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The first experience in the treatment of colorectal anastomosis fistulas using a platform for transanal endomicrosurgery

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ABSTRACT *AIM: to demonstrate the first experience of using the platform for transanal endoscopic microsurgery treatment for fistula of the colorectal anastomosis.*
PATIENTS AND METHODS: from October 2017 to March 2023 5 patients (36-77 years old) with persistent fistula of the colorectal anastomosis were included in the cohort. All of them underwent rectal resection for cancer. The surgery technique was presented on clinical case with defect of colorectal anastomosis on the posterior side up to 0.5 cm length with presacral sinus up to 2.5 cm in the largest dimension.
RESULTS: no postoperative morbidity developed. Patient discharged on the 6th day.
CONCLUSION: TEM platform allows to consider it promising approach for the persistent fistula of colorectal anastomosis.

KEYWORDS: *anastomotic leakage, transanal microscopic surgery (TEM), rectal carcinoma, colorectal surgery*

CONFLICT OF INTEREST: *the authors declare no conflicts of interest*

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INTRODUCTION

The colorectal anastomosis leakage (CAL) is the most serious complication in colorectal surgery which develops in 9–20% [1,2]. The approach to this complication depends on the severity of the clinical picture and the degree of anastomosis leakage, which in 2010 the International Study Group of Rectal Cancer proposed to classify into three degrees: 1) radiological (grade A); 2) clinical symptomatic (grade B) and 3) clinical severe (grade C) [3]. The occurrence of CAL grade B and C significantly aggravates postoperative period, increases hospital stay and associated with the potential need for re-operations.

The presence of a fistula in the anastomosis, which corresponds to grade A, along with the progression of the disease, is one of the main reasons to refuse preventive stoma closure in rectal cancer [4–6].

The traditional method for fistula in the area of colorectal anastomosis is local conservative therapy by washing the rectal lumen with antiseptic solutions, which is complemented by transanal drainage in the presence of a pathological cavity with a difficult outflow of pathological discharge. This technique can be used in all patients with CAL grades A and B in order to reduce symptoms, such as the discharge of pus, and allows to cure fistula in the vast majority of patients. According to literature data, the effectiveness of conservative treatment of

Table 1. *Characteristics of patients*

Patient, gender, age	B (m), 51 years old	N (m), 68 years old	B (f), 66 years old	B (f), 66 years old	Z (m), 77 years old
Stage as per TNM	II stage	III stage	II stage	III stage	II stage
Primary operation	Low anterior resection, Turnbull ileostomy	Anterior rectal resection	Low anterior resection, Turnbull ileostomy	Low anterior resection, Turnbull ileostomy	Low anterior resection, Turnbull ileostomy
AF Grade	Grade A	Grade C	Grade A	Grade A	Grade A
The height of the anastomosis from the anal verge	5 cm	9cm	4cm	5 см 5 cm	5 cm
Location and extent of the lesion	Posterior semicircle, 2 cm lesion with presacral cavity up to 3 cm in length	Posterior semicircle, 0.5 cm lesion with presacral cavity up to 2.5 cm in length	Right semicircle, 1.5 cm lesion, communicating with pathological cavity up to 3 cm in length.	Right semicircle, 1.5 cm lesion, communicating with pathological cavity up to 3.5 cm in length	Right semicircle, 0.6 cm lesion with blindly ending fistula, 2 cm long.
Time period of TEM after resection	27 months	24 months	11 months	12 months	6 months

colorectal anastomosis fistula varies from 75% to 91% [7].

In case of conservative therapy failure for a conditional period of 6–12 months, we are talking about persistent fistula, the treatment of which is a challenging problem [8]. The range of possible operative options varies from minimally invasive to resection of the bowel with re-formation of the new anastomosis. It should be emphasized that the last procedure is not possible for all patients due to various reasons, and the functional result of such operations is questionable. In this regard, a promising direction is the use of minimally invasive endoscopic techniques that allow to visualize the anastomosis lesion and perform local sanitation. Of particular interest is the availability of publications devoted to the successful use of transanal endomicrosurgery (TEM) in the treatment of colorectal anastomosis suture failure [9–11].

This article presents the experience of using transanal endomicrosurgery for persistent colorectal anastomosis fistula.

PATIENTS AND METHODS

From October 2017 to March 2023, 5 patients with persistent fistula in the area of colorectal anastomosis after operation for rectal cancer, aged 36 to 77 years, in the volume of anterior (n = 1) and low anterior rectal resection (n = 4) (Table 1), were treated. In the early postoperative period, clinical severe grade C leakage developed in only one patient, which required re-operation with diverting colostomy. In four patients, grade A failure was detected during a routine control before performing stoma closure. Conservative therapy as the first stage of treatment was performed in all the patients for 6 to 27 months, while no healing of the anastomosis fistula was achieved.

Clinical Case

Patient N., 68 years old, was operated elective in the volume of laparoscopical anterior resection for upper rectal cancer cT3N1aM0. The operation was performed as standard with high ligation of the inferior mesenteric artery and partial mesorectomectomy. The length of the proximal colon was sufficient; in this regard, mobilization of the splenic flexure of the colon was not required. The anastomosis was formed at a distance of 9 cm from the anal edge using the double staple suture technique — distally the rectum was crossed by laparoscopic access using the 'Echelon Flex 60'stapler with two cassettes, while the linear suture was located sagittal. A circular stapler CEEA29 was used to form a colorectal anastomosis. During the leak proof test, no air bubbles were detected in the anastomosis.

In the early postoperative period, clinical signs of colorectal anastomosis failure developed on day 3. CT showed contrast extravasation (Fig. 1), and therefore, re-operation was urgently performed. Revision revealed the presence of serous fluid in the abdominal cavity, the loops of the small intestine were smooth, shiny, and inflammatory infiltration of soft tissues in the area of colorectal anastomosis with a fibrin were detected. Given the absence of visible signs of diffuse peritonitis, the drainage of the abdominal cavity and the diverting colostomy were done. After this, no unfavorable events occurred postoperatively, he was discharged on the 10th day.

Figure 1. *CT examination of patient N. on the 3rd day after surgery with retrograde contrast of the rectum with water-soluble contrast: the output of the contrast agent outside the intestinal wall is determined presacrally (arrow)*

Local conservative treatment of colorectal anastomosis leakage for 24 months did not bring any effect; and during a control, a lesion was detected along the posterior semicircle of the anastomosis at the connection of the linear and circular suture lines. The patient

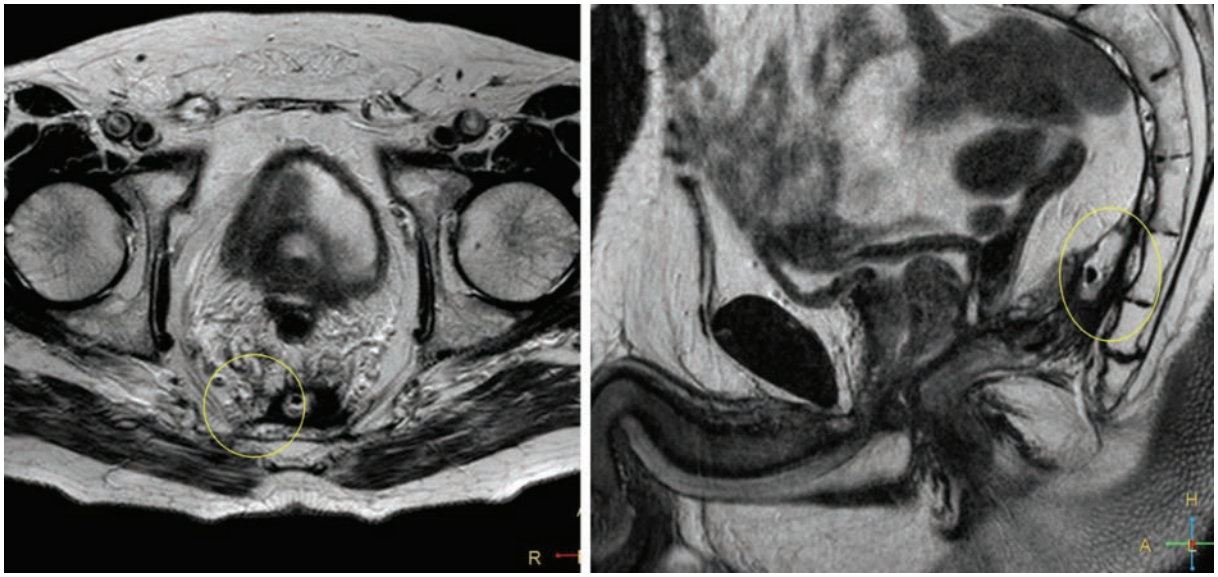

Figure 2. *MRI of patient N.'s pelvis 6 months after anterior rectal resection (axial projection on the left, sagittal projection on the right): presacrally, in the area of the anastomosis, a swelling with liquid contents, measuring 2.5 × 1.1 cm, surrounded by fibrous tissues, was revealed. The upper pole of the anastomotic sinus is at the level of the lower border of the S4 vertebra*

underwent pelvis MRI, in which a pathological cavity 2.5 × 1.1 cm was detected presacral (Fig. 2).

Sigmoscopy revealed internal fistula opening in the anastomosis (Fig. 3).

Due to the presence of a fistula in the anastomosis with presacral anastomotic sinus, it was decided to perform surgical treatment using the TEM platform.

Description of the Technique

Operation was performed under spinal anesthesia, supplemented by intravenous sedation. As an antibiotic prophylaxis, 1.2 g of protected amoxicillin was administered intravenously 30 minutes before the start of the procedure.

Taking into account the site of the anastomosis lesion along the posterior semicircle, the surgery was performed in the patient's position on the operating table lying on his back with his legs apart. Using an obturator for an operating proctoscope (Karl Storz company, proctoscope 40 mm, length 15 cm).An operating proctoscope was installed in the rectum, equipped with a multifunctional device with two ports — 5 mm in diameter and one port — 10 mm in diameter for manipulation with endoscopic instruments, a port for CO_2 supply and a video camera port. The intraluminal pressure was maintained at 12 mmHg.

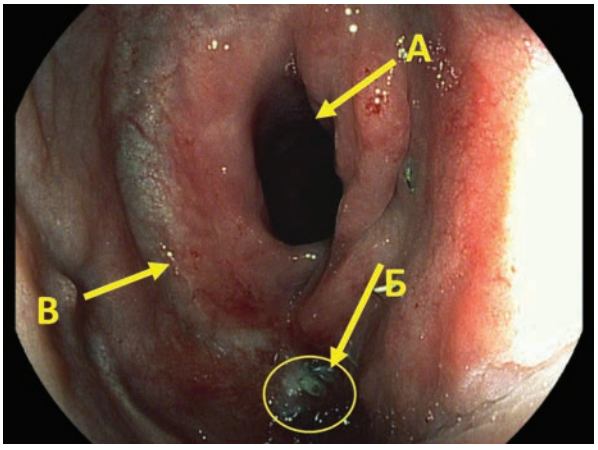

Figure 3. *Endophoto of patient N. 6 months after anterior rectal resection: А — lumen of the colon, Б — internal fistula, В — line of the circular hardware suture*

After the creation of the carboxyrectum, the anastomosis area with a lesion located along the posterior semicircle at the intersection of the circular and linear sutures was visualized (Fig. 4A). The lesion size was no more than 0.5–0.6 cm, which hampered the outflow of pus from the presacral cavity. The first step was to flush the sinus with an aqueous solution of chlorhexidine (Fig. 4B). Next, using a harmonic scalpel (Ultra Cision® Harmonic Scalpel, Ethicon Endosurgery, USA), scar tissue was excised in the area of the fistula opening with the removal of metal clips in the projection of the sinus (Fig. 4 C–D). The surgery was completed by installing a hemostatic sponge on the wound surface and a drainage tube into the rectal lumen.

The postoperative period was without unfavorable events, no antibiotics, the patient did not notice any pain syndrome and was discharged in a satisfactory condition on day 6.

After 3 months, an endoscopic control did not detect the fistula opening, and a fully healed postoperative wound was visualized (Fig. 5).

In order to exclude the internal fistula, proctography was also performed, according to which no water-soluble contrast agent was detected outside the bowel wall (Fig. 6). In this regard, diverting colostomy was closed.

The subsequent postoperative period was without complications. On the third day, there was an independent withdrawal of the stool against the background of the absence of signs of local and systemic inflammation; and therefore, on the fifth day, the patient was discharged. At a follow-up in 3 months after reconstructive surgery, there were no signs of recurrence of the fistula.

The remaining patients with fistula in the area of colorectal anastomosis underwent surgery according to the described method. The healing time of the postoperative wound was 4 (3.5–6) months. The stoma was closed in all the patients. The patients were followed for 7

(4–11) months, there is no data for the return of the disease.

DISCUSSION

The most studied method of treating persistent fistula in the area of colorectal anastomosis is its dissection into the lumen of the intestine by the type of marsupialization. The marsupialization technique is widely used for the treatment of abscesses of various sites and consists in the formation of a wide mouth to improve the outflow of pus from the pathological cavity.

Despite the fact that the first successful results of marsupialization of persistent fistula after colorectal surgery date back to 1997, only a limited number of publications on this are presented in the literature.

So, in 1997, Whitlow, C.B. et al., applying the technique of marsupialization with dissection of the fistula into the lumen of the bowel using high-energy instruments in 6 patients with anastomosis leakage (4 with ileorectal and 2 with colorectal), achieved stable healing of the fistula in all patients within a period of 6 to 12 months [12]. Similar results were demonstrated in the study by

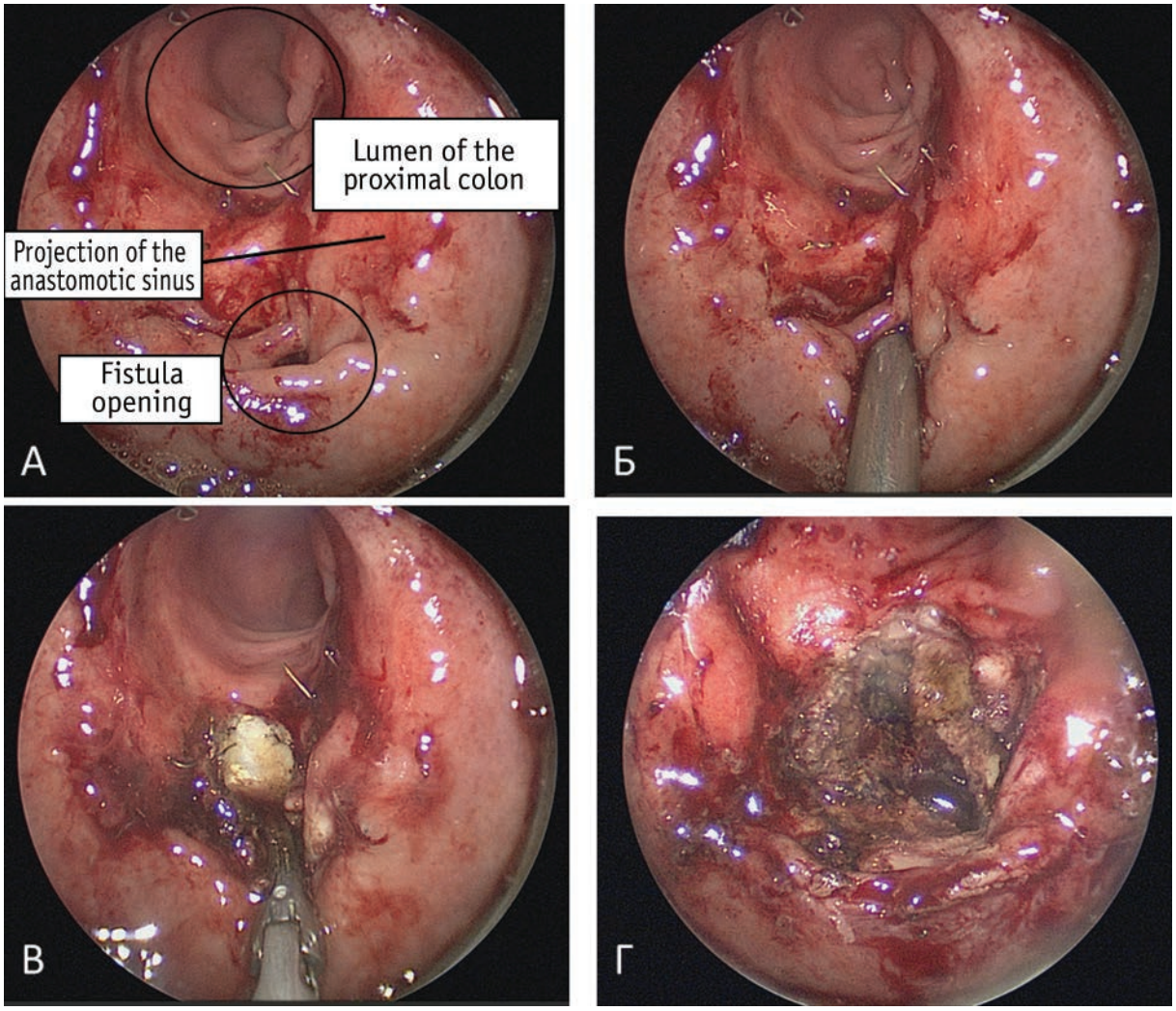

Figure 4. *Stages of TEM-marsupialization of the sinus cavity: А — Intraoperative endophoto of the lumen of the rectum and sigmoid colon and the fistula opening of the occlusion cavity; Б — Revision and flushing of the cavity through the fistula opening; В — Excision of the wall of the rectum located in the area of the cavity together with scar tissue around the fistula opening and removal of metal clips; Г — The final appearance of the wound*

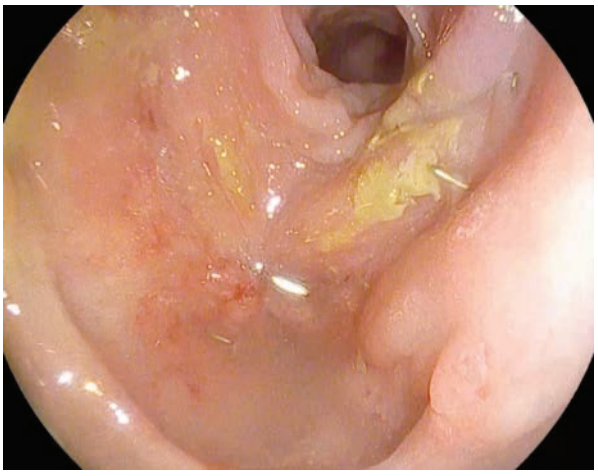

Figure 5. *Endophoto of patient N. 3 months after the elimination of the fistula and the cavity using the feasibility study platform: epithelialization of the postoperative wound is noted*

Figure 6. *Proctography of patient N. 3 months after TEM-marsupialization: colorectal anastomosis is determined at the level of the 4th sacral vertebra, wide. The remaining part of the rectum is 4.0 cm long. In the course of the study, the exit of the contrast agent from the anastomosis zone was not noted*

Stewart, B.T. et al., who used an endoscopic linear suturing and cutting device to dissect the fistula into the lumen of the intestine and create conditions for its healing. Stapler marsupialization was performed in 6 patients with persistent colorectal anastomosis fistula after anterior and low anterior resections and proved effective in five out of six cases, while no recurrence of fistula was detected during 13 (4–20) months of follow-up [13]. Slightly worse results of endoscopic stapler marsupialization were published in 2012 in the study by Abild N. et al., where stable healing of the fistula was achieved only in 4 out of 7 patients [14].

It is possible to improve the results using of a platform for transanal endomicrosurgery. This technique has demonstrated its effectiveness in the treatment of colorectal anastomosis leakage in the early postoperative period [9–11]. However, the experience of managing persistent fistula in the area of colorectal anastomosis is currently represented by only a single case described by Kevin R. McMahon [15]. The author applied this technique in a patient with persistent anastomotic fistula after robotic low anterior rectal resection with Turnbull ileostomy. At the same time, it should be noted that the patient had previously suffered an unsuccessful attempt at endoscopic stapler marsupialization of the fistula 2 months after the first surgery. Despite the repeated nature of the surgery, the use of the TEM platform made it possible to eliminate the presacral cavity and achieve complete healing of the fistula.

In our opinion, the use of a platform for transanal endomicrosurgery is the most optimal for performing fistula marsupialization in the area of colorectal anastomosis. The advantage of this technique is optimal visualization and the possibility of precise operation with the preservation of intact tissues by creating a carboxyrectum and the ability to use several instruments simultaneously. The relative disadvantages include the need for special equipment and a qualified surgeon.

This paper presents the results of the successful application of this technique in five patients with internal fistula opening in the area of colorectal anastomosis. The use of TEM-marsupialization technology made it possible to achieve stable healing of the fistula, on average, after 4 (3.5–6) months in all five patients. The postoperative period was without complications, and stoma closure was successfully performed in all the patients.

CONCLUSION

The results obtained indicate the effectiveness and safety of using this technique, which can be carried out in specialized centers where the necessary equipment and specialists with the skill of transanal endomicrosurgery are available.

AUTHORS CONTRIBUTION

Concept and design of the study: *Mikhail V. Alekseev, Stanislav V. Chernyshov, Evgeny G. Rybakov*

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