

# The role of transanal total mesorectal excision (TaTME) in the surgical treatment of rectal cancer

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Transanal total mesorectal excision (TaTME) is an innovative surgical approach for treating mid- and low-rectal cancers. The method offers several distinct advantages that make it superior to traditional techniques, with the principal benefits being better visualization and improved access to the lower pelvis. In this paper, we review the general assumptions of this method, with particular emphasis on the two-team (Cecil) approach. We also summarize our own experiences with the use of TaTME. Our experiences suggest that TaTME provides satisfactory oncological outcomes similar to those obtained with other commonly recognized surgical techniques. Moreover, TaTME is widely accepted by patients, especially those wishing to preserve their anal sphincters. However, more multicenter studies are needed to define objective indications for TaTME and to ultimately standardize the surgical technique, as published evidence suggests that many aspects of this procedure vary substantially from center to center.

**Keywords:** rectal cancer, TaTME, surgical technique

## Introduction

Rectal cancer remains a challenge for oncology surgeons. The dynamic development of surgical techniques observed within the last 40 years, after Heald introduced the principles of total mesorectal excision (TME), has not ended. Newly emerged surgical procedures have many supporters but also some opponents. Treatment outcomes obtained with these methods can be verified objectively with multicenter studies, which results in the introduction of new surgical treatment standards. Attempts to verify the outcomes of rectal cancer treatment were also undertaken in Poland [1, 2]. During the previous decade, a new technique for rectal cancer surgery, the transanal total mesorectal excision (TaTME) proposed by Lacy, has been the subject of an ongoing debate within the Polish surgical community. Below, we present the general assumptions of this method and our own experiences with the use of TaTME at

the Lower Silesian Oncology, Pulmonology and Hematology Center in Wrocław (Poland).

## Benefits of TaTME

Transanal total mesorectal excision has emerged as an innovative surgical approach for the treatment of mid- and low-rectal cancers. The method offers several distinct advantages that make it superior to traditional techniques, such as laparoscopic or open TME. One of the key benefits of TaTME is its ability to provide enhanced visualization and access to the lower pelvis. Approaching the rectum transanally, surgeons gain a direct view into the mesorectum from below, which is particularly advantageous in patients with challenging pelvic anatomy, i.e. those with a narrow pelvis, obesity, or bulky tumors. The improved access offered by TaTME facilitates a more accurate dissection of the distal rectum, with the resultant improvement

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in the quality of the mesorectal excision and clearer circumferential and distal margins [3]. As a result, TaTME is associated with lower rates of incomplete resections and positive circumferential resection margins — two factors that are crucial for minimizing local recurrence of rectal cancer [4, 5].

Aside from the oncological benefits mentioned above, TaTME has demonstrated superior outcomes in sphincter preservation. Due to its accuracy, the transanal approach allows the surgeon to dissect tumors located in close proximity to the anal canal more carefully, thus reducing the demand for a permanent colostomy. This benefit is particularly important in the case of patients with low-rectal tumors, in whom traditional approaches might necessitate a more radical surgery, such as abdominoperineal resection (APR) [6]. Preserving the sphincter, TaTME contributes to better postoperative functional outcomes, particularly in terms of continence and overall quality of life [7].

Furthermore, TaTME has been associated with lower conversion rates to open surgery than conventional laparoscopic approaches. The minimally invasive nature of TaTME reduces the need for conversion and contributes to shorter recovery times, decreased postoperative pain, and reduced duration of hospital stay [3]. A combination of transanal and transabdominal techniques allows for a more comprehensive and accurate resection, minimizing the risk of complications and wound infections [4].

In patients with locally advanced rectal cancers, TaTME offers an opportunity for a tailored approach, adjusted for complex pelvic anatomy and challenging tumor location. The ability to address tumors in the deep pelvis or those involving adjacent structures makes TaTME a versatile option in complex oncological cases [3]. Overall, the advantages of TaTME, such as improved access, higher rates of sphincter preservation, reduced conversion to open surgery, and faster recovery, make it an increasingly preferred option in the surgical treatment of rectal cancer.

## Indications and contraindications for TaTME

### Indications

Transanal total mesorectal excision is primarily indicated for the surgical management of rectal cancer, particularly in patients who present with the following characteristics:

- 1) mid- to low-rectal cancer:
  - TaTME is highly suitable for patients with rectal cancers located in the mid to distal rectum (within 10 cm from the anal verge). The technique allows for superior visualization and accurate dissection in this anatomically confined space [4, 6];
- 2) challenging pelvic anatomy:
  - patients with a narrow pelvis, obesity, or male sex can present a technical challenge in the case of conventional laparoscopic or open surgery. Transanal total mesorectal excision offers improved access to the lower rectum, making it a preferable option in such cases [4, 5];

- 3) locally advanced rectal cancer:
  - patients with stage II or III rectal cancer who require neoadjuvant chemoradiotherapy prior to surgery can benefit from TaTME. This approach allows for better mesorectal excision with negative resection margins, both crucial determinants of outcome in advanced cases [3, 4];
- 4) patients requiring sphincter-sparing surgery:
  - in patients with low-rectal cancer who are candidates for sphincter-sparing surgery, TaTME allows for more accurate dissection of the rectum in close proximity to the anal canal, increasing the likelihood of preserving continence and avoiding a permanent colostomy [6, 7];
- 5) multidisciplinary cancer care:
  - TaTME is often employed as part of a multimodal treatment plan involving neoadjuvant therapy, multidisciplinary discussion, and careful patient selection to maximize oncological outcomes [8].

### The role of anorectal manometry

While anorectal manometry is not a primary indication for TaTME, it can be an essential tool in the preoperative assessment of patients, especially those with low-rectal cancers considered for sphincter-preserving surgery. In such cases, anorectal manometry is used to evaluate the function of the anal sphincters, rectal sensitivity and coordination — crucial factors for maintaining postoperative continence.

Key scenarios in which manometry is useful:

- 1) sphincter-sparing surgery:
  - in patients with low-rectal tumors located close to the anal canal who desire sphincter preservation, manometry is helpful in assessing sphincter integrity and function. In patients with poor sphincter function (e.g. low anal resting pressure or weak squeeze pressures), the risk of postoperative incontinence may be high. Therefore, if the patient presents with poor sphincter function, a more radical surgery, such as APR, might be recommended instead of TaTME to avoid complications related to impaired continence [6, 7];
- 2) preoperative evaluation of functional outcomes:
  - manometry can guide the surgical decision-making process, providing information about baseline anorectal function, especially in patients with pre-existing anorectal dysfunction. Manometry is helpful in identifying patients with potentially increased risk of poor functional outcomes after TaTME, such as fecal incontinence, and allows the surgical team to adjust the treatment plan accordingly [5];
- 3) non-oncological indications (functional disorders):
  - in rare instances, TaTME may be considered a treatment option in complex benign conditions, such as recurrent rectal prolapse. In such cases, anorectal manometry can help assess sphincter competence and anorectal function to determine whether the procedure would be beneficial or should be replaced by an alternative approach [3].

## Contraindications

Despite its previously discussed advantages, TaTME is contraindicated in several clinical scenarios in which the risks may outweigh the benefits:

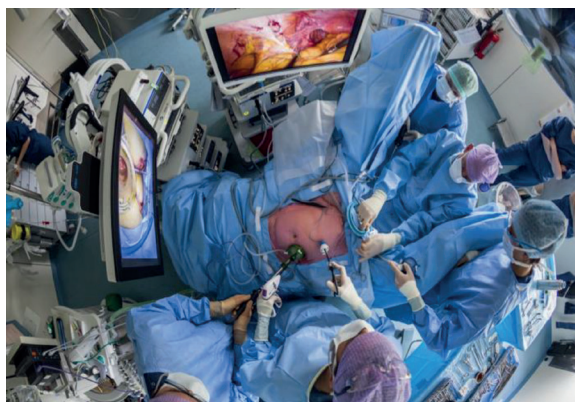
- 1) locally unresectable tumors:
  - tumors that have invaded adjacent organs or structures, e.g. the bladder, prostate, or sacrum, are not amenable to TaTME, as the approach does not provide sufficient access for multivisceral resections required in such cases [4];
- 2) high-rectal tumors:
  - tumors located in the upper rectum (more than 10 cm from the anal verge) are generally managed better with conventional laparoscopic or open TME. As mentioned before, the advantages of TaTME are primarily limited to tumors located in the mid and low rectum [5, 6];
- 3) severe comorbidities or poor surgical candidates:
  - patients with significant cardiovascular and respiratory comorbidities or other systemic conditions that severely limit their ability to tolerate surgery should not undergo TaTME. While as minimally invasive as it may be, TaTME is still a complex procedure that requires prolonged anesthesia and meticulous postoperative management [7];
- 4) previous extensive pelvic surgery or radiation:
  - patients with extensive adhesions from previous surgeries or those with a history of multiple rounds of pelvic radiation may not be ideal candidates for TaTME. Scar tissue formation and fibrosis can significantly limit the technical advantages of the transanal approach in such cases, increasing the risk of complications [8];
- 5) advanced anastomotic techniques required:
  - when performing an anastomosis involves a high degree of complexity (e.g., intersphincteric resection), alternative approaches may be more applicable, as TaTME does not always facilitate an optimal anastomotic technique in such challenging cases [3].

## The two-team approach (Cecil approach) — a collaborative surgical revolution

In the ever-evolving field of rectal cancer surgery, TaTME has redefined the way surgeons approach complex pelvic anatomy. At the heart of this innovation is the two-team approach, also referred to as the Cecil approach, where two surgical teams, one working abdominally and another working transanally, collaborate in real-time to optimize the outcomes. The Cecil approach has been gaining widespread attention not only for its efficiency but also for the precision and finesse it brings to the operating table.

The two-team approach is very demanding logistically and requires excellent coordination of work between both teams, the one operating from the bottom and the one operating from the abdominal side (Fig. 1).

Two surgical teams operate in coordination, with their efforts converging on the tumor from both the abdominal



**Figure 1.** Transanal total mesorectal excision (TaTME) using the two-team (Cecil) approach

and transanal approaches. The abdominal team carefully navigates the upper rectum and colon, releasing tissues and managing blood supply. Meanwhile, the transanal team works from below, meticulously dissecting the rectum near the tumor to obtain clean, safe resection margins. This synchronized choreography allows for a dual approach to tackling rectal cancer, and the results have been transformative.

### **The efficiency of two hands over one**

The most striking benefit of the two-team approach is its impact on operation time. During a conventional surgery, one team performs the procedure in a step-by-step manner, whereas in the Cecil approach, both teams operate simultaneously. This significantly reduces the overall duration of the surgery, which is beneficial both for the surgical team and for the patient who spends less time under anesthesia [4]. Shorter time in the operating room corresponds also to fewer risks and faster recovery. Using the two-team approach, surgeons can achieve the same goals in a markedly shorter time without compromising the quality of the procedure.

### **Enhanced visualization — two perspectives, one objective**

Perhaps one of the greatest challenges in rectal surgery is the necessity of navigating within the confined space of the pelvis, especially in patients with complex anatomies, i.e. those with a narrow pelvis or suffering from obesity. The two-team approach provides surgeons with an unmatched view of the surgical field. While the abdominal team dissects the colon and upper rectum from above, the transanal team obtains unprecedented access to the lower rectum and mesorectum. This dual visualization reduces the risk of incomplete resections and increases the precision of the procedure, especially in patients with low-rectal tumors in whom achieving clear resection margins is of utmost importance [4, 6].

By approaching the tumor from both sides, surgeons can avoid “tunnel vision,” a common problem during single-team

operations. Instead, the operators have access to a widely open surgical field, which allows them to perform a more comprehensive and controlled dissection of the tumor and surrounding tissues.

### **Oncological and functional mastery**

One of the paramount concerns in rectal cancer surgery is achieving clear circumferential and distal margins, which is key to reducing the risk of local recurrence. The two-team approach, involving simultaneous abdominal and transanal dissection, and improves the accuracy of the resection margins. In particular, the ability of the transanal team to dissect tissues from below contributes to cleaner distal margins, a crucial factor for reducing cancer recurrence and improving long-term outcomes [7].

The use of the two-team approach also increases the likelihood of preserving anal sphincters in low-rectal tumors. In patients in whom sphincter-sparing surgery is an option, the transanal approach improves control and precision of dissection near the sphincters. This translates into better functional outcomes, particularly in terms of continence, allowing patients to avoid a permanent colostomy and improving their quality of life post-surgery [3, 7].

### **Tailoring surgery for complex cases**

For patients with challenging pelvic anatomies, such as a narrow male pelvis, obesity, or the presence of bulky tumors, the two-team approach offers a strategic advantage. The simultaneous effort of both teams allows them to overcome the space constraints more easily. While the abdominal team creates a space and mobilizes tissues from above, the transanal team works meticulously from below to access and dissect tissues that would otherwise be difficult to reach [5]. This dual approach opens up the pelvis in a way that could not be achieved by a single team operating from just one side.

### **Relieving surgeon's fatigue — a collaborative benefit**

The reduction of surgeon's fatigue is a frequently overlooked advantage of the two-team approach. Transanal total mesorectal excision is a technically demanding procedure that can last several hours when performed by a single team. With the Cecil approach, the workload is split between two teams. Surgeons working in tandem can maintain their concentration and precision for the duration of the procedure, which leads to better outcomes for the patient and less exhaustion for the operating team [3].

### **Two teams, one goal**

The two-team (Cecil) approach in TaTME represents remarkable progress in rectal cancer surgery, whereby collaborative speed and precision translate into superior clinical outcomes. By allowing two teams to work in parallel, the Cecil approach

reduces operating time, facilitates visualization, and improves oncological and functional outcomes. In patients with complex and challenging pelvic anatomies, the Cecil approach was demonstrated to be an innovative solution. It allows the surgeons to achieve their goals with greater efficiency yet without compromising the patient's safety.

With the two-team approach, rectal cancer patients are more likely to benefit from sphincter preservation, faster recovery, and, ultimately, cancer-free survival.

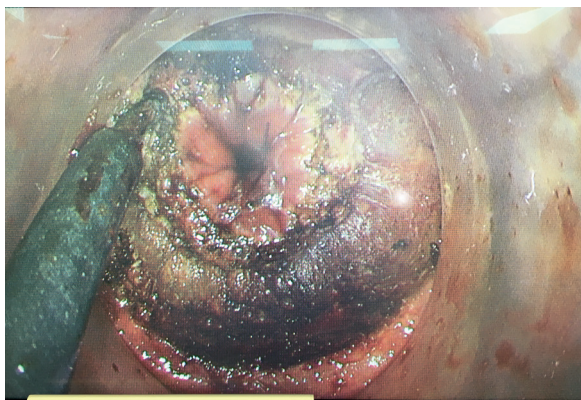
### **Surgical steps**

Abdominal approach:

- 1) patient positioning:
  - the patient is placed in a lithotomy position with legs raised, providing access to both the abdomen and the perineum;
- 2) pneumoperitoneum and trocar placement:
  - the abdominal team creates a pneumoperitoneum (insufflation of the abdomen with CO<sub>2</sub>) and inserts laparoscopic or robotic trocars for instrument access;
- 3) mobilization of the sigmoid colon:
  - the abdominal team mobilizes the sigmoid colon by incising the lateral peritoneal attachments. this ensures adequate mobilization of the colon for later anastomosis;
- 4) ligation of the inferior mesenteric vessels:
  - the inferior mesenteric artery and vein are identified and ligated to ensure proper blood supply to the remaining colon and to provide adequate mobility of the bowel;
- 5) dissection of the upper rectum and mesorectum:
  - the abdominal team begins the dissection of the upper part of the rectum, releasing the mesorectum from the surrounding tissues while protecting critical structures, such as the hypogastric nerves and ureters;
- 6) division of the sigmoid colon:
  - once sufficient mobilization is achieved, the sigmoid colon is divided using a surgical stapler, preparing it for eventual anastomosis.

Transanal approach:

- 1) placement of the transanal platform:
  - a specialized transanal platform (e.g. GelPOINT or SILS port) is inserted into the anal canal, providing access for instruments and visualization;
- 2) circumferential mucosal incision:
  - the transanal team makes a circumferential mucosal incision at the rectal level below the tumor (Fig. 2), to facilitate accurate dissection of the distal part of the tumor;
- 3) dissection of the mesorectum:
  - the mesorectum is carefully dissected in a "bottom-up" approach. the transanal team works toward the abdominal team's dissection, ensuring a total mesorectal excision and maintaining clear resection margins;
- 4) transanal transection of the rectum:
  - once the rectum is thoroughly dissected and mobilized, the transanal team transects the rectum below the tumor



**Figure 2.** Circumferential mucosal incision at the rectal level performed by the transanal team during transanal total mesorectal excision (TaTME) using the two-team (Cecil) approach

using a surgical stapler or scalpel, depending on the tumor's location;

- 5) connection with abdominal dissection:
    - the transanal and abdominal dissections meet in the middle, completing the full mobilization of the rectum and mesorectum;
  - 6) extraction of the specimen:
    - the tumor and the surrounding rectal tissue are typically removed transanally, minimizing trauma to the abdomen and reducing the size of any necessary incisions.
- Final steps:
- 1) colorectal anastomosis:
    - after the tumor is excised, the two teams work in coordination to create a colorectal anastomosis, often using a circular stapler, reconnecting the healthy ends of the colon to restore bowel continuity;
  - 2) protective ileostomy (if needed):
    - in some cases, a temporary diverting ileostomy is created to protect the anastomosis and to facilitate its appropriate healing, thus reducing the risk of complications;
  - 3) closure:
    - the transanal platform is removed, and the abdominal incisions are closed. the patient is then prepared for postoperative recovery.

### Our own experiences with TaTME

In our material patients with rectal cancers located up to 6 cm from the anorectal junction (AJ) and normal sphincter function have been qualified for TaTME at the Department of Oncological Surgery, Lower Silesian Oncology, Pulmonology and Hematology Center in Wrocław (Poland). Patients with tumors located more than 6 cm from the AJ were qualified for standard surgical techniques using the abdominal approach. In our opinion, extending the indications for TaTME to tumors in other locations and with non-malignant conditions, as reported at some centers abroad, is unnecessary.

The first TaTME at the Lower Silesian Oncology, Pulmonology and Hematology Center was performed on May 5, 2016. Until the end of September 2024, 237 TaTME procedures have been performed on 165 men (69.6%) and 72 women (30.4%) aged between 26 and 86.

The group of patients qualified for TaTME included 226 with rectal cancer, 7 with benign rectal polyps that could not be treated endoscopically, 3 with rectal neuroendocrine tumors (NET), and 1 with a submucosal tumor. The tumors represented groups I-III according to the Rullier classification [8]. The average distance of the tumor from the AJ was 2.92 cm, with a range from 0 cm to 6 cm.

Published evidence suggests that obese patients and men are the groups that benefit most from TaTME [9]. The average body mass index (BMI) of patients operated on using TaTME at our center was 26.58 kg/m<sup>2</sup>, with a range from 17.75 kg/m<sup>2</sup> to 41.28 kg/m<sup>2</sup>.

The qualification for preoperative treatment, conducted by a multidisciplinary team, was based on guidelines published by various scientific bodies, including the Polish Society of Clinical Oncology (PTOK), Polish Society of Surgical Oncology (PTChO), European Society for Medical Oncology (ESMO), and the European Society of Surgical Oncology (ESSO). Based on clinical data, 172 patients were qualified for preoperative treatment. The remaining patients were qualified directly for TaTME, either as a primary surgery (n = 50) or as a secondary procedure after an initial non-radical local excision of the rectal tumor (n = 15). Patients qualified for neoadjuvant treatment received standalone radiotherapy 5 × 5 Gy (n = 91), radiotherapy combined with chemotherapy (n = 79), or standalone chemotherapy (n = 2).

Early outcomes of TaTME in our group were similar to those obtained with classical TME performed either via open or laparoscopic techniques, which is consistent with the results published by other authors [10, 11]. Subradical resection (R1) was obtained in only 5 (2.1%) patients operated on using TaTME, with the remaining 232 (97.9%) patients satisfying the criteria of radical resection (R0).

Low anterior resection syndrome (LARS) appears to be an important clinical issue in patients subjected to TaTME. According to the literature, LARS may occur in up to 76% of patients operated on using TaTME, with the primary risk factor being the distance between the tumor and the AJ [12]. However, despite performing very low anterior rectal resections (with a mean distance between the anastomosis and AJ of 2.5 cm), we did not observe an increased incidence of LARS in our material. Thus, the true frequency and the exact causes of LARS as a potential frequent complication of TaTME should be addressed in detail in future studies.

### Conclusions

Transanal total mesorectal excision is a valuable option for the surgical treatment of rectal cancers and extensive polyps



of the lower rectum. In selected cases of rectal cancer, TaTME may constitute an alternative to abdominosacral (ASAR) or perineal (APR) resection of the tumor. However, it needs to be emphasized that TaTME is a demanding, minimally invasive technique with a long learning curve. Our own experiences suggest that TaTME provides satisfactory oncological outcomes similar to those obtained with other commonly recognized surgical techniques. Moreover, TaTME is widely accepted by patients, especially those wishing to preserve their anal sphincters. Despite performing very low anterior rectal resections, we did not observe an increased incidence of LARS, which was reported by other authors as a common complication of TaTME. While TaTME is used in many clinics, the principles of patient qualification and many technical aspects vary from center to center. Thus, more multicenter studies are needed to define objective indications for TaTME and to ultimately standardize this surgical technique.

## Article information and declarations

### Data availability statement

The data have not been published in any other journal.

### Ethics statement

The study was conducted with the approval of the Bioethics Committee of the Wrocław Medical University.

### Author contributions

Marek Bębenek — conceptualization, investigation, methodology, supervision, writing — original draft preparation, writing — review & editing.

Michał Kazanowski — data curation, investigation, methodology, writing — original draft preparation.

Bartosz Kapturkiewicz — formal analysis, investigation, resources, validation, writing — original draft preparation.

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### Conflict of interest

None declared.

### Supplementary material

None.

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## References

1. Błaszowski T, Celban G, Domagała M, et al. Surgical treatment of rectal cancer in Poland — a report from a prospective, multi-centre observational study PSSO\_01 conducted under the auspices of the Polish Society of Surgical Oncology. *Nowotwory. Journal of Oncology*. 2018; 68(3): 118–126, doi: 10.5603/njo.2018.0019.
2. Jankowski M, Rutkowski A, Zegarski W, et al. The surgical treatment of rectal cancer in Poland. The findings of a multi-center observational study by the Polish Society of Surgical Oncology (PSSO-01). *Nowotwory. Journal of Oncology*. 2021; 71(5): 282–289, doi: 10.5603/njo.a2021.0050.
3. Penna M, Hompes R, Arnold S, et al. TaTME Registry Collaborative. Transanal Total Mesorectal Excision: International Registry Results of the First 720 Cases. *Ann Surg*. 2017; 266(1): 111–117, doi: 10.1097/SLA.0000000000001948, indexed in Pubmed: 27735827.
4. Deijen CL, Velthuis S, Tsai A, et al. COLOR III: A multicentre randomized clinical trial comparing transanal TME versus laparoscopic TME for mid and low rectal cancer. *Colorectal Dis*. 2016; 18(8): 802–809.
5. Lacy AM, Adelsdorfer C, Delgado S, et al. Transanal Total Mesorectal Excision (TaTME): An Updated Perspective. *Tech Coloproctol*. 2015; 19(9): 505–507.
6. Atallah S, Albert M, Monson JR. Critical Review of Transanal Total Mesorectal Excision: Is It Really a Game Changer? *Dis Colon Rectum*. 2013; 56(6): 115–119.
7. Andersen LH, Klein M, Gögenur I, et al. Long-Term Functional Outcome Following Transanal Total Mesorectal Excision (TaTME) for Rectal Cancer. *Ann Surg Oncol*. 2018; 25(4): 1031–1036.
8. Rullier E, Denost Q, Vendrely V, et al. Low rectal cancer: classification and standardization of surgery. *Dis Colon Rectum*. 2013; 56(5): 560–567, doi: 10.1097/DCR.0b013e31827c4a8c, indexed in Pubmed: 23575394.
9. Tejedor P, Arredondo J, Simó V, et al. The role of transanal compared to laparoscopic total mesorectal excision (taTME vs. lapTME) for the treatment of mid-low rectal cancer in obese patients: outcomes of a multicenter propensity-matched analysis. *Updates Surg*. 2023; 75(8): 2191–2200; Erratum in: *Updates Surg*. 2024; 76(1): 329, doi: 10.1007/s13304-023-01676-4, indexed in Pubmed: 37903996.
10. Li Ze, Liu H, Luo S, et al. Long-term oncological outcomes of transanal versus laparoscopic total mesorectal excision for mid-low rectal cancer: a retrospective analysis of 2502 patients. *Int J Surg*. 2024; 110(3): 1611–1619, doi: 10.1097/JS9.0000000000000992, indexed in Pubmed: 38091943.
11. Ammann Y, Warschkow R, Schmied B, et al. Is survival after transanal total mesorectal excision (taTME) worse than that after traditional total mesorectal excision? A retrospective propensity score-adjusted cohort study. *Int J Colorectal Dis*. 2024; 39(1): 28, doi: 10.1007/s00384-023-04591-7, indexed in Pubmed: 38376756.
12. Parnasa SY, Mizrahi I, Helou B, et al. Incidence and Risk Factors for Low Anterior Resection Syndrome following Trans-Anal Total Mesorectal Excision. *J Clin Med*. 2024; 13(2), doi: 10.3390/jcm13020437, indexed in Pubmed: 38256571.