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Translation of the article

Quality of life after rectal cancer surgery (systematic review)

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ABSTRACT *AIM: search for modifiable and unmodifiable risk factors affecting the quality of life of patients after rectal cancer surgery.*
MATERIALS AND METHODS: the literature search was done according to the keywords: quality of life, rectal cancer, low anterior resection syndrome. Twelve prospective randomized studies, 2 cohort studies, and 2 meta-analyses are included in the study. The quality of life was assessed in the analyzed studies by using questionnaires for cancer patients and updated questionnaires for colorectal cancer: EORTC QLQ-CR29, QLQ-C30, QLQ-CR38, BIQ.
RESULTS: the literary data on influence of gender, age, surgery, stoma, and chemoradiotherapy on life quality of patients after rectal cancer surgery was analyzed.
CONCLUSION: the most significant factor affecting the life quality of patients with rectal cancer is a violation of the body image if it is necessary to form the stoma on the anterior abdominal wall. The manifestations of the low anterior resection syndrome and the urination problems are significant risk factors in the case of restoration of bowel continuity.

KEYWORDS: *quality of life, rectal cancer, low anterior resection syndrome, risk factors*

CONFLICT OF INTEREST: *The authors declare no conflict of interest.*

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INTRODUCTION

The World Health Organization (WHO) defines quality oflife as “an individual’s perception of their position inlife in the context of the culture and value systems in which theylive and in relation to their goals, expectations, standards and concerns”. This is a broad concept that is comprehensively influenced by a person’s physical health, psychological state, personal beliefs, social relations and their attitude to the characteristic features of the environment…”[1].

In this regard, thelife quality of patients depends not only on the disease itself, but also on its treatment methods, as well as other demographic, socio-economic and oncological aspects.

With the changes in the treatment approach for rectal cancer from the mandatory formation of a permanent stoma during colorectal resection to a multidisciplinary care with the possible combined treatment with the use of chemo-or radiotherapy in most patients, it is possible to preserve the terminal part of the gastrointestinal tract anatomically and functionally. However, both the diagnosis of “rectal cancer” and the available methods of its treatment affect thelife quality of patients through their psychophysical and social functioning, which makes it a significant problem of world healthcare [2].

Even with the preservation of the defecation, by performing sphincter-preserving procedures, 25-90% of patients develop “low anterior resection syndrome” (LARS), manifested by frequent stools (up to 6 times a day or more), prolonged and incomplete bowel emptying, imperative urge to defecate and anal incontinence [3, 4]. At the same time, in another quarter of this category of patients, a temporary stoma becomes permanent [5].

Understanding the factors that affect the quality of life will help identify the most vulnerable category of patients who may need social rehabilitation and appropriate psychological support.
The life quality of patients with rectal cancer can also indirectly affect the life expectancy of patients adjusted for age, gender and stage of the disease. Patients with stage III-IV colorectal cancer, while on maintenance therapy, have a higher overall survival rate in the group with better life quality [6, 7].
Thus, the purpose of this article is a critical review of the literature aimed at finding modifiable and non-modifiable risk factors that decrease the life quality of patients who have undergone surgery for rectal cancer.

MATERIALS AND METHODS

The literature was searched in PubMed, Scopus, and elibrary.ru databases using the following keywords: quality of life, rectal cancer, LARS score, low anterior resection syndrome, stoma. The quality of life was assessed in the analyzed studies by using questionnaires for cancer patients and updated questionnaires for colorectal cancer: EORTC (European Organization for Research and Treatment of Cancer questionnaire module for colorectal cancer) QLQ-CR29, QLQ-C30, QLQ-CR38, BIQ.
EORTC QLQ-C30 is a self-use questionnaire designed for quality of the life of cancer patients. The questionnaire consists of 30 questions that assess 5 functional scales (physical, role-playing, emotional, cognitive, and social), 3 symptom scales (fatigue, nausea/vomiting, and pain), 6 independent questions (about shortness of breath, insomnia, loss of appetite, constipation, diarrhea, and financial difficulties), and 1 general health index. The latter assesses the general state of health and the general quality of life on the seven-score scale, where 1 means very bad, and 7 – excellent. For all other multiple-choice questions, there are four possible answers: “no”, “slightly”, “significantly”, and “very strongly” [8].
The EORTC QLQ-CR38 questionnaire is used to measure the quality of life of patients with colorectal cancer. It is designed similarly to the QLQ-C30.
Thirty-eight questions assess 4 functional scales (body image, sexual functioning, future prospects) and 8 symptoms (urination, chemotherapy side effects, gastrointestinal symptoms, sexual problems, defecation, weight loss, stoma-related problems) [9].
EORTC QLQ-CR29 [10] contains 6 functional scales (body image, sexual functioning, sexual pleasure, prospects for the future) and 11 independent questions (urination, side effects of chemotherapy, gastrointestinal symptoms, sexual problems, defecation, weight loss, problems related to the stoma).
It is worth noting that at the moment, EORTC QLQ-CR29 has been validated and its Russian-language version has been created, which is equivalent to the original [11].
For these tools, individual scores were converted to scores from 0 to 100 according to the EORTC guidelines. A high score on the symptom scales reflects a high level of the problem, while a high score on the functional scales and the global health index corresponds to a high score on the overall condition and quality of life.
The BIQ scale consists of 8 items that assess the appearance of the body and the cosmetic effect after surgery.
Items 1-5 are aimed at assessing patients’ perception of their body and satisfaction with it, as well as their attitude to their appearance. A higher score means a worse attitude to the body image. Items 6-8 are responsible for the cosmetic effect and assess the degree of satisfaction with the scar. A high score means a high degree of satisfaction with the cosmetic results [12].

RESULTS

The quality of life in patients with rectal cancer is associated with several factors. According to the search results, the factors can be divided into modifiable and unmodifiable. Unmodifiable factors: gender, age, cancer outcomes. Modifiable factors: type of surgery and stoma formation, surgical approach, chemoradiotherapy, and lifestyle.

Gender

Females and males experience the problems of checkup and treatment of rectal cancer differently

through psycho-emotional functioning aspect. Schmidt C. et al. studied 368 patients: 183 females and 185 males who underwent various surgeries for rectal cancer. The QLQ-30 questionnaire was used to assess the quality of life. Upon discharge from the hospital, the overall health index was equally low for both genders: males – 47.50 points, females – 43.25. However, starting from three months of follow-up over the entire period, there were statistically significant differences in the quality of life between the genders ($p < 0.05$). Females were significantly worse at assessing overall well-being and physical functioning (68.86 vs. 80.49 points for males), noted greater fatigue (33.24 vs. 35.28 points) and concern about cosmetic defects after surgery ($p < 0.05$), and were more likely to suffer from constipation both before surgery (19.16 vs. 17.33 points) and 24 months later (9.04 vs. 15.56 points). Males reported difficulties with sexual satisfaction (59.62 vs. 30.77 points), which in the long-term created a high level of tension experienced (65.15 vs. 43.48 points; $p < 0.05$). It is important to note that these problems tended to persist throughout the entire period of dynamic observation – 24 months [13].

Similar results were obtained by Pérez Lara F. et al. in a study involving 116 patients (males – 78, females – 38) with locally advanced rectal cancer. As part of the study, univariate and multivariate analyses were carried out. The QLQ-38 questionnaire was used.

In the univariate analysis, females had the worst indicators of sexual function ($p = 0.006$) and sexual satisfaction ($p = 0.002$). And in the multivariate analysis, statistically significant differences between the genders were obtained in the category of gastrointestinal symptoms ($p = 0.001$), weight loss ($p = 0.045$), and overall quality of life score ($p = 0.028$) [14].

Age

The relationship between age and quality of life is contradictory in both the physical and psychological aspects of functioning.

A prospective study by Kinoshita Y. et al. included 137 patients after sphincter-preserving procedures for rectal cancer.

The data was collected using the QLQ-38 and QLQ-30 questionnaires, which patients completed before and after surgery in 1, 6, and 12 months. Of 137 patients, 82 were aged over 60 years old. Among elderly patients aged ⩾ 60 years old, the overall life quality and cognitive function were significantly lower both before and after surgery ($p = 0.003$ and $p = 0.001$, respectively). In patients younger than 60 years old, nausea and vomiting were more pronounced in the postoperative period ($p = 0.007$), and in 6 months after surgery – more pronounced diarrhea (p = 0.012). Patients younger than 60 years old were also more likely to report financial difficulties ($p = 0.004$). Among patients from the younger age group, there was a worse perception of their own body ($p = 0.004$), and patients aged over 60 years old noted greater problems with sexual function in a year after surgery ($p = 0.040$).

Problems with urination were significantly more frequent after surgery in the older group ($p = 0.005$). However, most of the differences that occurred in 3 and 6 months were reversed by 12 months after surgery [15].

Prospective study by Li K. et al. combined the results of treatment of 207 patients after various surgeries for rectal cancer. The aim of this study was to assess the influence of age on the quality of life, who were divided into elderly (⩾ 60 years, 107 cases) and adult (< 60 years, 100 cases) groups. The quality of life was assessed using QLQ-C30 questionnaires. According to the results, the elderly group had lower indicators of physical function ($p = 0.004$), more significant fatigue from symptoms, sleep disorders and poor appetite ($p < 0.001$).

The quality of life was generally worse in the elderly group ($p = 0.002$). However, the feeling of being a part of society and the emotional state in the group of older people were significantly better ($p < 0.001$) [16].

In addition to the direct impact on the quality of life after treatment of colorectal cancer, age directly correlates with the level of social support of the population. Haviland J. et al. made a cohort study of 871 patients with a follow-up period of more than 2 years, which showed that elderly patients (> 70 years) have less social support ($p = 0.046$).

Accordingly, the worse quality of life (general health/quality of life, reduced well-being, anxiety,

and depression) was associated with low levels of social support ($p < 0.001$) [17].

Thus, it is obvious that the elderly are the most vulnerable category of patients with the most significant decline in the quality of life.

Life style

To assess the impact of lifestyle on life quality after colorectal cancer surgery, Grimmett C. et al. surveyed 478 patients (men – 284, women – 194) as per the EORTC-QLQ-C30 scale with a median follow-up of 2 years after surgery. In addition, were used the questionnaires that included measurements of the amount of fruit and vegetable consumption, physical activity, smoking status, and alcohol consumption. According to the data obtained: physically active patients had a higher overall level of life quality ($p = 0.003$), physical condition ($p = 0.001$), role-playing ($p = 0.007$) and cognitive ($p = 0.037$) functions, self-assessment in society ($p = 0.024$), as well as decreased fatigue ($p = 0.004$); they experienced less pain (26% compared to 45%) and sleep disorders (39% vs. 52%) [18]. When compared in terms of nutrition, those who consumed 5 servings of vegetables and fruits per day had higher overall quality of life ($p = 0.001$), physical condition ($p = 0.002$), role ($p = 0.021$), and cognitive function ($p = 0.004$). In this category of people, the incidence of constipation decreased (20% vs. 30%). Overweight people had higher cognitive scores ($p = 0.032$) and lower fatigue levels ($p = 0.039$).

People with normal weight were more likely to complain of nausea (21% vs. 16%), loss of appetite (21% vs. 17%), and less – dyspnea (31% vs. 41%), compared with overweight or obese patients.

There was no significant association between life quality and smoking or alcohol drinking. Non-drinkers had significantly lower physical ($p = 0.030$), role-playing ($p = 0.039$) and social ($p = 0.034$) functions and higher fatigue ($p = 0.026$) compared to moderate drinkers.

Surgery Volume and Stoma Formation

Currently, 80% of patients undergo surgery for rectal cancer with the preservation of the locking apparatus, but up to 90% of these patients will later have some manifestations of "low anterior resection syndrome", which can negate the benefits in quality of life [4].

The surgery volume has a greater impact on the life quality through social and role-based self-perception. So, Engel J. et al., in a prospective study involving 299 patients, noted that patients after anterior and low anterior resection without removing the stoma, despite problems with urination and defecation, had higher quality of life indicators than patients with a permanent stoma after abdominal-perineal extirpation.

All data was collected and assessed using the QLQ-30 and QLQ-38 questionnaires over a four-year follow-up period. For 4 years of follow-up, patients with stoma noted their well-being as worse for 9 variables, of which 4 are functional (role-playing, social, physical, and cognitive functions), urination problems, and sexual problems, compared to patients who underwent reconstructive surgery. However, there was an improvement in life quality indicators over time, which can be explained by the closure of temporary stomas or physiological adaptation. Dynamic assessment of the life quality showed that emotional functioning ($p < 0.02$) and future prospects ($p < 0.03$) improved significantly only in patients who underwent low anterior resection. Body image ($p < 0.02$), nausea/vomiting ($p < 0.02$), and sexual functioning ($p < 0.02$) showed positive dynamics only in patients with anterior resection. Role-playing functioning ($p < 0.05$ and 0.001), defecation problems ($p < 0.007$ and 0.001), and weight loss ($p < 0.02$ and 0.03) significantly improved for both patients after low anterior resection and those undergoing anterior resection, respectively [19].

On the contrary, Feddern M. L. et al., in a study of the life quality of 898 patients with rectal tumors located at a distance of less than 10 cm from the anal margin, concluded that participants with colorectal anastomosis (474 people) after low anterior resection rated their life quality worse than patients who underwent abdominal-perineal extirpation with the removal of a lifetime stoma (424 people). The authors surveyed the patients using the QLQ-C30 questionnaire. The multivariate analysis showed that patients with sphincter-sparing surgery had a lower overall health score ($n = 876$, $p = 0.026$, OR = 1.32, 95% CI = 1.03-1.68) and often reported "low anterior resection syn-

drome" while patients with stoma were less likely to have constipation (n = 866, p = 0.001, OR = 0.47, 95% CI = 0.32-0.69) and diarrhea (n = 861, p = 0.001, OR = 0.47, 95% CI = 0.35-0.64) [20].

In a study by Trenti L. et al., were analyzed the results of 224 patients after abdominal-perineal extirpation of the rectum with excretion stoma on the anterior abdominal wall (72 patients), anterior resection with manual anastomosis (30 patients) andlow anterior resection with apparatus colorectal anastomosis (122 people). The analysis was carried out using the QLQ-C30 and QLQC29 questionnaires. When comparing all three groups, the body image was worse in patients after extirpation (68.0 scores), compared with the group of anterior (81.5 scores) andlow (81.9 scores) anterior resection (p = 0.002). When assessing the incidence of "low anterior resection syndrome", it was found that it appeared much more often in patients after the formation of alow supra-anal colorectal anastomosis (OR = 2.38, p = 0.048).

At the same time, the global life quality index was comparable among all the three groups: 67.3 scores – after extirpation, 65.6 scores-after anterior and 69.8 scores – afterlow anterior rectal resection (p = 0.601) [21].

Thus, the choice of the surgery volume and the possibility of reconstruction to restore the natural defecation act should be adjusted for the expected functional results, and the patient should be aware of possible complications after the treatment [22].

Surgical Access

Laparoscopic access in comparison with open access is associated with a decrease in bloodloss, in pain, and in the number of days of hospital stay with a comparable oncological component of both methods [23].

Many studies assessing thelife quality, when comparing laparoscopic and open surgeries, suggest the advantages of laparoscopic surgeries in the short term. So, in a prospective study, Karachun A.M. et al. assessed the impact of surgical access on the life quality of patients using the QLQ-C30 and QLQ-C29 questionnaires. The authors noted that in the early postoperative period (for the first 7 days) afterlaparoscopic low anterior resections, patients were less likely to complain about urination (p = 0.047) and noted less pronounced pain syndrome (p = 0.0005) than after open surgeries.

In 60 days after surgery,laparoscopically operated patients were morelikely to be satisfied with their appearance (p = 0.047) andlesslikely to experience discomfort in the area of the postoperative wound (p = 0.079). At the same time, anxiety was more pronounced in patients of the laparoscopic group before the surgery than in those operated with open access, but after 2 months, the level of experience in patients from the open surgery group remained at the same level, and in patients from the laparoscopic group significantly decreased (p = 0.007) [24].

In a prospective randomized trial (Colorectal Cancer Laparoscopic or Open Resection (COLOR) II), Andersson J. et al. did not show significant advantages in terms oflife quality afterlaparoscopic access compared to open surgery. The authors compared thelife quality of patients in 12 months after laparoscopic and open surgeries for rectal cancer. The study analyzed 385 patients (260 in thelaparoscopic group and 125 in the open surgery group), who were tested using QLQ – C30, QLQ – CR38. Physical (67.1 scores – in the laparoscopic group and 67.2 – in the open surgery group), role-playing (46 vs. 48.2 scores) and social functioning (64.6 vs. 63.7 scores), as well as fatigue (47.8 vs. 46.8 scores) showed a significant deterioration in both groups in 4 weeks after surgery. However, all functional and symptomatic indicators improved after 6 months and returned to baseline levels within 12 months [25].

A fundamental aspect of rectal cancer surgery, regardless of access, is total mesorectumectomy.

Transanal total mesorectumectomy (TATME) was developed to solve the problems associated with visceral obesity of the patient, the presence of a narrow or deep pelvis. However, the available literature reports that TATME is associated with a higher risk of impaired anal retention (p = 0.032). Nevertheless, according to the study by Helbach M.V. et al., there were no significant differences in the symptoms oflow anterior resection syndrome compared to traditional mesorectumectomy (p = 0.131) [12].

Robot-assisted surgery is a relatively new area of rectal cancer surgery, so data on this issue islimited.

In a study by Hirpara D.H. et al., 30 patients after open (n = 8), laparoscopic (n = 12), and robot-assisted (n = 0) low anterior resection were interviewed using the QLQ-C30, QLQ-CR29, and BIQ scales to identify the impact of access on patients' self-esteem and life quality after surgery.

The comparison involved patients who had passed at least 8 months after the surgery, had no signs of the disease recurrence, had no additional postoperative treatment, and the anastomosis was located at a distance of 2-12 cm from the anal margin.

The group that underwent open surgery rated their body image worse according to the BIQ questionnaire – 12.0 scores versus 6.5 after laparoscopic surgery and 5.8 scores in the group with a robot-assisted approach, and cosmetic defects were more significant: 9.6 scores versus 16.4 and 15.2 scores, respectively (p < 0.001). A comparison of the life quality assessment between the laparoscopic and robot-assisted approaches did not reveal a statistically significant difference (p > 0.99).

When assessing physical functions, including physical activity, long-term movement, and self-help, paired comparisons showed that open surgeries were associated with significantly lower rates compared to laparoscopic and robot-assisted surgeries (83.3 scores, versus 94.9 and 94.3 scores, respectively, p = 0.045). There was no significant difference between robot-assisted and laparoscopic surgeries (p > 0.99). Patients who underwent laparoscopic surgery reported no impairment of role-playing function (98.6 scores vs. 71.0 scores in the open access, p = 0.019 and vs. 71.8 scores in the robot-assisted approach, p = 0.015). Similarly, a comparison of social function in different cohorts showed higher scores for laparoscopic access (93.1 scores, versus 79.4 scores for open access, p = 0.306; and 73.4 scores for robot-assisted access, p = 0.046), including the opportunity to enjoy hobbies, family life, and social activities. Surgical access did not significantly affect fatigue, gastrointestinal function, bowel movement, defecation act, psychological state (p = 0.793), pain, and sexual function after surgery (all p > 0.05) [26].

Nevertheless, the results of this study are compromised by a small sample of patients, which limits the possibility of their extrapolation to the general population and the formulation of unambiguous recommendations. However, according to the available literature data, the advantage of laparoscopic access in the short-term impact on the life quality of patients with colorectal cancer is obvious.

Oncological Results

The stage and location of cancer become one of the most important indicators that determine the future quality of life of patients, as they determine the symptoms, treatment tactics and affect the chances of cure.

In patients with stage I, there is a progressive positive trend in assessing the life quality; while patients with stage IV show a negative trend. In patients with stage II and III, there was an initial decrease in the life quality, followed by an improvement in indicators.

A possible explanation may be reconsideration of one's life quality after being diagnosed with rectal cancer. An additional factor may be adaptation of patients to their disease over time, which is a phenomenon called "a response shift" and is defined as a change in self-assessment of the life quality as a result of changes in internal standards and values [27, 28].

Wrenn S.M. et al., in their study, showed that the life quality factors, which surgeons most often pay attention to, such as the incision length (interested only 4% of the patients surveyed), the length of hospital stay (13%), the choice of surgical access or the surgery volume (14%), were not the most important from the point of view of patients. So, out of 167 respondents with colorectal cancer, 92.2% were satisfied with their recovery. The most significant factors for patients were: recovery from cancer (76%), the absence of a permanent stoma (78%) and the ability to avoid complications (74%) [29].

Chemoradiotherapy

Preoperative chemoradiotherapy significantly reduces the risk of local recurrence of colon cancer. However, its use is associated with side effects that directly affect the quality of life, manifesting both immediately and in the long-term period [30, 31]. A meta-analysis by Martin Loos et al. [32] combined the treatment results of 6,548 patients from 25 studies. This study showed that the ex-

posed patients were more likely to have stool incontinence (HR = 1.67; CI 95%; $p < 0.0001$), which was also confirmed by the results of manometry (mean resting pressure = 15.04; CI 95%; $p = 0.04$; maximum pressure of contractions = 30.39; 95% CI; $p < 0.0001$). However, the meta-analysis revealed no statistically significant differences in the frequency of erectile dysfunction (HR = 1.41; CI 95%; $p = 0.3$) and urinary dysfunction (HR = 1.05; CI 95%; $p = 0.82$).

Adjuvant chemotherapy also affects the dynamics of life quality indicators. Van der Valk M. et al. [33] conducted a randomized trial involving 226 patients, with ($n = 115$) or without ($n = 111$) adjuvant chemotherapy with capecitabine after surgical treatment of rectal cancer.

The life quality was assessed in 1 month after surgery (before the start of chemotherapy) and 3, 6, and 12 months later. The patients receiving adjuvant chemotherapy reported poor physical functioning (mean score 78.3 vs. 87.0, $p < 0.001$), fatigue, and dyspnea (mean score 35.7 vs. 21.0 and 17.1 vs. 6.7, $p < 0.001$). Overall quality of life was worse in patients receiving chemotherapy compared to the control group (mean 82.3 vs. 86.9, $p = 0.006$), but the difference was not clinically significant. However, all these differences disappeared in 12 months after the surgery.

CONCLUSION

The quality of life after rectal surgery depends not only on the factors of a particular patient, but also on the methods of its treatment. The introduction of minimally invasive and laparoscopic technologies from a surgical point of view, theoretically, can significantly improve the quality of life of patients with rectal cancer.

However, the results of the literature review showed that the most important factor that reduces the quality of life is a violation of the body image in the case of the need to a permanent stoma, and when performing stoma closure – an obstructive defecation.

It should be emphasized that the limitation of this review is the fact of including studies of the quality of life assessment of patients with not only rectal cancer, but also of the colon. So, there is a certain need for direct studies of the quality of life of the corresponding category of patients.

AUTHORS CONTRIBUTION

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