DOI: https://doi.org/10.54393/pjhs.v7i7.3857

PAKISTAN JOURNAL OF HEALTH SCIENCES
(LAHORE)
https://thejas.com.pk/index.php/pjhs
ISSN (E): 2790-9352, (P): 2790-9344
Volume 7, Issue 07 (July 2026)

Original Article

OPEN ACCESS

Patient Preferences and Concerns Regarding Stoma Formation Versus Sphincter-Sparing Surgery in Rectal Cancer

Farrukh Ozair Shah[1], Hussain Jan Abbasi[2], Tilal Ahmad Raza[1,3*] and Hajra Imtiaz[4]

[1]Department of General Surgery, Hayatabad Medical Complex, Peshawar, Pakistan
[2]Department of Colorectal Surgery, Khyber Medical College, Peshawar, Pakistan
[3]Department of Surgery, Pilgrim Hospital Boston, United Kingdom
[4]Department of Dermatology, Life Care Hospital and Research Centre, Peshawar, Pakistan

ARTICLE INFO

Keywords:
Rectal Cancer, Stoma, Sphincter Preservation, Patient Preference, Abdominoperineal Resection

How to Cite:
Shah, F. O., Abbasi, H. J., Raza, T. A., & Imtiaz, H. (2026). Patient Preferences and Concerns Regarding Stoma Formation Versus Sphincter-Sparing Surgery in Rectal Cancer: Stoma Formation Versus Sphincter-Sparing Surgery in Rectal Cancer. Pakistan Journal of Health Sciences, 7(7), 45-50. https://doi.org/10.54393/pjhs.v7i7.3857

***Corresponding Author:**
Tilal Ahmad Raza
Department of Surgery, Pilgrim Hospital Boston, United Kingdom
tilalahmad@yahoo.com

Received Date: 20th January, 2026
1st Revision Received: 13th March, 2026
Acceptance Date: 26th March, 2026
Published Date: 31st July, 2026

ABSTRACT

The outcome of the decision between stoma construction and sphincter-sparing procedures is critical to the quality of life of the patients after a rectal cancer operation. In a socio-culturally diverse society like Pakistan, clinical outcomes are significant to the surgeon to reach a decision, but the views of the patients are significant as well. **Objectives:** To assess the preferences and concerns of rectal cancer patients regarding permanent stoma formation versus sphincter-preserving surgery in Khyber Pakhtunkhwa (KPK), Pakistan. **Methods:** This analytical cross-sectional study was carried out in the Department of General Surgery, Hayatabad Medical Complex, Peshawar, between January 2022 and December 2024. A total of 250 patients with rectal cancer were enrolled. The final analysis included 220 patients after excluding those who had undergone previous surgery (n=12), cognitive impairment (n=8), recurrent rectal cancer (n=6), and those who refused participation (n=4). **Results:** Among 220 respondents, 63.6% preferred sphincter-sparing surgery and 36.4% preferred abdominoperineal resection (APR). Female gender (p<0.069), rural residence (p=0.024), and a high concern level (p<0.001) were significant predictors of preference for APR, while knowledge of stoma was associated with lower odds of APR preference (p<0.012). Higher education (p=0.165) and age (p=0.271) were not statistically significant. **Conclusions:** Psychosocial, informational, and demographic factors all affect patient preferences for rectal cancer surgery. Patients with greater preoperative concerns, female gender, and those who lived in rural areas were all linked to a stoma favor. However, prior experience with stoma care was protective of this choice.

INTRODUCTION

Colorectal cancer (CRC) is one of the most common causes of cancer morbidity and mortality globally, and noticeably, rectal cancer represents a considerable proportion of cases [1]. Rectal cancer surgery requires decision-making between sphincter-sparing procedures (SSP) and abdominoperineal resection (APR), with a permanent stoma. Although oncological outcomes are still the main issue, patient-related endpoints, such as QoL, body image, and psychosocial adjustment, have attracted more attention in the decision-making process of surgical treatment [2, 3]. The principles of sphincter-saving operation are to enhance sphincter function while achieving tumor clearance [4]. But such interventions may not always be practical because of tumor placement, size, or anatomic limitations of the patient. When this is not possible, APR, colorectal resection with permanent stoma (APR) is mandatory [5, 6]. Despite improvements in stoma care and education, a lot of patients maintain a great deal of anxiety about having to live with a stoma, including fears about social stigma, intimacy, alteration of lifestyle, and long-term psychological burden [7]. On the other hand, SSPs retaining the anal sphincter interim a low anterior resection syndrome (LARS) with urgency, incontinence, and frequent bowel motion may affect QoL aspects [8].

DOI: https://doi.org/10.54393/pjhs.v7i7.3857

Therefore, the balances of each of these options are intricate and frequently tied to a patient's desire, cultural influences, and socioeconomic considerations [9]. The results of this survey should guide shared decision-making, enhance preoperative counselling, and shape culturally sensitive strategies for care.

In low- and middle-income countries (LMICs) such as Pakistan, where health literacy is variable, and stoma care facilities are not universal, it is important to understand patient experiences of undergoing rectal cancer surgery. There is no local literature available about patients' perception and preferences regarding these surgical options, more so in the local population of Khyber Pakhtunkhwa with its own cultural and health care trends. This study aimed to evaluate patients' preferences and concerns for stoma creation and sphincter-saving surgery in rectal cancer patients of Khyber Pakhtunkhwa.

METHODS

This analytical cross-sectional study was conducted in the Department of General Surgery, Hayatabad Medical Complex, Peshawar, Khyber Pakhtunkhwa (KPK), Pakistan, from January 2022 to December 2024. Approval was taken from the Institutional Review Board (IRB) of Hayatabad Medical Complex, Peshawar, before the start of the study under reference no: 1110 on 19th December 2021. A total of 250 rectal cancer patients were assessed for eligibility during the study period. After excluding patients who had undergone prior surgery (n=12), had cognitive impairment (n=8), recurrent rectal cancer (n=6), or declined participation (n=4), 220 patients were included in the final analysis (88%). The sample size was calculated using the formula $n=Z^2p\ (1–p)\ /\ d^2$ for cross-sectional prevalence studies [10]. Taking the anticipated prevalence of preference for APR as 38% from Lee *et al.* [11], with 95% confidence level and 6.5% absolute precision, the minimum required sample size was 214; hence, the final sample of 220 patients was adequate. Inclusion criteria were: age > 18 years, having histological evidence of rectal adenocarcinoma, and being a known case for radical surgical therapy (i.e., undergoing either abdominoperineal resection or sphincter-preserving surgery). Patients with recurrent disease, cognitive impairment, or previous surgery were excluded in order to prevent bias in preference reporting. The standardized interviewer-administered questionnaire was designed to collect the data after the written and informed consent was received. The English-language questionnaire was translated into Urdu and Pashto so that it would be easy to understand. It contained demographic data, clinical history, the knowledge of surgical choices, and perception and particular concerns on stoma or sphincter-sparing surgery. The relevance of the questions and their clarity were identified after the pre-test on a sample of 20 patients, and the required changes were made. A surgical resident used standardized materials to teach patients about the two main surgical options: abdominal perineal resections (APR) and sphincter-preserving procedures. Following that, they were asked if they had a preference, if they thought either operation had benefits or drawbacks, and whether they were afraid of or unwilling to do any of the suggested procedures.

IBM SPSS 25.0 was used to process and input all of the data. Descriptive statistics were used to summarize clinical and demographic features. Numbers and percentages were used to represent categorical variables. The relationships between patient preferences and clinical and demographic factors were assessed using the chi-square test, or Fisher's exact test if necessary. A statistically significant difference was defined as $P \leq 0.05$.

RESULTS

Among the 220 respondents, most patients preferred sphincter-sparing surgery, with approximately two-thirds selecting SSP compared with about one-third preferring APR. Nevertheless, the proportion of patients who expressed major concerns in the case of the sphincter group was 75 (53.6%), with most of the concerns being related to bowel control, urgency, and disruption in lifestyle. Conversely, 65 (81.3%) patients in the stoma group raised serious concerns, which included the fear of social stigmatization, body image, and practical difficulties of dealing with the stoma. Regional distribution showed a total of 120 (54.5%) belong to urban areas of the KPK, and the remaining 100 (45.5%) belong to rural areas (Table 1).

Table 1: Summary of Patient Enrolment and Preferences

Variables	n (%)
Preferred Sphincter-Sparing Surgery	140 (63.6%)
Preferred Stoma (APR)	80 (36.4%)
Major Concerns - Sphincter Group	75 (53.6%)
Major Concerns - Stoma Group	65 (81.3%)
Urban	120 (54.5%)
Rural	100 (45.5%)

Gender distribution differed between surgical preference groups. Among patients preferring sphincter-sparing surgery, 85 (60.7%) were male, and 55 (39.3%) were female. In contrast, among patients preferring APR, 35 (43.7%) were male and 45 (56.3%) were female, indicating a relatively higher proportion of females opting for permanent stoma formation (Figure 1).

DOI: https://doi.org/10.54393/pjhs.v7i7.3857

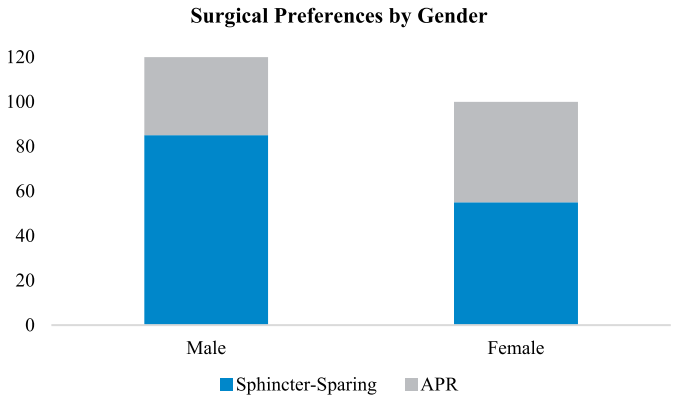

Figure 1: Surgical Preference by Gender

Similarly, residence was associated with surgical preference. Among urban residents, 90 patients (40.9%) preferred sphincter-sparing surgery, while 30 (13.6%) opted for APR. Among rural residents, 50 patients (22.7%) preferred sphincter-sparing surgery and 50 (22.7%) preferred APR, suggesting a comparatively higher inclination toward permanent stoma formation among rural patients (Figure 2).

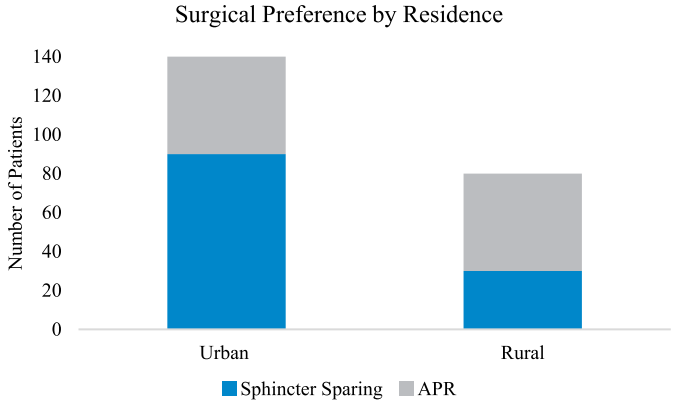

Figure 2: Surgical Preference by Residence

Univariate analysis was conducted to analyse the relationship between patient attributes and preference for permanent stoma formation (APR). There was a strong correlation between female gender and preference for APR with rural residence. On the same note, patients who were more concerned were also much more likely to choose APR, and good knowledge of stoma care also correlated with low chances of opting to permanently form the stoma. The higher education exhibited the trend of sphincter-preserving surgery; however, not statistically significant. The variables that might have a connection in the univariate analysis were later incorporated in the multivariate logistic regression model to come up with independent predictors of surgical preference (Table 2).

Table 2: Univariate Analysis of Factors Associated with Preference for Permanent Stoma (APR)

Variables	SSP, n (%)	APR, n (%)	COR	95% CI	p-value
Gender					
Male	85 (60.7%)	35 (43.7%)	1.00	Reference	–
Female	55 (39.3%)	45 (56.3%)	1.98	1.13–3.46	0.017*
Residence					
Urban	90 (64.3%)	30 (37.5%)	1.00	Reference	–
Rural	50 (35.7%)	50 (62.5%)	3.00	1.67–5.37	<0.001*
Education Level					
Lower education	70 (50.0%)	50 (62.5%)	1.00	Reference	–
Higher education	70 (50.0%)	30 (37.5%)	0.60	0.34–1.06	0.079
Knowledge of Stoma Care					
Poor Knowledge	60 (42.9%)	55 (68.8%)	1.00	Reference	–
Good Knowledge	80 (57.1%)	25 (31.2%)	0.34	0.18–0.64	0.001*
Concern level					
Low Concern	95 (67.9%)	15 (18.8%)	1.00	Reference	–
High Concern	45 (32.1%)	65 (81.2%)	9.13	4.73–17.6	<0.001*

COR = Crude Odds Ratio, CI = Confidence Interval, APR = Abdominoperineal Resection, SSP = Sphincter-Sparing Procedure, * Statistically significant at $p \leq 0.050$

To identify independent predictors of surgical preference, binary logistic regression analysis was performed with preference for APR as the dependent variable. The analysis demonstrated that female gender (OR = 2.31, 95% CI: 1.26–4.24; p<0.069) and rural residence (OR = 2.67, 95% CI: 1.42–5.03; p<0.024) were significant predictors of preference for APR. Additionally, higher levels of concern were strongly associated with choosing APR (OR = 3.86, 95% CI: 2.10–7.11; p<0.001). Conversely, knowledge of stoma care was associated with lower odds of preferring APR (OR = 0.36, 95% CI: 0.19–0.67; p<0.012). In contrast, higher education (OR = 1.52; p=0.165) and age (OR = 1.01; p=0.271) were not statistically significant predictors of surgical preference (Table 3).

Table 3: Results of Multivariable Binary Logistic Regression for Preference for APR

Variables	AOR	95% CI (Lower–Upper)	p-value
Female Gender	2.31	1.26–4.24	<0.069*
Rural Residence	2.67	1.42–5.03	<0.024*
Higher Education	1.52	0.84–2.76	0.165
Knowledge of Stoma	0.36	0.19–0.67	<0.012*
High Concern Level	3.86	2.10–7.11	<0.001*
Age (Years)	1.01	0.99–1.04	0.271

AOR = Adjusted Odds Ratio; CI = Confidence Interval. * Statistically significant at $p \leq 0.050$

DISCUSSION

In this study, women were much more likely than men to choose permanent stoma formation (OR = 2.31; p<0.069). Mak *et al.* stated that male patients were not as willing to accept APR due to uremic concerns like sexual function

DOI: https://doi.org/10.54393/pjhs.v7i7.3857

and appearance after the creation of a stoma [12]. On the other hand, our results are in line with Eid *et al.* who showed that female patients showed much more anxiety about the postoperative bowel dysfunction and fecal incontinence, which resulted in a greater acceptance of a permanent stoma as a more reliable functional outcome [13]. Other gender-based variations have been found in South Asian colorectal cancer decision-making studies, where the considerations related to hygiene, control of continence, and sustaining daily social functions appear more often among the female patients [14]. The cultural concept of bowel control may also become an issue that affects the preference of surgery, where the fear of bowel control being unpredictable is a factor in more conservative communities like Pakistan, and a permanent stoma is assumed to be a better option than the risk of postoperative incontinence in sphincter-preserving surgery. Research carried out in similar cultural contexts has indicated that patients tend to value functional predictability over anatomical preservation in cases where the results of continence are questionable [15]. This study indicated that rural residence was among the important independent predictors of preference to stoma formation (OR 2.67; p<0.024). Nevertheless, other variables such as female gender, familiarity with stoma care, and increased level of concern were also found to be independent variables with surgical preference during the multivariate analysis. This finding is in line with Jung [16], who similarly found that patients from nonrecourse-limited or rural locations were more likely to favor a definitive treatment, hence avoiding the need for additional postoperative care. Similarly, Abelson *et al.* found that rural communities lacked access to specialized continence treatment, which led to surgeons and patients being persuaded to use APR [17]. On the other hand, if oncological safety is not compromised, the urban patient should have better access to rehabilitative services and be better informed about and able to get radical sphincter preservation. In current study, those with greater levels of education were more likely to favor sphincter preservation (OR 1.52), but this difference was not statistically significant (p=0.165). Prior research, such as that conducted by Gadan *et al.* revealed that patients with higher levels of education were more likely to participate in shared decision-making, prioritized better quality of life outcomes, and preferred sphincter-sparing treatments [18]. The lack of public health education in the local context that is not connected to formal education or variations in educational quality could be the reason we were unable to find a meaningful effect. In this analysis, choosing APR seems to be significantly protected by having a good understanding of stoma care (OR = 0.36; p<0.012). This is in accordance with Nassar *et al.* findings, which showed that prior planning considerably reduces anxiety and boosts acceptance of temporary or permanent stomas [19]. Given that not all temporary stomas become permanent and can be adequately managed, patients in our cohort who had prior experience with stoma care—whether from personal experience or exposure in the community were more likely to consent to sphincter preservation. The strongest independent predictor of choosing a stoma in this research was perceived high distress (OR 3.86; p<0.001). This pattern was also discovered by Abdalla, who reported that a significant factor of patient preference was the degree of post-sphincter saving surgery quality of life and fear of postoperative incontinence [20]. In general, patients' fears of "not reaching the toilet in time" or social embarrassment exceeded their worries about stoma stigma, according to Crippa *et al.* [21]. Our findings support the notion that addressing psychosocial concerns is a key objective of preoperative counseling. In our investigation, age did not significantly predict outcomes (p=0.271), some trends suggest that older patients might be more likely to undergo decisive operations. This partially contradicts the findings of Denost *et al.* who discovered that older patients were more inclined to accept a permanent stoma [22]. This finding seems to be related to rehabilitation and functional level after major procedures. Concern level and expertise appear to predict preferences more accurately in our sample than age alone.

There are certain limitations of the study that must be recognized. These findings might not be generalizable to other regions, or even to other private healthcare providers in Pakistan, since it was performed at a public tertiary care hospital in Khyber Pakhtunkhwa. The cross-sectional design also complicates the anticipation of how the preferences of the patients might change over time or over the process of counseling. Moreover, the multivariate analysis lacked the pertinent confounding factors such as socioeconomic status, mental health, and the influence of the surgeon in the selection of the patient. Despite these shortcomings, we do recommend that future research should utilize multi-center and longitudinal studies in terms of tracking the alterations in patient preferences and perceptions over time. Extra insights into patient motivations and psychological impacts can be achieved with the help of the qualitative research methods, when some focus groups or interviews are conducted. Interventional studies of the effect of structured counseling, decision aids, and stoma education programs are also proposed to improve patient-centered surgical planning of rectal cancer.

DOI: https://doi.org/10.54393/pjhs.v7i7.3857

CONCLUSIONS

This research shows that most rectal cancer patients had been choosing sphincter-sparing surgery instead of permanent stoma formation. Nevertheless, both groups showed significant concerns, with bowel functionalities and lifestyle disruption being the most common in those who preferred sphincter-sparing surgeries, and social stigma, body image, and realistic stoma-related challenges being the most important in patients undergoing abdominoperineal resection (APR). Rural residency and female gender were found to be independently related to increased chances of preferring permanent stoma formation, and enhanced knowledge of stoma care was correlated with less preference for a stoma. These results show that patient-centered counseling, specific patient education, and context-dependent communication are necessary to make informed decisions during surgery in patients with rectal cancer.

Acknowledgment

The authors express their gratitude to the participants for their participation and time spent on this study.

Authors' Contribution

Conceptualization: FOS, TAR
Methodology: FOS, HJA, TAR, HI
Formal analysis: HJA, TAR, HI
Writing and Drafting: HJA, HI
Review and Editing: FOS, HJA, TAR, HI

All authors approved the final manuscript and take responsibility for the integrity of the work

Conflicts of Interest

All the authors declare no conflict of interest.

Source of Funding

The authors received no financial support for the research, authorship and/or publication of this article.

REFERENCES

[1] Algie JP, Van Kooten RT, Tollenaar RA, Wouters MW, Peeters KC, Dekker JW. Stoma Versus Anastomosis After Sphincter-Sparing Rectal Cancer Resection: The Impact on Health-Related Quality of Life. International Journal of Colorectal Disease. 2022 Oct; 37(10): 2197-205. doi: 10.1007/s00384-022-04257-w.

[2] Creavin B, Kelly ME, Ryan ÉJ, Ryan OK, Winter DC. Oncological Outcomes of Laparoscopic versus Open Rectal Cancer Resections: Meta-Analysis of Randomized Clinical Trials. British Journal of Surgery. 2021 May; 108(5): 469-76. doi: 10.1093/bjs/znaa154.

[3] Yılmaz G, Harputlu D, Pala M, Mert T, Çakıt H, Sücüllü İ. A Cross-Sectional Evaluation of Patients with Ostomy in Turkey. Türk Kolon ve Rektum Hastalıkları Dergisi. 2021; 31(2). doi: 10.4274/tjcd.galenos.2020.2020-10-10.

[4] Khaliq RZ, Hameed A, Tahir T, Abbas A. Colorectal Cancer in Pakistan: genetic, molecular, and epidemiological perspectives. International Journal of Natural Medicine and Health Sciences. 2023 Dec; 3(1): 13-7.

[5] Imran M, Baig M, Alshuaibi RO, Almohammadi TA, Albeladi SA, Zaafarani FT. Knowledge and Awareness About Colorectal Cancer and Barriers to Its Screening among a Sample of the General Public in Saudi Arabia. Plos One. 2023 Aug; 18(8): e0290269. doi: 10.1371/journal.pone.0290269.

[6] Alharbi NT, Alluqmani TA, Alraddadi AN, Alsaedi RS, Alahmadi AM, Sinan AM *et al.* Knowledge, Attitude, and Practice Towards Colorectal Cancer Prevention and Screening Among the Population in the Madina Region. Cureus. 2025 Dec; 17(12). doi: 10.7759/cureus.99770.

[7] Jørgensen JB, Erichsen R, Pedersen BG, Laurberg S, Iversen LH. Stoma Reversal After Intended Restorative Rectal Cancer Resection in Denmark: Nationwide Population-Based Study. British Journal of Surgery Open. 2020 Dec; 4(6): 1162-71. doi: 10.1002/bjs5.50340.

[8] Abuadas FH, Petro-Nustas WJ, Abuadas MH. The Effect of a Health Education Intervention on Jordanian Participants' Colorectal Cancer Knowledge, Health Perceptions, and Screening Practices. Cancer Nursing. 2018 May; 41(3): 226-37. doi: 10.1097/NCC.0000000000000480.

[9] Gong Y, Peng P, Bao P, Zhong W, Shi Y, Gu K *et al.* The Implementation and First-Round Results of a Community-Based Colorectal Cancer Screening Program in Shanghai, China. The Oncologist. 2018 Aug; 23(8): 928-35. doi: 10.1634/theoncologist.2017-0451.

[10] Althubaiti A. Sample Size Determination: A Practical Guide for Health Researchers. Journal of General and Family Medicine. 2023 Mar; 24(2): 72-8. doi: 10.1002/jgf2.600.

[11] Lee L, Trepanier M, Renaud J, Liberman S, Charlebois P, Stein B *et al.* Patients' Preferences for Sphincter Preservation versus Abdominoperineal Resection for Low Rectal Cancer. Surgery. 2021 Mar; 169(3): 623-8. doi: 10.1016/j.surg.2020.07.020.

[12] Mak JC, Foo DC, Wei R, Law WL. Sphincter-Preserving Surgery for Low Rectal Cancers: Incidence and Risk Factors for Permanent Stoma.

DOI: https://doi.org/10.54393/pjhs.v7i7.3857

World Journal of Surgery. 2017 Nov; 41(11): 2912-22. doi: 10.1007/s00268-017-4090-8.

[13] Eid Y, Menahem B, Bouvier V, Lebreton G, Thobie A, Bazille C *et al.* Has Adherence to Treatment Guidelines for Mid/Low Rectal Cancer Affected the Management of Patients? A Monocentric Study of 604 Consecutive Patients. Journal of Visceral Surgery. 2019 Sep; 156(4): 281-90. doi: 10.1016/j.jviscsurg.2019.01.001.

[14] Ivatury SJ, Suwanabol PA, De Roo AC. Shared Decision-Making, Sphincter Preservation, and Rectal Cancer Treatment: Identifying and Executing What Matters Most to Patients. Clinics in Colon and Rectal Surgery. 2024 Jul; 37(04): 256-65. doi: 10.1055/s-0043-1770720.

[15] Algie JP, Van Kooten RT, Tollenaar RA, Wouters MW, Peeters KC, Dekker JW. Stoma versus Anastomosis After Sphincter-Sparing Rectal Cancer Resection; The Impact on Health-Related Quality of Life. International Journal of Colorectal Disease. 2022 Oct; 37(10): 2197-205. doi: 10.1007/s00384-022-04257-w.

[16] Kang SB, Cho JR, Jeong SY, Oh JH, Ahn S, Choi S *et al.* Quality of Life After Sphincter Preservation Surgery or Abdominoperineal Resection for Low Rectal Cancer (ASPIRE): A Long-Term Prospective, Multicenter, Cohort Study. The Lancet Regional Health–Western Pacific. 2021 Jan; 6. doi: 10.1016/j.lanwpc.2020.100087.

[17] Abelson JS, Gaetani RS, Hawkins AT. Shared Decision Making in the Treatment of Rectal Cancer. Journal of Clinical Medicine. 2025 Mar; 14(7): 2255. doi: 10.3390/jcm14072255.

[18] Gadan S, Floodeen H, Lindgren R, Rutegård M, Matthiessen P. What is the Risk of Permanent Stoma Beyond 5 Years After Low Anterior Resection for Rectal Cancer? A 15-Year Follow-Up of a Randomized Trial. Colorectal Disease. 2020 Dec; 22(12): 2098-104. doi: 10.1111/codi.15364.

[19] Nassar A, Challine A, O'connell L, Voron T, Chafaï N, Debove C *et al.* Effective Initial Management of Anastomotic Leak in the Maintenance of Functional Colorectal or Coloanal Anastomosis. Surgery Today. 2023 Jun; 53(6): 718-27. doi: 10.1007/s00595-022-02603-7

[20] Abdalla S, Cotte E, Epin A, Karoui M, Lefevre JH, Berger A *et al.* Short-Term and Long-Term Outcome of Endoluminal Vacuum Therapy for Colorectal or Coloanal Anastomotic Leakage: Results of a Nationwide Multicenter Cohort Study from the French GRECCAR Group. Diseases of the Colon & Rectum. 2020 Mar; 63(3): 371-80. doi: 10.1097/DCR.0000000000001560.

[21] Crippa J, Duchalais E, Machairas N, Merchea A, Kelley SR, Larson DW. Long-term Oncological Outcomes Following Anastomotic Leak in Rectal Cancer Surgery. Diseases of the Colon and Rectum. 2020 Jun; 63(6): 769-77. doi: 10.1097/DCR.0000000000001634.

[22] Denost Q, Solomon M, Tuech JJ, Ghouti L, Cotte E, Panis Y *et al.* International Variation in Managing Locally Advanced or Recurrent Rectal Cancer: Prospective Benchmark Analysis. Journal of British Surgery. 2020 Dec; 107(13): 1846-54. doi: 10.1002/bjs.11854.