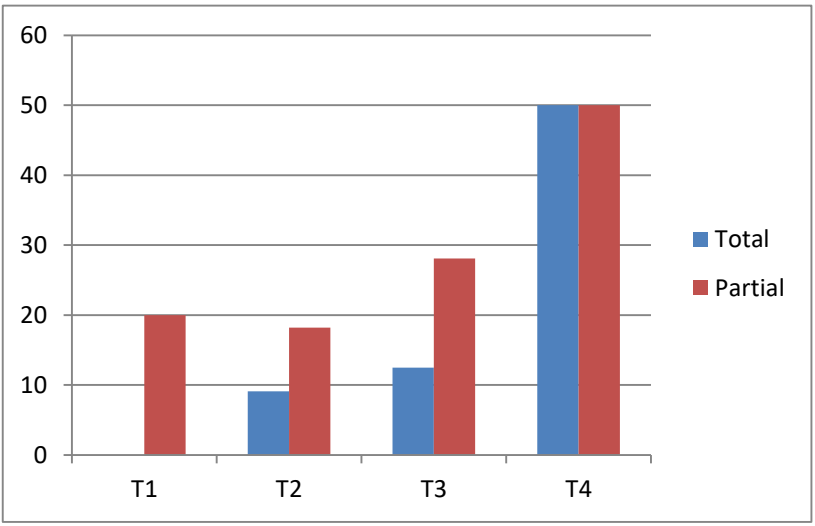
In 45 patients in the laparoscopic group, no recurrence was detected in 82.2 ± 1.6% of patients within 3 years after surgery (37). Recurrence was found in 8 (17.8%) patients (local recurrence in 4 patients and distant metastasis in 4 patients). Despite recurrence during this period, 3 patients (6.67%) were able to survive for 3 years despite recurrence of the disease. The remaining 5 patients (11.1%) died between 18 and 36 months due to dissemination of the disease. Thus, the actual 3-year survival of patients who underwent laparoscopic rectal anterior resection was 88.7 ± 1.8%, and the 3-year survival without recurrence was 82.2 ± 1.6%. In patients who underwent open rectal anterior resection (36 in total), the survival without recurrence for 3 years was 28 (77.8 ± 2.8%). Local recurrence and distant metastasis were observed in 8 (22.2%) patients. The recurrence of the disease was able to continue despite the recurrence of the lives of 4 patients (11.6%). Four patients survived for 18 to 30 months as the disease progressed, and then died. Thus, the actual survival in patients in the open group was 89.4 ± 1.8%, and the survival without recurrence was 77.8 ± 2.8%. A comparative analysis of 3-year survival found no statistically significant differences between the open and laparoscopic groups. ($p > 0.05$) (Table 14).

The types of nerve damage and the application of laparoscopic technology in this injury were compared in 56 patients under observation. Patients depending on the extent of damage to the pelvic nerve sheaths 3 divided into half groups. 1) patients with fully protected nerves 31 (55.3%) 2) patients with partially protected nerves 16 (28.5%) 3) patients with fully damaged nerves 9 (16.1%) (Table 15).

Frequency of injuries of autonomic nerve plexus Table 15.

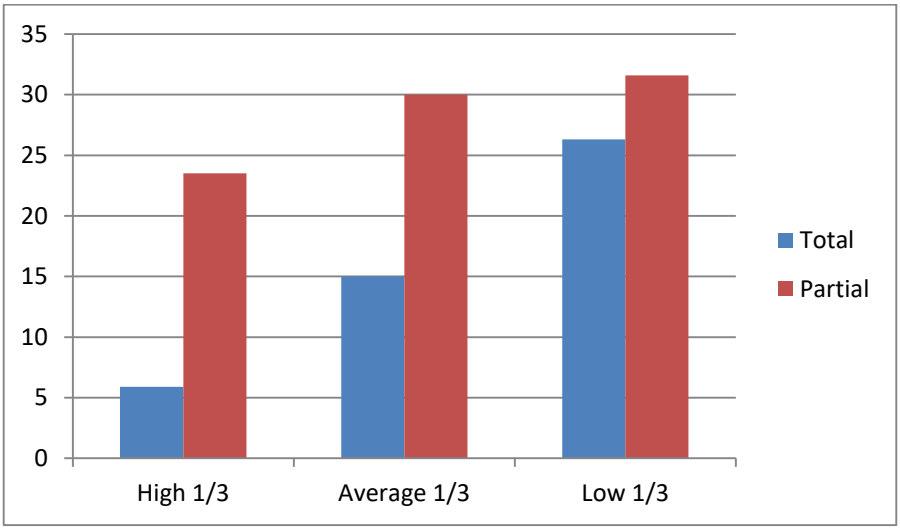
Types of nerve fiber protection	LTME (n=27)		OTME (n=29)	
	Abs	%	Abs	%
Full protection	14	51,9	17	58,6
Partial protection	8	29,6	8	27,6
Total injury	5	18,5	4	13,8
$\chi 2$; p	$\chi 2 = 0,330$; $p = 0,848$			

In both hypogastric nerve injuries, we have partially evaluated such injuries because the pelvic floor (lower hypogastric sheath) continues to be complete and functional. A number of factors have contributed to nerve damage. We examined these factors in both the laparoscopic and open group. The probability of partial nerve damage at the depth of T1 invasion was 20%, at the depth of T4 invasion was 50%, and for complete damage at stage T1 was 0%, and at stage T4 was 50% (Picture 12).



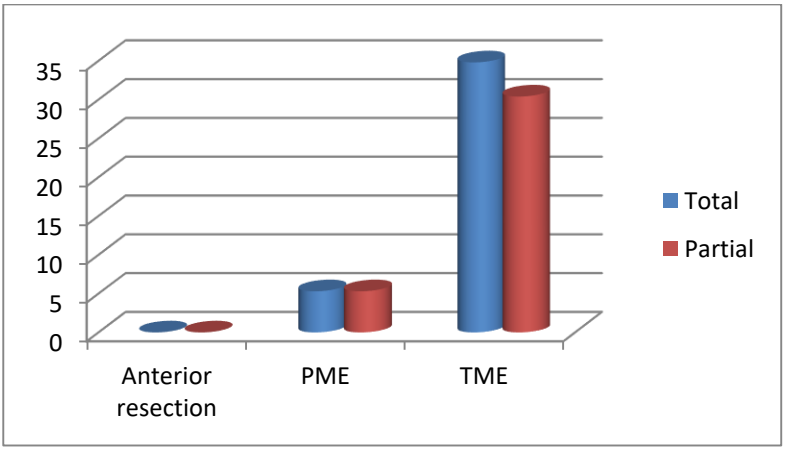
Picture 12. Dependence of nerve injury on the depth of cancer invasion

Complete nerve damage was 5.9% in the upper 1/3 derivatives, 26.3% in the lower 1/3 derivatives, and 23.5% and 31.6% in partial injury, respectively (Picture 13).



Picture 13. Frequency of autonomic nerve injury depending on the location of the tumor

While no complete nerve injury was reported in the anterior resection groups, complete injury was found in 34.8% of the TME groups (Picture 14).



Picture 14. Diagram showing the effect of the type of operation on nerve injury

In the course of the study, the mean and maximum volume velocity (AVS, MVS) of urine excretion in NI + and NI- groups in both groups were studied. Urodynamic studies performed on patients and a comparison of clinical outcomes showed that among patients with urinary incontinence, there were patients with impaired urodynamics. Thus, in both groups (laparoscopic and open) no nerve damage was observed (31 patients in total), 19.3% of patients had a decrease in the average and maximum urinary rate. We also found that a decrease in AVS and MVS during urination was most common in 66.7% of men. This manifested itself equally in both groups. A decrease in AVS of less than 10% was observed in 16.1% of patients without nerve damage (men) and in 25% of patients with nerve damage (P = 0.43). Among women, a decrease in AVS was observed in 25% of patients with nerve damage, compared to 6.8% (p = 0.012) in patients without nerve damage. A comparative analysis of AVS by groups (both laparoscopic, open, and NI- and NI +) shows that the maximum decrease in AVS occurs in male patients with marked nerve damage. Studies of urinary incontinence during the last three consecutive AVS examinations (before surgery, 1 week after surgery, and 6 months after surgery) show that patients with nerve damage reported a steady decline in AVS and MVS. The decrease was observed in both the open group and the laparoscopic group.

The International Index of Erectile Function (EFBI) in male patients with no reported nerve damage (NI-) showed dynamic follow-up (preoperative, 1 month and 6 months) of 66.1 ± 4.3, 56.2 ± 12, respectively. , 5, 41.3 ± 16.4, and in the NI + group it was 62.8 ± 13.6, 41.8 ± 14.7, 42.6 ± 21.5, respectively. The sharp difference manifested itself in the first month, and in the 6th month the EFBI began to decline equally in both groups. Thus, it is clear that erectile dysfunction manifests itself in one form or another in patients belonging to both NI- and NI + groups. We have provided a classification to study the types of damage. The classification describes both the anatomical and topographic features of nerve damage, as well as the functional disorders that occur in this case. An attempt was made to determine the relationship between the

classification sequence and the severity of the complication. N1-1 type injuries The mildest NI-5 type injuries are interpreted as the most severe.

Table 16.

Classification of nerve injuries during TME

Type of injuries		Laparoscopic (n=27)				Open (n=29)			
		Iatrogen		Oncologic		Iatrogen		Oncologic	
		Men	Women	Men	Women	Men	Women	Men	Women
Nİ-1	IMA around radix	1	1	–	1	1	–	–	–
	High HP	1	–	–	–	–	1	–	–
	HN	1	1	–	–	1	–	–	–
Nİ-2	Low HP	1	–	1	–	–	–	1	1
Nİ-3	Sacral parasimpatic nerve	–	–	–	–	–	–	–	1
Nİ-4	Cavernous nerves	1	–	–	–	1	–	–	–
Nİ-5	Paraorgan nerves	1	1	–	–	–	1	1	–
Combined injuries	One sided injuries of HN və low HP	1	–	–	–	1	–	–	1
	2 sided injuries of HN and 1 sided injuries of low HP	–	–	1	–	–	–	1	–
Total $\chi 2$ p		7 25,9 %	3 11,1%	2 7,4%	1 3,7%	4 13,8%	2 6,9%	3 10,3%	3 10,3%
		10 37,0% $\chi 2$=1,831 p=0,176		3 11,1% $\chi 2$=0,373 p=0,541		6 20,7%	6 20,7%		
		13 48,1% $\chi 2$=0,259 p=0,611				12 41,4%			

60% of patients with observed neurological damage were diagnosed with etrogenic and 40% with oncological causes.

Complete injury was found in 36% of patients and partial damage in 64% (Table 16).

Vegetative nerves in the course of TME in the observation groups in 36% of cases were NI-1, in 16% of cases NI-2, in 4% of cases NI-3, in 8% NI-4, in 16% NI-5, and in 20% of cases there was combined injury. was observed.

Analysis of the influencing factors shows that damage to the right ($p = 0.001$), left hypogastric nerve ($p = 0.005$), as well as right hypogastric pelvic girdle ($p < 0.001$) causes transient dysuria. Persistent dysuria was observed in patients with damage to the internal organ nerve ($p > 0.05$) and the right lower pelvic floor ($p = 0.02$). A decrease in EFBI of less than 30% was observed in the right ($p = 0.02$) and left hypogastric nerves ($p = 0.04$), right ($p = 0.005$) and left lower pelvic floor injuries ($p = 0.091$). The effect of preoperative radiation therapy on erectile dysfunction was determined ($p = 0.081$). Univariate analysis of factors affecting retrograde ejaculation shows that injury to the nerves around the seminal vesicles ($p = 0.003$) and paraprostatic nerves ($p < 0.05$) have an effect on this indicator. Nerve injury most often causes severe consequences during distal denervation. 75% of patients with distal denervations have some form of urinary problems. Erectile dysfunction is observed in 50% of men. In contrast, sympathetic denervations do not result in serious functional complications. Anorgasmia was observed in 4 (66.7%) of the 6 patients included in the NI-1 group. In mixed-type lesions, urinary problems are less common (in our case, 1 in 5 patients). In conclusion, it should be noted that in the development of pelvic dysfunction is not the volume of the nerves, but their functional load. Our observations show that severe consequences are most pronounced when the paraorganic nerves are removed. Thus, injury to the paraorgan nerves leads to a decrease in the compensatory capacity of the body (loss of organ function over time) and the appearance of dystrophic changes in the body wall.

Thus, there is no significant difference between oncological and functional outcomes during laparoscopic, open anterior and

lower anterior resections performed in benign and malignant tumors of the distal 1/3 of the rectum, rectosigmoidal and S-shaped bowel. The presence of laparoscopic technology in selected patient groups in these localized derivatives provides a basis for great success.

RESULTS

1. Total mesorectal excision in colorectal cancer is the only and correct surgical treatment. High-quality total mesorectal excision can be performed laparoscopically in selected groups of patients, and the results are close to those of TME performed by the open method. Grade-3 44.7% in the laparoscopic group, 42.8% in the open group, 27.6% in the Grade-2 laparoscopic group, 28.5% in the open group, 27.6% in the Grade-1 laparoscopic group, and 28.5% in the open group % was. In colorectal cancer, patients with a positive circulatory resection threshold and metastatic lesions with regional lymph nodes are more likely to have a local recurrence. Local recurrence was reported in 62.5% of patients with laparoscopic group with positive CRM, in 75% of patients in open group, in 8.3% of patients in laparoscopic group with negative CRM, and in 6.25% of open group. $p > 0.05$ [5, 8, 11, 17, 18, 19, 31, 35, 37, 39].

2. The location and depth of the lesion, pelvic anthropometric parameters, proximity of tumor deposits and emboli to the mesorectal fascia, metastatic lesions of regional lymph nodes, and low-quality TME increase the risk of CRM positivity in both the laparoscopic and open groups. This risk is associated with localized tumor spread in the LTME and OTME groups, with 41.7% and 38.5% of tumor deposits, 16.7% and 19.2%, respectively, with emboli, 12.5% and 15.4% with lymph nodes, respectively. 2%, 26.9%. Although the quality of TME is affected by factors such as the surgeon's ability, location and stage of the tumor, laparoscopic surgery or open execution does not have such a significant effect ($p < 0.05$) [10, 12, 14, 15, 20, 38].

3. Comparative analysis of close results between laparoscopic and open groups in the lower anterior resection groups showed statistically significant differences ($p < 0.05$). Local relapses in both

groups were 14.9% and 14.3% (p = 0.931) in the LTME and OTME groups, respectively, and distant metastases were 6.4% and 7.1% (p = 0.810), respectively. Local recurrence was reported in the first 36 months in 2.1% of patients with high-quality TME in the laparoscopic group and 0% in the open group. Grade 2 caused local recurrences in the LTME and OTME groups by 4.3%, 5.1%, and in Grade 1 by 8.5% and 10.7% (p = 0.717), respectively. Actual and non-relapse survival (36 months) in the lower anterior resection groups for laparoscopic and open groups was 81% (71.5%) and 80% (68.7%), respectively [4, 6, 16, 26, 28, 30, 33].

4. In the anterior resection group, local recurrence was 5.6% in the laparoscopic group, 4.9% in the open group (p = 0.836), distant metastasis was 7.0% in the laparoscopic group, and 8.2% in the open group (p = 0.803). 82.2 ± 5.7% without recurrence in the laparoscopic group, 88.9 ± 4.7% in fact, 77.8 ± 6.9% in the open group, 83.3 ± 6.2% in actual life (p = 0.618) , p = 0.468). Laparoscopic and open anterior resection did not reveal any significant differences in the occurrence of local relapses, distant metastases, as well as in 3 years of life. p> 0.05 [29, 32, 34].

5. ICG angiography is of particular importance to assess intestinal perfusion during TME. Our observations show that in 28.5% of cases there is a difference between the visible perfusion limit and the ICG fluorescence limit. T1 / 2max TR inclination indicators were used to quantify perfusion. T1 / 2max> 19.8, inclination <1.7, TR> 0.6 cases have a high probability of complications. In these indicators, the FTC = 41.1 [23, 39].

6. In the surgical treatment of malignant tumors of the rectum, in addition to oncological results, it is advisable to use neurosurgical techniques to ensure satisfactory functional (urogenital) results. In the laparoscopic group, complete nerve protection was 51.9%, partial injury was 29.6%, complete injury was 18.5%, and in the open group, complete protection was 58.6%, partial protection was 27.6%, and complete injury was 13.8% (p = 0.848). Total injury was 9.1% (p = 0.924) in T2 derivatives, 12.5% (p = 0.788) in T3 derivatives, 50% (p = 0.480) in T4 derivatives, 5.9% in the upper 1/3

localization, and 1/3 in the middle. 15% in localization, 26.3% in the lower 1/3 localization ($p = 0.891$), 5.3% in PME ($p = 0.957$), 34.8% in TME ($p = 0.676$), 12 in short radiotherapy, 5% ($p = 0.927$) and 20.8% ($p = 0.856$) during long-term radiotherapy [22, 27].

7. Tumor localization, invasive depth, peripheral metastases, and pelvic anthropometric parameters have a significant effect on nerve protection ($p < 0.05$). The duration of operations in the laparoscopic group was 390 ± 4.1 minutes during nerve identification. 320 ± 2.2 min in the open group and 310 ± 4.7 min in unidentified patients, respectively. and 276.1 ± 2.4 min. The amount of blood lost during the operation in the laparoscopic and open group was 370 ± 9.1 ml and 423 ± 8.8 ml in the first case, 231.9 ± 11.8 ml and 338.2 ± 11.5 ml in the second case [13].

8. Transient dysuria, persistent dysuria, less than 30% decrease in EFBI, retrograde, ejaculation, various levels of nerve damage (NI-1, NI-2, NI-3, NI-4, NI-5) were recorded ($p < 0.05$). Urinary incontinence is 2.3% when nerve elements are fully protected, and 67% when fully damaged. Urinary incontinence is 15% when using neuroprotective surgery. Urinary incontinence was not observed in either group during partial nerve damage. Inability to urinate was recorded in 6.5% of cases with complete protection, 25% in case of partial damage, 77.8% in case of complete damage, and 22% of cases of complete inability to hold urine. Our observations show that the application of neuroprotective surgery along with TME has allowed to achieve optimal oncological and functional results in the treatment of colorectal cancer. $p > 0.05$ [22].

9. In no case was it possible to obtain Crade 3 TME quality ($p = 0.043$), regardless of the stage and localization of the derivative ($p = 0.031$) in the open group in cases where the corrosion index was 0.75 <. Outcome of laparoscopic surgery in this group of patients was better ($p = 0.019$). Although it was not possible to obtain Crade 3, it was possible to obtain Crade 2 (only Crade1 was obtained in open operations). During the operation (in order to prevent anastomotic suture occlusion) it is very important to assess the perfusion of the large intestinal segment by JGC angiography. In

patients with T1 / 2max 18 sec> and TR> 0.6, avoid anastomosis as much as possible, alternative measures - change the surgical strategy (do not mobilize the spleen curvature, think about ileostomy, perform low ligation of the IMA), draw the transection line proximal, insert colostomas It is more expedient to use such methods [1, 2, 9, 25, 21, 36].

PRACTICAL RECOMMENDATIONS

1. TME is the only radical treatment for colorectal cancer and endoscopically incurable dysplastic polyps. TME can be performed both openly and laparoscopically. Both macroscopic-visual and microscopic assessment of TME quality is very important in terms of evaluating treatment outcomes.

2. Morphological examination of the CRM must be performed to determine the radicality of the surgical intervention in both laparoscopic and open operations. All patients with CRM-positive should be monitored after surgery and included in the next treatment plan.

3. If there is a suspicion that the quality of TME will decrease during laparoscopic surgery, the operations must be continued openly. Even if a high-quality TME is performed and the CRM status is at risk, these patients should be included in the postoperative treatment plan, regardless of whether the operation is laparoscopic or open, and are considered at risk for local recurrence.

4. If high-quality TME has been performed in patients with CRM-negative, if there is no metastatic damage to regional lymph nodes (T1 and T2 derivatives, including dysplastic polyps), treatment should be completed surgically and no chemotherapy should be performed after surgery. All patients at risk for mesorectal fascia CRM (as a result of MRI, CT) should undergo surgery after a course of preoperative radiochemistry.

5. Laparoscopic technology should be used as the first option in malignant tumors of the rectum and dysplastic polyps, but this should not be done routinely. The surgeon's ability and desire,

technical capabilities, the patient's desire play an important role in choosing the type of operation.

6. In addition to oncological outcomes, functional outcomes should be considered when performing TME and anterior resection. If the tumor tissue has invaded the nerve elements, it is possible to resect them in accordance with the principles of neuroprotective surgery. To protect the nerves, it is important to know the anatomical variations and topography of the nerves. If the nerve variations are widespread, there is no need to "catch" them. It is enough to watch the nerves in the back wall of the abdomen. The 2.5 microscope in open operations (no need for laparoscopic operations) makes it easier to see. From the trunk-type nerve variations, the nerves can be "caught" to facilitate tracking. This process will simplify the tracking process. It should be borne in mind that prolongation of the operation and an increase in the amount of blood lost during the operation may be observed when taking the handle.

7. When performing TME, care should be taken in terms of nerve injury at 4 points: IMA around the root, the entrance to the small pelvis, the lateral ligaments, and the paraorgan (anterior-lateral areas) areas. Other nerve structures toward the proximal and distal can be easily identified by locating the right hypogastric nerve to facilitate nerve identification. To find the left paraaortic nerve fibers around the IMA root, the nerve should be lowered by continuing the dissection toward the distal as close as possible to the vessel junction after the artery has been cut.

8. In cases where it is not possible to fully protect the vegetative nerve elements along with TME during both laparoscopic and open operations, it is necessary to try to protect them partially. It is essential to protect the lower hypogastric nerve sheaths (at least unilaterally) to maintain normal urination after surgery. Distal derivatives of the rectum are at risk for T4 stage tumors, inflammatory complications, and preoperative radiation therapy for nerve damage.

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Abbreviations

IMA - inferior mesenteric artery

OAR - open anterior resection

OTME - open total mesorectal excision

AG - open group

CA 19-9 - carcinoma (cancer) antigen

CEA - carcinoembryonic antigen

RC - rectal cancer

EFBI is an international index of erectile function

FSI - Fisher Snedocor indicator

Grade - level

ICG - the green of indiosia

CT - computed tomography

LAR - laparoscopic anterior resection

LG - laparoscopic group

LTME - laparoscopic total mesorectal excision

MF - mesorectal fascia

MVS - maximum volume speed

MRI - magnetic resonance imaging

NI (-, +) - nerve injury (negative, positive)

AVS - average volume speed

CRM - circular resection margin

OR - the ratio of chances

TME - total mesorectal excision

TR - time ratio

T1 / 2 max - half of the time spent at maximum fluorescence intensity

USM - ultrasound examination

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