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RESEARCH ARTICLE

Imaging-Guided Surgical Management of Retrorectal Tumors: A Single-Center Experience

Engin Ölçücüoğlu[1], Alpaslan Şahin[2]

[1]University of Health Science Türkiye, Ankara Etlik City Hospital, Clinic of Surgery, Ankara, Türkiye
[2]University of Health Science Türkiye, Konya City Hospital, Clinic of Surgery, Konya, Türkiye

ABSTRACT

Aim: Retrorectal tumors represent a rare and heterogeneous group of presacral lesions with diverse embryologic origins and pathologic features. Their deep pelvic location and often non-specific presentation pose challenges for both diagnosis and operative planning, and surgical decision-making is frequently guided by anatomy and imaging rather than robust comparative evidence.

Method: We retrospectively reviewed adult patients who underwent surgical resection for primary retrorectal tumors between 2016 and 2025 at a tertiary referral center. Preoperative assessment relied mainly on magnetic resonance imaging, with the choice of surgical approach determined by tumor extent in relation to the S3 vertebral level. Demographic data, operative details, histopathologic findings, and postoperative outcomes were evaluated.

Results: The study included 16 patients, with a mean age of 48.3±14.2 years and a predominance of female patients. Most tumors were located below the S3 level and were treated via a posterior approach, whereas anterior or combined approaches were selected for lesions with cranial extension. Congenital lesions were most common, whereas malignant tumors accounted for 31.2% of cases and consisted exclusively of chordomas. Macroscopically complete resection was achieved in all patients; one chordoma demonstrated microscopic margin involvement. Postoperative complications were generally low grade, no perioperative mortality occurred, and tumor recurrence was observed in a single patient during follow-up.

Conclusion: This single-center experience suggests that preoperative imaging and anatomical considerations may assist surgical planning and enable safe tumor resection in patients with retrorectal tumors.

Keywords: Pelvic neoplasms, magnetic resonance imaging, digestive system surgical procedures, chordoma, postoperative complications

Introduction

Retrorectal tumors, also referred to as presacral tumors, are rare and heterogeneous lesions arising in the potential space between the rectum and the sacrum. This anatomically concealed region contains remnants of several embryologic structures, including the tailgut and notochord, which explains the wide histopathologic spectrum ranging from benign congenital cysts to malignant neoplasms such as chordomas.[1-3] Owing to their deep pelvic location and frequently non-specific symptoms, these tumors may remain undetected for long periods, and their diagnosis and management can be challenging.[4] The rarity of the disease and the diversity of tumor types have limited the development of standardized management strategies, and most available evidence is derived from retrospective institutional series.[2,5]

Accurate preoperative evaluation plays a critical role in surgical planning. Magnetic resonance imaging (MRI) is considered the primary imaging modality for retrorectal tumors because it allows detailed assessment of tumor morphology, sacral involvement, and the relationship to surrounding pelvic structures.[6,7] These imaging findings are essential in

Address for Correspondence: Assoc. Prof.,Alpaslan Şahin, University of Health Science Türkiye, Konya City Hospital, Clinic of Surgery, Konya, Türkiye
E-mail: drasahin@gmail.com, alpaslan.sahin@sbu.edu.tr **ORCID ID:** orcid.org/0000-0001-5707-1203
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determining the optimal surgical approach, particularly with regard to the tumor's relationship to the S3 vertebral level. Lesions located below S3 are generally amenable to a posterior approach, whereas tumors extending above this level may require anterior or combined surgical access.[3,8]

Given the rarity of retrorectal tumors and the continued reliance on institutional experience for clinical decision-making, well-documented case series remain valuable for guiding surgical management. The present study presents our single-center experience with surgically treated retrorectal tumors, with particular emphasis on the role of preoperative imaging in guiding the choice of surgical approach.

Materials and Methods

Study Design

This retrospective observational study was conducted between September 2016 and September 2025 in the department of general surgery of a tertiary referral hospital. The study protocol was approved by the institutional Ethics Committee of University of Health Science Türkiye, Ankara Etlik City Hospital (decision no: 2025-662, dated: 18.11.2025), and the requirement for written informed consent was waived. The conduct and reporting of this study adhered to the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines.[9]

Patient Selection

Adult patients who underwent surgical treatment for a primary retrorectal tumor during the study period were included. Eligibility required radiologic suspicion of a retrorectal lesion and definitive surgical resection. Patients with secondary retrorectal involvement, tumors originating from non-presacral structures, or those managed without surgery were excluded. Consecutive cases were identified to ensure an unselected cohort. The patient selection process is illustrated in a STROBE flow diagram (Figure 1).

Bias

Given the retrospective design, selection bias is inherent. However, consecutive case inclusion and standardized imaging-based surgical planning were employed to minimize systematic bias.

Preoperative Assessment

All patients underwent standardized preoperative evaluation using cross-sectional imaging. MRI served as the primary modality for lesion characterization, enabling assessment of tumor size, morphology, and the relationship to adjacent pelvic structures. Computed tomography was used selectively when additional evaluation of bony anatomy was required. Endoanal ultrasound was performed selectively to assess the relationship between the lesion and the anal sphincter complex.

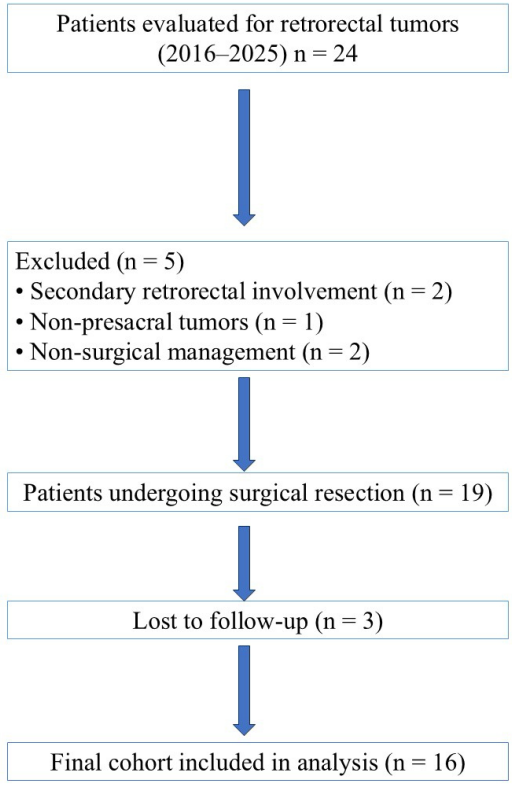

Figure 1. STROBE flow diagram of patient selection for the study cohort

Preoperative biopsy was not routinely performed because of its limited diagnostic yield in heterogeneous or cystic presacral lesions and the potential risks of infection or tumor seeding. None of the patients had undergone biopsy prior to referral to our institution. The final diagnosis was established by histopathologic examination of the resected specimens.

Surgical Management

The surgical approach was determined by tumor location and extent, with particular attention to its relationship to the S3 vertebral level. Lesions confined below this level were preferentially managed using a posterior approach, whereas tumors extending cranially were treated using anterior or combined approaches. In all cases, the operative goal was complete tumor excision while preserving neurologic function and pelvic organ integrity.

The anterior approach was performed using open or laparoscopic techniques at the surgeon's discretion. In laparoscopic procedures, the rectum was mobilized to expose the presacral space, and the lesion was dissected along embryologic planes with careful preservation of the pelvic vessels, ureters, and autonomic nerves.

For the posterior approach (Kraske procedure), patients were placed in the prone jackknife position to allow direct access to the retrorectal space. Coccygectomy was performed when

necessary to facilitate exposure. In combined procedures, anterior mobilization was followed by posterior resection to achieve en bloc tumor removal. When required for adequate exposure or complete resection, additional procedures such as partial sacrectomy and reconstruction were performed in collaboration with orthopedic spine surgeons.

Postoperative follow-up consisted of regular clinical assessment and radiologic surveillance. MRI was the primary modality used to detect recurrence when clinically indicated.

Outcome Measures and Data Collection

The primary outcome was complete tumor excision with negative histopathologic margins (R0 resection). Secondary outcomes included postoperative complications, length of hospital stay, operative time, final histopathologic diagnosis, and tumor recurrence during follow-up.

Clinical, radiologic, operative, and pathologic data were collected retrospectively from institutional medical records, operative reports, imaging archives, and pathology databases using a standardized data abstraction process. Postoperative follow-up consisted of regular clinical assessment and radiologic surveillance, primarily using MRI when clinically indicated.

Statistical Analysis

Statistical analysis was performed to provide a descriptive summary of patient demographics, tumor characteristics, surgical approaches, and clinical outcomes. Continuous variables were examined descriptively and are reported as means with standard deviations and ranges, reflecting the non-normal distribution typically observed in small retrospective cohorts. Categorical variables are presented as frequencies and percentages. Given the retrospective design and limited sample size, no formal hypothesis testing or multivariable modeling was pursued to avoid overinterpretation of the data. Analyses were conducted using available-case methodology, as missing data were infrequent and nonsystematic. All statistical analyses were performed using SPSS software (version 22.0; IBM Corp., Armonk, NY, USA).

Results

A total of 16 patients who underwent surgical treatment for retrorectal tumors during the study period were included in the analysis. The mean age was 48.3±14.2 years (range: 33-67 years), and the majority of patients were women (68.8%). Demographic characteristics, clinical presentation, and radiologic findings are summarized in Table 1.

Clinical presentation was variable. Pelvic or perineal pain was the most common symptom, reported in 43.8% of patients, whereas 25.0% of patients were asymptomatic at the time of diagnosis. Other presenting features included a perineal mass, constipation, and urinary dysfunction. MRI was performed in all patients as the primary diagnostic modality, whereas computed tomography and endoanal ultrasound were used selectively. A retrorectal mass was detected on digital rectal examination in 87.5% of patients (Table 1).

Tumor location, surgical approach, and perioperative outcomes are summarized in Table 2. Most tumors were located below the S3 vertebral level (68.8%). Accordingly, a posterior surgical approach was most frequently employed (56.3%), followed by anterior (25.0%) and combined approaches (18.7%). Lesions located below the S3 level were predominantly managed using a posterior approach, whereas tumors extending above this level more often required anterior or combined access. The median tumor size was 6 cm (range: 2-12 cm), and the mean operative time was 165±95 minutes (range: 70-360 minutes). Macroscopically complete tumor excision was achieved in all patients, with selective use of reconstructive techniques when required (Figure 2). Histopathologic examination demonstrated negative margins (R0 resection) in 15 patients, whereas one chordoma case had a microscopically positive margin (R1).

Table 1. Demographic characteristics and clinical-radiologic features of patients with retrorectal tumors

Variable	Value
Age (years)	48.3±14.2 (33-67)
Female/male ratio	11/5
Body mass index (kg/m^2)	29.5±4.4
ASA physical status class	
I-II	14 (87.5)
III-IV	2 (12.5)
Clinical presentation	
Pelvic or perineal pain	7 (43.8)
Perineal mass	3 (18.8)
Constipation	2 (12.5)
Urinary dysfunction	2 (12.5)
Asymptomatic	4 (25.0)
Radiologic evaluation	
MRI	16 (100)
CT	6 (37.5)
Endoanal ultrasound	2 (12.5)
Mass detected on digital rectal examination	14 (87.5)

Data are presented as mean ± standard deviation (range), number (%), or ratio

ASA: American Society of Anesthesiologists

Some patients experienced more than one perioperative complication. Complications were recorded on an event basis. Intraoperative complications occurred in seven patients, with cyst rupture being the most common intraoperative event (25.0%), followed by pelvic bleeding (12.5%) and rectal injury (6.3%). Cyst rupture was documented as an intraoperative event because of its potential impact on operative difficulty and postoperative management. Pelvic bleeding was controlled intraoperatively without the need for transfusion, and rectal injury was recognized during surgery and repaired primarily without subsequent leakage or major morbidity. Postoperative complications were observed in seven patients and were classified according to the Clavien-Dindo system as grade I in four patients, grade II in two patients, and grade III in one patient, which consisted of a postoperative pelvic collection requiring percutaneous drainage. The mean postoperative length of hospital stay was 8.6±9.4 days (range: 3-43 days). There was no postoperative 30-day mortality. Ninety-day readmission occurred in two patients (12.5%), and tumor recurrence was observed in one patient during follow-up (Table 2).

Histopathologic diagnoses and resection margin status are presented in Table 3. Congenital lesions constituted the majority of cases, including dermoid cysts, epidermoid cysts, tailgut cysts, and mature teratomas (Figure 3). Malignant tumors were identified in five patients (31.2%), all of which were chordomas (Figure 4). Negative histopathologic margins (R0 resection) were achieved in 15 patients. One patient with

Table 2. Tumor characteristics, surgical approach, and perioperative outcomes

Variable	Value
Tumor location	
Below S3	11 (68.8)
Above S3	5 (31.2)
Surgical approach	
Posterior	9 (56.3)
Anterior	4 (25.0)
Combined	3 (18.7)
Tumor size (cm)	6 (2-12)
Operative time (min)	165±95 (70-360)
Intraoperative complications	
Cyst rupture	4 (25.0)
Pelvic bleeding	2 (12.5)
Rectal injury	1 (6.3)
Postoperative complications (Clavien-Dindo)	
Grade I	4 (25.0)
Grade II	2 (12.5)
Grade III	1 (6.3)
Postoperative length of hospital stay (days)	8.6±9.4 (3-43)
Postoperative 30-day mortality	0
90-day readmission	2 (12.5)
Recurrence	1 (6.3)
Follow-up (months)	36 (12-96)

Data are presented as mean ± standard deviation (range), median (min-max), or number (%). Some patients experienced more than one complication

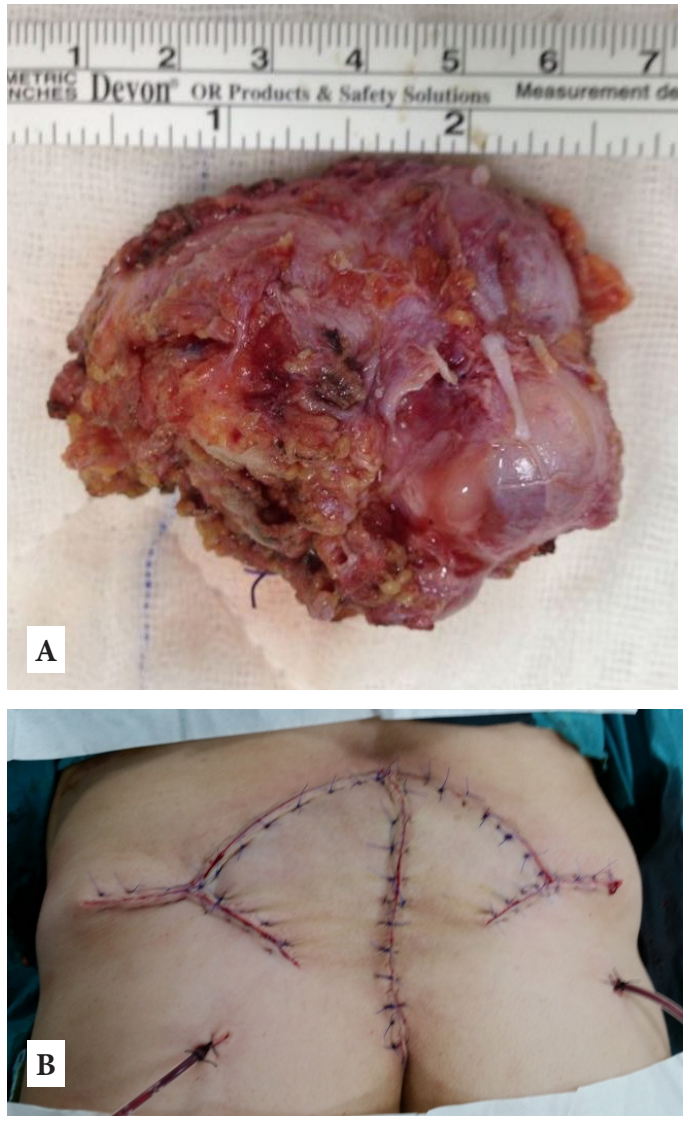

Figure 2. Surgical specimen and reconstruction following retrorectal tumor excision. Representative operative images showing (A) macroscopic specimen of a resected tailgut cyst and (B) postoperative reconstruction following en bloc chordoma excision using a V-Y advancement flap

chordoma had a microscopically positive margin (R1 resection) and subsequently underwent postoperative radiotherapy, later developing local recurrence during follow-up. The median follow-up duration was 36 months (range: 12-96 months).

Discussion

Retrorectal tumors remain among the most diagnostically and surgically demanding entities in colorectal surgery because of their rarity, embryologic heterogeneity, and anatomically concealed location. Although uncommon, these lesions carry substantial clinical significance, as delayed diagnosis or inadequate management may result in local invasion, malignant transformation, or long-term functional morbidity. In keeping with both early descriptions and contemporary series, the present cohort demonstrated a predominance of middle-aged female patients, confirming demographic patterns that have been consistently reported across different populations and healthcare systems.[1-4]

The histopathologic distribution observed in this study closely parallels that reported in large reviews and institutional series, in which congenital lesions account for the majority of retrorectal tumors.[2,5,6] Developmental cysts, including dermoid, epidermoid, and tailgut cysts, represented the most common benign entities in our cohort, consistent with findings from contemporary single-center and multicenter studies.[7,8,10,11] Notably, malignant tumors constituted nearly one-third of cases in the present series. Although this proportion exceeds that reported in several contemporary cohorts, it remains consistent with pooled estimates from systematic reviews and may reflect referral bias in tertiary centers managing more complex disease.[12,13] Recent evidence also suggests that the risk of malignant transformation in tailgut cysts may be

Table 3. Histopathologic findings and resection margin status

Histopathologic diagnosis	No. (%)	Benign/malignant	Negative margin (n)	Positive margin (n)
Congenital lesions				
Epidermoid cyst	2 (12.5)	Benign	2	0
Dermoid cyst	4 (25.0)	Benign	4	0
Tailgut cyst	2 (12.5)	Benign	2	0
Mature teratoma	3 (18.8)	Benign	3	0
Malignant tumors				
Chordoma	5 (31.2)	Malignant	4	1 (microscopic +)

Data are presented as number (%)

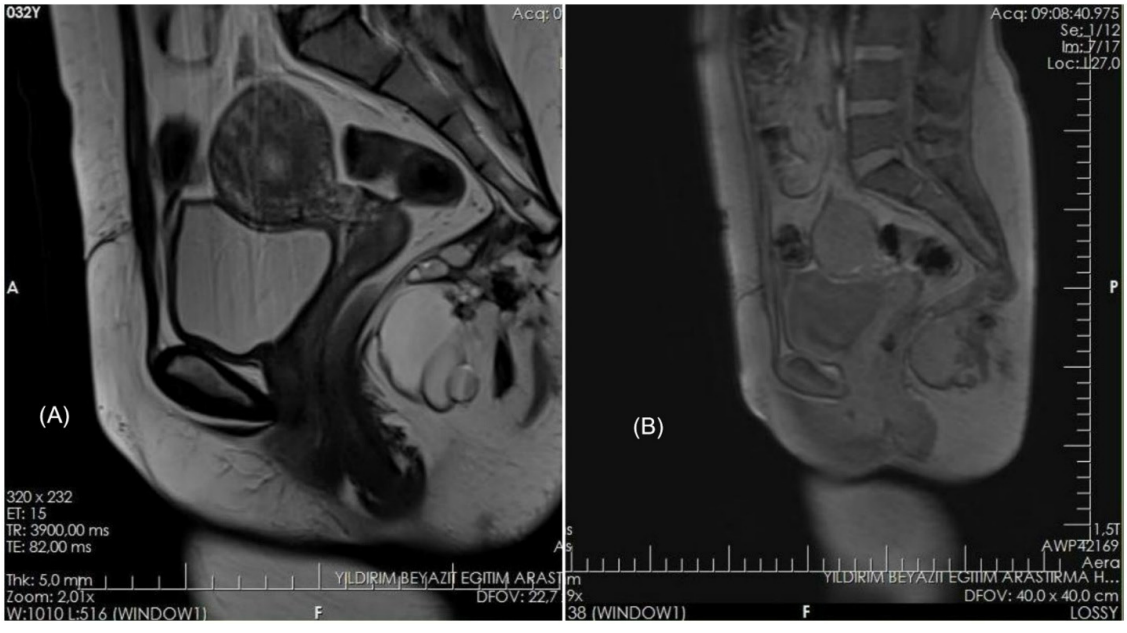

Figure 3. Magnetic resonance imaging features of a tailgut cyst. Representative sagittal MRI images demonstrating a retrorectal tailgut cyst. (A) T1-weighted image. (B) T2-weighted image
MRI: Magnetic resonance imaging

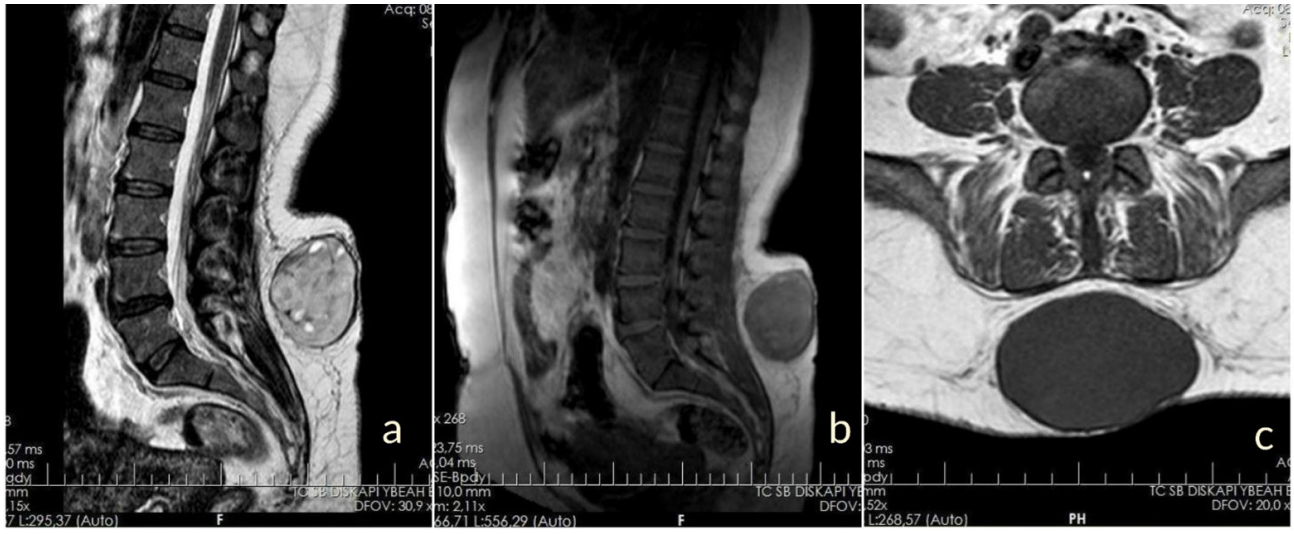

Figure 4. Magnetic resonance imaging features of a retrorectal chordoma. Representative pelvic MRI images demonstrating imaging characteristics of a retrorectal chordoma. (A) T1-weighted sagittal image. (B) T2-weighted sagittal image. (C) Axial image
MRI: Magnetic resonance imaging

higher than previously assumed, with rates exceeding 25% in systematic analyses, supporting the need for complete oncologic excision even in lesions presumed to be benign.[12] Although routine preoperative biopsy is generally discouraged because of the risks of infection, tumor seeding, and limited diagnostic yield in cystic lesions, some centers advocate a selective biopsy strategy in cases with radiologic suspicion of malignancy to guide multidisciplinary treatment planning. The relatively high proportion of malignant tumors in our cohort, together with the achievement of negative margins in most chordoma cases, likely reflects referral patterns to tertiary centers managing more complex retrorectal disease and provides additional insight into the surgical management of malignant retrorectal tumors.

Preoperative evaluation plays a pivotal role in guiding management strategies. In the present study, MRI served as the primary diagnostic modality, enabling accurate assessment of tumor extent, sacral involvement, and relationships with adjacent pelvic structures. This image-based approach is strongly supported by existing literature, which consistently identifies MRI as the most informative modality for preoperative planning.[4] In a dedicated analysis of preoperative assessment, Sagar et al.[14] demonstrated that cross-sectional imaging accurately discriminated benign from malignant retrorectal tumors in the vast majority of cases, whereas preoperative biopsy did not alter surgical strategy or clinical decision-making.[14] In contrast, the role of preoperative biopsy has progressively diminished. Multiple studies have demonstrated that biopsy provides limited diagnostic benefit in resectable retrorectal tumors and carries meaningful risks, including infection, fistula formation, and tumor seeding, particularly in cystic lesions.[2,3,7,10]

Selection of the surgical approach remains a central determinant of perioperative outcomes and long-term disease control. In our cohort, the operative strategy was primarily guided by tumor location relative to the S3 vertebral level, in accordance with well-established anatomical principles. Posterior approaches predominated, reflecting the high prevalence of lesions confined below S3, whereas anterior or combined approaches were reserved for tumors extending cranially or involving adjacent structures. This strategy aligns closely with operative paradigms described in major series and reviews, which emphasize posterior access for lesions located below the S3 level.[2,3,7,14-16] As summarized in Table 4, posterior access remains the most frequently employed approach across contemporary cohorts, although its utilization varies according to tumor characteristics and institutional expertise. The comparisons presented in Table 4 should be interpreted as descriptive rather than statistical, given the differences in study design, sample size, and tumor composition across the available series. Rather than proposing a novel surgical technique, the present study illustrates the practical application of established anatomical principles in surgical decision-making for retrorectal tumors and highlights the value of preoperative imaging in determining the most appropriate operative approach. The wide variation in operative time likely reflects differences in tumor size, anatomical extent, and the need for combined surgical approaches in selected cases.

When contextualized within the broader literature, the perioperative outcomes observed in the present study are largely comparable to those reported in modern series. Although the overall complication rate in our cohort appears higher than that reported in some larger studies, such as those by Gould et al.[15] and Broccard et al. [10], this difference

Table 4. Summary of published surgical series on retrorectal tumors

Study	Year	Study type	No. of patients	Malignant tumors (%)	Posterior approach (%)	Anterior or combined (%)	Complication rate (%)	Recurrence (%)	Follow-up (months)
Baek et al.[2]	2016	Systematic review	1,708	30	52	48	13.2	21.6	30
Yalav et al.[7]	2020	Retrospective	20	15	70	30	35	5	53.8±40
Carpelan-Holmström et al.[8]	2020	Retrospective	52	8	85	15	21	27	39.6
Li and Lu[11]	2021	Retrospective	31*	25.8	83.9	16.1	22.6	37.5	25
Gould et al.[15]	2021	Retrospective	107*	15.9	60	40	6	7	12
Broccard et al.[10]	2022	Retrospective	73	8.2	76.7	23.3	17.8	5	40.8
Present study	2025	Retrospective	16	31.2	56.3	43.7	43.8	6.3	36

Data are presented as number, percentage, mean ± standard deviation, or median as reported in the original studies. NR: not reported. Complication rates may vary across studies due to differing definitions. *Calculated based on surgically treated patients only.

likely reflects the inclusion of minor (Clavien-Dindo grades I-II) events, variations in complication definitions, and the limited sample size.[8] Importantly, most complications were low grade and did not result in prolonged morbidity. In addition, events such as cyst rupture were recorded as intraoperative complications in this study, which may contribute to a higher overall rate than that observed in series using different reporting criteria. The relatively high complication rate may also reflect referral patterns of a tertiary center managing more complex retrorectal tumors. Postoperative outcomes and recurrence were assessed through routine clinical evaluation and radiologic follow-up, primarily using MRI when clinically indicated.

Long-term outcomes following retrorectal tumor resection are closely linked to the achievement of complete excision with negative margins, particularly in malignant disease. In the present cohort, margin positivity was limited to a single case of chordoma, a tumor type well recognized for its locally aggressive behavior and propensity for recurrence despite technically adequate surgery.[3,10] Across published series, recurrence rates vary widely, ranging from <5% to >30%, with higher rates typically observed in cohorts enriched with malignant tumors or multiloculated cystic lesions.[8-10] As illustrated in Table 4, the relatively low recurrence rate observed in this study compares favorably with those reported in similar single-center cohorts and supports the importance of careful surgical planning and en bloc excision.

The role of minimally invasive techniques in the management of retrorectal tumors continues to evolve. Although open surgery constituted the predominant approach in our cohort, accumulating evidence suggests that laparoscopic and robotic techniques may achieve comparable oncologic outcomes with reduced hospital stays in carefully selected patients.[13,15] Nevertheless, given the rarity and heterogeneity of these tumors, minimally invasive approaches should be reserved for centers with advanced expertise and should never compromise the fundamental objective of complete tumor excision.

Study Limitations

Several limitations of this study should be acknowledged. First, the retrospective design and relatively small sample size reflect the inherent rarity of retrorectal tumors and are consistent with most published series. The extended study period may also introduce variability related to advances in imaging, surgical techniques, and perioperative care. Second, the histopathologic heterogeneity of retrorectal tumors should be considered when interpreting the findings. These lesions encompass a wide spectrum of congenital, benign, and malignant entities with distinct biological behaviors and recurrence patterns. In the present study, different tumor subtypes were analyzed together because the primary objective was to describe surgical management and approach selection based on anatomical considerations rather than to compare oncologic outcomes between specific tumor types. In addition, functional outcomes such as bowel, urinary, and sexual function were not systematically documented in the medical records; therefore, they could not be evaluated. Furthermore, the median follow-up duration of 36 months may be insufficient to fully capture late recurrences, particularly for malignant tumors such as chordomas. Future prospective studies with standardized data collection may allow for a more comprehensive characterization of patients and postoperative recovery.

Conclusion

In conclusion, retrorectal tumors require a tailored, anatomy-driven surgical strategy supported by high-quality imaging and multidisciplinary expertise. Complete surgical excision remains the cornerstone of management for both benign and malignant lesions. Viewed alongside contemporary evidence, these findings further support anatomy-based surgical decision-making in specialized centers.

Ethics

Ethics Committee Approval: This study was approved by the Ethics Committee of Ankara Etlik City Hospital (decision no: 2025-662, date: 18.11.2025).

Informed Consent: The requirement for written informed consent was waived due to the retrospective use of de-identified patient data.

Footnotes

Authorship Contributions

Surgical and Medical Practices: E.Ö., Concept: E.Ö., A.Ş., Design: E.Ö., A.Ş., Data Collection or Processing: E.Ö., Analysis or Interpretation: E.Ö., A.Ş., Literature Search: E.Ö., A.Ş., Writing: E.Ö., A.Ş.

Conflict of Interest: The authors declare no conflict of interest.

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RESEARCH ARTICLE

High Diagnostic Yield of Colonoscopy in Symptomatic Adults Aged Under Fifty Years: Missed Opportunities for Early Detection of Colorectal Cancer in Southeast Asia

Muhammad Irfan bin Mohamad Salmi, Fatimah Nabilah binti Zainal Abidin, Azmi Mohamad Nor, Faisal Elagili

International Islamic University Malaysia, Colorectal Unit, Department of Surgery, Kuantan, Malaysia

ABSTRACT

Aim: Despite the global rise in young-onset colorectal cancer (CRC), data on the diagnostic yield of colonoscopy in symptomatic adults aged <50 years remain scarce. This study evaluates colonoscopic findings and identifies predictors of clinically significant pathology in this cohort.

Method: This retrospective study included symptomatic adults aged 18-49 years who underwent colonoscopy between January 2017 and June 2023 at a Malaysian tertiary referral center. Clinical, endoscopic, histopathological, and complication data were analyzed. Univariate analysis identified predictors of clinically significant pathology, defined as CRC, adenomas (including advanced adenomas), histologically confirmed inflammatory bowel disease (IBD), or diverticulosis, whereas hyperplastic polyps, hemorrhoids, and non-specific colitis were considered non-significant.

Results: Among the 397 patients included (mean age 37±8 years; 51% women), the most common indications were altered bowel habits (n=178), abdominal pain (n=126), and rectal bleeding (n=149). Clinically significant pathology was identified in 15.9% of patients, comprising CRC (3.3%), adenomas (5.8%), IBD (2.8%), and diverticulosis (4.0%). Hyperplastic polyps (8.8%) were excluded from clinically significant pathology and reported separately. Rectal bleeding odds ratio (OR) 2.29, 95% confidence interval (CI) 1.22-4.30; p=0.009, weight loss (OR 4.87, 95% CI 1.49-15.87; p=0.009), and altered bowel habits (OR 1.95, 95% CI 1.07-3.56; p=0.03) were independent predictors. No major procedural complications were observed. The adenoma detection rate was 5.8%, and the colonoscopy completion rate was 81.4%, with incomplete procedures mainly due to looping, obstructing lesions, or poor bowel preparation.

Conclusion: A substantial proportion of symptomatic adults aged <50 years demonstrate clinically significant pathology. These findings support prioritized, symptom-based referral for early colonoscopy rather than universal screening in this age group but require validation in prospective multicenter studies.

Keywords: Colonoscopy, colorectal neoplasms, young colorectal cancer

Introduction

Colorectal cancer (CRC) is among the three most common malignancies worldwide, with nearly two million new cases and over 900,000 deaths annually.[1] Although traditionally considered a disease of older adults, there has been a consistent global increase in young-onset CRC (YOCRC), defined as a diagnosis when aged <50 years.[2] Meta-analyses document rising trends across Europe and North America and increasingly in the Asia-Pacific regions.[3,4]

YOCRC frequently presents with red-flag symptoms, such as rectal bleeding, altered bowel habits, abdominal pain, iron-deficiency anemia, and unintentional weight loss.[7,8] Younger patients often have a low suspicion of cancer, which may contribute to delays in seeking medical attention.[5] Diagnostic delays ranging from 7 weeks to >2 years have been reported, often due to misattribution of symptoms to benign conditions, such as hemorrhoids or irritable bowel syndrome.[7,9] These delays may result in advanced-stage diagnosis, poorer survival outcomes, and more complex surgical management.[2,8]

Despite the rising incidence, data on colonoscopic yield among symptomatic young adults in Southeast Asia remain limited. Identifying predictors of clinically significant pathology is essential to refine triage and referral strategies. This study

Address for Correspondence: Faisal Elagili, International Islamic University Malaysia, Colorectal Unit, Department of Surgery, Kuantan, Malaysia
E-mail: elagili2009@gmail.com **ORCID ID:** orcid.org/0009-0000-4179-7288
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retrospectively examines symptomatic adults aged 18-49 years undergoing colonoscopy at a Malaysian tertiary center, analyzing clinical presentations, colonoscopic and histopathological findings, and associated predictors.

Materials and Methods

A retrospective observational study at a tertiary referral center in Malaysia, which served a mixed urban and semi-rural population, was conducted. Adults aged 18-49 years undergoing colonoscopy for symptomatic indications between January 2017 and June 2023 were included. Exclusion criteria were screening colonoscopy, post-polypectomy surveillance, and inflammatory bowel disease (IBD) follow-up.

Ethics approval was obtained from the International Islamic University Malaysia (IIUM) Research Ethics Committee with reference number: IIUM/504/14/11/2/ IREC 2023-119, date: 21.08.2023.

Data, including demographics, presenting symptoms, colonoscopic findings, interventions, and complications, were extracted from electronic medical records and endoscopy reports. Clinically significant pathology was defined as CRC, adenomas (including advanced adenomas), histologically confirmed IBD, and diverticulosis. Hyperplastic polyps, hemorrhoids, and non-specific colitis were classified as non-significant findings and excluded from the primary outcome analysis. Red flag symptoms included rectal bleeding, weight loss, persistent altered bowel habits (>6 weeks), and anemia.

Statistical Analysis

Continuous variables were summarized as mean ± standard deviation, and categorical variables were presented as frequencies/percentages. Univariate analysis was performed using the chi-square test or Fisher's exact test, as appropriate. Multivariable analysis was not performed due to the limited number of events and the retrospective nature of the study. Odds ratios (ORs) with 95% confidence intervals (CIs) were reported; significance was set at $p<0.05$. Analyses were performed using SPSS version 29.

Results

A total of 397 symptomatic patients met the inclusion criteria. The mean age was 37 years; 57% were aged <40 years, and 51% were women. Most patients were Malay (97%), broadly reflecting the local demographic composition,[10] with a low comorbidity burden (Charlson index 0-2 in 98%). A family history of CRC was present in 3% of patients.

Among the 397 patients, a total of 482 presenting symptoms were recorded. The most common symptoms were altered bowel habits (n=178), rectal bleeding (n=149), abdominal pain (n=126), anemia (n=16), and weight loss (n=13). Eighteen percent of patients reported more than one red-flag symptom; therefore, symptoms were analyzed individually.

Colonoscopy completion (cecal intubation) was achieved in 81.4%, and the adenoma detection rate was 5.8% (Table 1). Among the 74 incomplete colonoscopies, the most common causes were bowel tortuosity and looping (35%), obstructing lesions (22%), severe pain (22%), and poor bowel preparation (17%).

Following an incomplete colonoscopy, 15 patients (20%) required a repeat procedure, and another 10 (14%) underwent computed tomography imaging. Two extracolonic malignancies were detected on CT, and the remainder were benign or normal findings. Among patients with obstructing lesions, most had colorectal adenocarcinoma. One was treated palliatively, and the rest underwent either surgery or neoadjuvant chemotherapy followed by surgery. The

Table 1. Demographic and clinical characteristics for symptomatic patients who underwent diagnostic colonoscopy (n=397)

Variables	n (%)
Age (years)	
Mean	37 (±8)
<40	226 (57)
>40	171 (43)
Ethnicity	
Malay	385 (97)
Gender	
Female	202 (51)
Charlson Comorbidity Index	
Mild (0-2)	388 (98)
Moderate (3-4)	7 (2)
Severe (5-6)	2 (0.5)
Family history of colorectal cancer	10 (3)
Indication	
Altered bowel habit	178
Per rectal bleeding	149
Abdominal pain	126
Anaemia	16
Unexplained loss weight	13
Incomplete colonoscopy	74 (19)
Diagnostic yield positive	113 (28)
Finding	
Colorectal cancer	13 (3.3)
Advanced adenoma	3 (0.8)
Tubular adenoma-low grade dysplasia	20 (5)
Hyperplastic polyp	34 (8.8)
Inflammatory bowel disease	11 (2.8)
Colitis	24 (6)
Solitary rectal ulcer	7 (1.8)
Diverticulum	16 (4)
Neuroendocrine tumour of rectum	2 (0.5)
Haemorrhoid	87 (22)

remaining 36 (48%) patients either declined further work-up or defaulted on follow-up (Table 2).

Clinically significant findings were detected in 15.9% of cases, with CRC (13 cases, 3.3%), adenomas (23 cases, 5.8%), IBD (11 cases, 2.8%), and diverticulosis (4%). Rectal bleeding (OR 2.29; 95% CI 1.22-4.30; p=0.009), weight loss (OR 4.87; 95% CI 1.49-15.87; p=0.009), and altered bowel habits (OR 1.95; 95% CI 1.07-3.56; p=0.03) were independent predictors of significant findings. No major complications were recorded (Table 3).

The 13 patients (3.3%) diagnosed with CRC were analyzed; 10 (77%) were aged 45-49 years, and the majority were women (n=9). Most tumors were located in the left colon and rectum. Importantly, 9 of the 13 patients (69%) were diagnosed at Stage III or IV, and 6 patients (46%) had distant metastases at diagnosis, most commonly to the liver, peritoneum, or ovary (Table 4).

Table 2. Sequelae of incomplete colonoscopy in young symptomatic patients (n=74)

Additional procedure	n (%)	Outcome
Re-colonoscopy	15 (20)	10 Normal findings 3 Diverticulum 1 Benign polyp 1 Colitis
CT abdomen/colonography	10 (14)	3 Normal findings 2 Malignancy -extracolonic 2 Diverticulum 1 Benign polyp 1 Tuberculosis gut 1 Symptomatic gall stone
Surgery/chemotherapy/ palliation	13 (18)	-
Defaulted/refusal investigation	36 (48)	-

CT:

Discussion

This study demonstrates a substantial diagnostic yield of colonoscopy in symptomatic adults aged <50 years, with 15.9% exhibiting clinically significant pathology (CRC, adenomas, IBD, diverticulosis). Given the small number of CRC cases, the model evaluates predictors of overall clinically significant pathology rather than CRC-specific outcomes. CRC was detected in 3.3%, or >28% of the clinically significant findings. Although a high proportion presented at advanced stages consistent with late YOCRC patterns globally, causal inference regarding diagnostic delay cannot be established due to the absence of time-to-diagnosis data.[2,8]

Predictor analysis showed that rectal bleeding and weight loss were significantly associated with pathology findings, supported by prior reports showing hematochezia in 46%, weight loss in 10%, and anemia in 13% of cases.[7,8,11,12] These symptoms remain critical red flags, particularly given that most affected patients lack family history or known genetic syndromes.[7,11]

Importantly, this cohort represents a symptomatic tertiary referral population rather than a screening cohort, which likely reflects the lower colonoscopy completion rate compared with international benchmarks. The colonoscopy completion rate (81.4%) was below recommended standards. This may reflect real-world procedural challenges, including poor bowel preparation, obstructing lesions, and patient-related factors. Recent machine-learning models using real-world data have also highlighted the potential value of clinical variables for early-onset CRC risk prediction.[13]

Incomplete colonoscopy and high default rates (48%) represent a substantial source of potential bias and may lead to underestimation of proximal pathology. Multivariate analysis has demonstrated globally similar findings where poor bowel preparation, obstructing lesions, and pain significantly affect colonoscopy completion.[14]

Table 3. Logistic regression analysis between symptoms and positive diagnostic yield from colonoscopy in young symptomatic patients

	Histological findings			Univariate analysis	
Symptoms	Colorectal cancer n (%)	Advanced adenoma n (%)	Tubular adenoma low grade dysplasia n (%)	Odds ratio (95% CI)	p-value
Altered habit (n=178)	6 (3)	1 (0.5)	8 (4)	1.95 (1.07-3.56)	0.03
Per-rectal bleeding (n=149)	3 (2)	2 (1)	10 (7)	2.29 (1.23-4.28)	0.009
Anaemia (n=16)	2 (13)	0	0	1.67 (0.47-5.92)	0.43
Weight loss (n=13)	2 (15)	0	1 (7)	4.87 (1.47-16.05)	0.009
Abdominal pain (n=126)	6 (5)	0	5 (4)	1.55 (0.85-2.82)	0.16

Cl:

Table 4. Demographic young symptomatic patient with CRC

Age	Gender	Location	Staging	Metastasis Location
30	Female	Sigmoid	Stage 3	
36	Female	Rectum	Stage 4	Spleen
39	Male	Rectosigmoid	Stage 3	
46	Female	Rectum	Stage 4	Ovary
46	Female	Sigmoid	Stage 4	Peritoneal
47	Female	Descending	Stage 3	
47	Male	Rectosigmoid	Stage 3	
48	Female	Splenic Flexure	Stage 3	
49	Female	Sigmoid	Stage 4	Liver, lung and bone
49	Female	Rectosigmoid	Stage 2	
38	Male	Caecum	Stage 4	Liver and lung
45	Male	Rectum	Stage 3	
46	Male	Rectosigmoid	Stage 1	

CRC: Colorectal cancer

The regression model was intentionally parsimonious to avoid overfitting, given the retrospective design and limited number of CRC events. The results are consistent with previous meta-analyses demonstrating a higher diagnostic yield among symptomatic patients.[6]

The predominantly Malay cohort reflects local demographics; however, this may limit generalizability to more diverse populations. Malays form approximately 80% of the city population, and the center is a semi-government hospital providing subsidized care for government officials, who are mostly Malays.[10]

Study Limitations

Limitations include the retrospective design and single-center setting, which may affect generalizability, though the sizeable cohort and histopathological confirmation strengthen the results. Prospective, multicenter studies across Southeast Asia are needed to validate these findings, assess screening or triage models, and explore integration of emerging risk stratification tools, such as machine learning models using symptoms and basic laboratories.[3,9,13]

Conclusion

Colonoscopy in symptomatic adults aged <50 years demonstrates a meaningful diagnostic yield. Rectal bleeding and weight loss strongly predict positive findings and should prompt early referral. These findings support symptom-based referral strategies but should not be extrapolated to population-level screening without further prospective multicenter validation.

Ethics

Ethics Committee Approval: Ethics approval was obtained from the International Islamic University Malaysia (IIUM) Research Ethics Committee with reference number: IIUM/504/14/11/2/ IREC 2023-119, date: 21.08.2023.

Informed Consent: This is retrospective study and data was retrieved using electronic medical record with no intervention from the study, thus no consent was taken from patient.

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Footnotes

Authorship Contributions

Surgical and Medical Practices: M.I.M.S., F.N.Z.A., A.M.N., F.E., Concept: F.N.Z.A., A.M.N., F.E., Design: F.N.Z.A., A.M.N., F.E., Data Collection or Processing: F.N.Z.A., A.M.N., F.E., Analysis or Interpretation: M.I.M.S., F.N.Z.A., F.E., Literature Search: M.I.M.S., F.N.Z.A., F.E., Writing: M.I.M.S., F.N.Z.A., A.M.N., F.E.

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RESEARCH ARTICLE

Endoluminal Vacuum Therapy for Anastomotic Leakage Following Rectal Cancer Resection: A Retrospective Case Series

Abdullah Güneş, Ömer Akay, Murat Özdamar

University of Health Sciences Türkiye, Kocaeli City Hospital, Clinic of General Surgery, Kocaeli, Türkiye

ABSTRACT

Aim: Anastomotic leakage (AL) remains one of the most serious complications following rectal cancer surgery, particularly in low rectal anastomoses. Endoluminal vacuum therapy (EVT) has emerged as a minimally invasive treatment option aimed at controlling pelvic sepsis and preserving the anastomosis. This study aimed to evaluate the clinical outcomes, safety, and feasibility of EVT in the management of AL following rectal cancer resection.

Method: A retrospective two-center case series was conducted between January 2020 and December 2025, including patients who developed AL following rectal cancer surgery and were treated with EVT. Clinically stable patients without generalized peritonitis were included, whereas patients requiring emergency surgical intervention were excluded. Demographic characteristics, leakage features, EVT-related variables, treatment outcomes, and complications were analyzed.

Results: A total of 13 patients were included in the study. The mean age was 57.7±12.3 years, and all patients had a protective diverting stoma at the time of EVT initiation. AL was diagnosed at a median of 10 postoperative days (range, 6-115), with most leaks located in low rectal anastomoses (mean leak level: 4.7±1.8 cm from the anal verge); EVT was initiated at a median of 12 postoperative days (range, 8-120). The median number of EVT sessions was three (range, 2-6), and the median time to clinical healing was 16 days (range, 12-34). Clinical resolution of AL was achieved in 12 patients, resulting in an overall success rate of 92.3%; EVT-related complications occurred in 2 patients (15.4%), including one anastomotic stricture, successfully managed with endoscopic balloon dilatation, and one rectovaginal fistula, which required a Hartmann procedure and was considered a treatment failure. No pelvic abscess was observed. Diverting ileostomies were closed 1 month after confirmed healing in all eligible patients.

Conclusion: EVT appears to be a promising and feasible minimally invasive treatment option for AL following rectal cancer surgery, particularly in carefully selected clinically stable patients with low rectal anastomoses. The high success rate, acceptable morbidity, and low need for reoperation suggest that EVT may represent a valuable anastomosis-preserving strategy. Larger prospective studies are needed to better define optimal patient selection and treatment timing.

Keywords: Endoluminal vacuum therapy, anastomotic leakage, rectal cancer, case series, colorectal surgery

Introduction

Rectal cancer remains a major global health burden in terms of incidence, morbidity, and mortality.[1] Surgical resection continues to represent the cornerstone of curative treatment for rectal cancer[2]; however, it is associated with a substantial risk of postoperative complications. Anastomotic leakage (AL) and other colorectal defects, such as Hartmann's stump leakage, represent some of the most serious complications following rectal cancer resection and are associated with significant morbidity and mortality.[3] In rectal cancer surgery, the reported incidence of AL varies according to the level of the anastomosis, ranging from 6% to 30%, with an average incidence of approximately 11%.[3] Despite advances in surgical techniques, perioperative care, and neoadjuvant treatment strategies, the incidence of AL remains unacceptably high. AL is associated

Address for Correspondence: Abdullah Güneş, MD, University of Health Sciences Türkiye, Kocaeli City Hospital, Clinic of General Surgery, Kocaeli, Türkiye
E-mail: apogunes@hotmail.com **ORCID ID:** orcid.org/0000-0003-3755-1749
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with prolonged hospital stay, increased rates of reoperation, impaired functional outcomes, and adverse oncological consequences, including delayed initiation of adjuvant therapy and higher local recurrence rates.[4,5] Therefore, effective management of AL is critical to improving both short- and long-term outcomes following rectal cancer surgery.

The management of rectal AL is primarily determined by the patient's clinical status, the severity and anatomical location of the defect, and the presence of a diverting stoma. Patients presenting with generalized peritonitis typically require urgent surgical reintervention with dismantling or revision of the anastomosis. In contrast, clinically stable patients, particularly those with a protective stoma, may be suitable candidates for less invasive, non-operative treatment approaches. These approaches include percutaneous image-guided drainage, endoscopic clipping techniques, and endoluminal vacuum therapy (EVT).[6]

EVT has emerged as a promising minimally invasive technique for the treatment of AL following rectal cancer resection. By applying continuous negative pressure to the leakage cavity, EVT facilitates effective drainage, reduces local inflammation, and promotes granulation tissue formation, resulting in progressive cavity shrinkage and defect closure.[7,8] Recent studies have reported clinical success rates ranging from 85% to 89%, with high rates of anastomotic preservation, supporting the growing adoption of EVT in the management of rectal AL.[9,10]

Despite these encouraging results, data regarding the clinical effectiveness of EVT, optimal patient selection, timing of therapy initiation, and its overall impact on patient recovery remain limited. Accordingly, this case series aimed to evaluate the clinical outcomes, safety, and feasibility of EVT in patients treated for AL following rectal cancer surgery. This case series has been reported in line with the PROCESS 2025 Guideline.[11]

Materials and Methods

Study Design and Patient Selection

This retrospective, two-center study was conducted following approval from the institutional ethics committee of Kocaeli City Hospital (approval no: 2025-186, date: 25.12.2025). Both centers represented consecutive institutional settings of the same colorectal surgery team following institutional relocation in 2023. Therefore, all patients were managed by the same surgical team using a consistent treatment strategy throughout the study period. The study was conducted in accordance with the principles of the Declaration of Helsinki. Patients who developed AL following rectal cancer resection and were treated with EVT between January 2020 and December 2025 were included. All consecutive eligible patients managed with EVT during the study period were included in the analysis. No additional eligible cases were intentionally excluded. All patients were followed up until clinical resolution of AL or discontinuation of EVT.

AL was diagnosed based on clinical findings, radiological imaging, and endoscopic evaluation. Patients presenting with generalized peritonitis at the time of diagnosis were excluded from the study and managed with emergency surgical intervention according to standard clinical practice. Only clinically stable patients without signs of generalized peritonitis in whom EVT was applied as part of the treatment strategy were included in the analysis.

Demographic, clinical, perioperative, and EVT-related data were retrieved from electronic medical records, operative reports, endoscopy records, and follow-up charts. Case identification was performed using institutional colorectal surgery databases and was confirmed by operative reports, endoscopy records, and follow-up charts.

Endoscopic Assessment and EVT Procedure

Following the diagnosis of AL, all patients underwent endoscopic evaluation to assess the level of the anastomosis, size of the defect, and the presence and extent of the associated leakage cavity. The decision to initiate EVT was based on endoscopic findings and the patient's overall clinical condition, and EVT was initiated once the patient was deemed clinically suitable.

EVT was performed under general anesthesia or sedoanalgesia, with the patient in the lithotomy position, using a sponge-based vacuum system. A handmade EVT device was prepared using a standard vacuum-assisted closure sponge, trimmed to the dimensions of the anastomotic defect and cavity, and then securely attached to a Nelaton catheter**.** The sponge was prepared individually based on the size of the anastomotic defect and leakage cavity. Under direct endoscopic visualization, with additional assessment via digital rectal examination when appropriate, the sponge was positioned to adequately fill and seal the leakage cavity. Proper positioning of the sponge was confirmed endoscopically and, when appropriate, via digital rectal examination.

Following correct placement, continuous negative pressure of 40-50 mmHg was applied using a standard vacuum source; EVT dressings were routinely exchanged every 3-5 days. During each exchange, the leakage cavity was reassessed endoscopically, and sponge size and positioning were adjusted based on changes in cavity size and the extent of granulation tissue formation. The same handmade EVT system, the same experienced colorectal surgery team, and the same treatment protocol were used consistently across all patients throughout the study period to ensure procedural standardization and safety, and to minimize inter-operator variability; EVT was continued until clinical resolution of the AL was achieved.

Representative endoscopic images of AL cavities and the EVT system used in this study are shown in Figures 1 and 2, respectively.

Following documented closure of the AL, all patients underwent routine rectosigmoidoscopic evaluation 3 weeks after healing to confirm sustained closure and mucosal integrity. In patients with a diverting ileostomy, stoma closure was planned and performed 1 month after confirmed healing, provided that no contraindications were present.

Treatment Follow-up

EVT was performed as part of a multidisciplinary treatment strategy that also included antibiotic therapy, clinical monitoring, and nutritional support when required. The therapy was continued until clinical resolution of the AL, defined as closure of the leakage cavity with sufficient granulation tissue and absence of clinical or radiological signs of ongoing leakage or infection. No patients required premature discontinuation of EVT during the treatment period. The total number of EVT sessions, therapy duration, and time to clinical resolution were recorded for each patient. Patients were closely monitored throughout the treatment period, with EVT-related complications, need for additional interventions, and overall clinical course documented. In patients with a diverting stoma, stoma closure was evaluated following successful resolution of the AL. All patients had a minimum follow-up duration of 6 months after documented healing, and no patients were lost to follow-up.

Outcome Measures

The primary outcome measure was clinical resolution of AL following EVT. Secondary outcomes included the duration of EVT, the number of sponge exchanges, the time to leakage resolution, anastomotic preservation, and EVT-related complications. AL severity was retrospectively classified according to the International Study Group of Rectal Cancer (ISREC) grading system, and post-treatment adverse events were graded using the Clavien-Dindo classification.

Statistical Analysis

Given the limited sample size, statistical analysis was primarily descriptive. Continuous variables with approximately symmetric distribution were expressed as mean ± standard deviation, whereas skewed variables were presented as median (minimum-maximum). Categorical variables were presented as frequencies and percentages. No comparative statistical analysis or hypothesis testing was performed.

RESULTS

A total of 13 patients who developed AL following rectal cancer resection and were treated with EVT were included in the study. The mean age of the cohort was 57.7±12.3 years, and the majority of patients were men [9 (69.2%) vs. 4 women (30.8%)]. All patients had a protective diverting stoma at the time of EVT initiation, and neoadjuvant therapy had been administered in 11 patients (84.6%). All included leaks were retrospectively classified as ISREC Grade B AL. Low anterior resection was the predominant surgical procedure, performed laparoscopically in most patients. Circular stapled anastomosis was used in most cases, most commonly with a 31-mm stapler.

AL was diagnosed at a median of 10 postoperative days (range, 6-115). The patient diagnosed on postoperative day 115 had initially undergone emergency open low anterior resection with protective diverting stoma formation and experienced an uneventful early postoperative course. During routine rectosigmoidoscopic evaluation prior to planned stoma closure, a clinically silent anastomotic leak was identified, and EVT was subsequently initiated. The mean tumor distance from the anal verge was 7.7±3.7 cm, and the mean anastomotic leak level was 4.7±1.8 cm from the anal verge, indicating that most leakages occurred in low rectal anastomoses. Endoscopic evaluation revealed a leakage cavity in all patients, with a median cavity diameter of 20 mm (range, 15-30 mm). EVT was initiated at a median of 12 postoperative days (range, 8-120).

The median number of EVT sessions was three (range, 2-6). Clinical resolution of AL was achieved in 12 patients, resulting in an overall EVT success rate of 92.3%. The median time to clinical healing was 16 days (range, 12-34).

One patient (Patient No. 2) developed a late rectovaginal fistula on postoperative day 120, after prior initial closure of the AL confirmed endoscopically following completion of EVT. This patient had received neoadjuvant radiotherapy prior to surgery. During follow-up, the patient developed malodorous vaginal discharge, prompting further colonoscopic evaluation, which revealed a rectovaginal fistula. No clear warning signs of persistent leakage were identified between the documented endoscopic closure and the subsequent fistula formation, and the patient subsequently required reoperation with a Hartmann's procedure. This was considered treatment failure (Clavien-Dindo Grade IIIb). EVT-related morbidity was limited. One patient (7.7%) developed an anastomotic stricture during follow-up, which was successfully managed with endoscopic balloon dilatation (Clavien-Dindo Grade IIIa). No other major EVT-related complications were observed. Overall, two EVT-related complications (15.4%) occurred, including one rectovaginal fistula and one anastomotic stricture; however, only the rectovaginal fistula was considered treatment failure.

Following confirmed closure of the AL, diverting ileostomies were closed approximately 1 month after documented healing in all eligible patients. The median follow-up duration was 23 months (range, 6-62 months). Except for the previously

described rectovaginal fistula case, no recurrent AL was detected following documented healing. Baseline demographic and clinical characteristics of the patients are summarized in Table 1, and detailed patient-level data are presented in Table 2. Considerable heterogeneity was observed in baseline characteristics, timing of postoperative leak diagnosis, and EVT treatment burden. The number of EVT sessions ranged from 2 to 6. Clinical healing was achieved in the majority of patients, with limited post-treatment morbidity.

Discussion

In the present case series, EVT achieved a high clinical success rate of 92.3% for treating predominantly low rectal AL, with a low need for reoperation and acceptable morbidity. These findings indicate that EVT can be an effective minimally invasive option for controlling pelvic sepsis while preserving the anastomosis in selected patients.

AL remains one of the most severe complications following rectal cancer surgery, particularly in low rectal anastomoses, and is associated with increased morbidity, prolonged hospitalization, and compromised oncological outcomes.[5] In this context, EVT has gained increasing attention as a treatment strategy that promotes continuous drainage, reduces local inflammation, and facilitates defect closure without the need for immediate surgical reintervention.[6,12]

The favorable outcomes observed in our cohort are consistent with previous reports indicating that EVT is particularly suitable for low rectal anastomoses, in which surgical revision is technically challenging and carries substantial risk. By allowing repeated endoscopic assessment and stepwise management, EVT enables individualized treatment while maintaining a minimally invasive approach. Overall, our findings support EVT as a practical and effective treatment option in routine clinical practice and contribute additional clinical evidence to the evolving literature on AL management.

Previous studies have consistently reported high success rates for EVT in managing colorectal AL. Jagielski et al.[13] reported successful transrectal vacuum-assisted endoscopic treatment

Table 1. Baseline demographic, clinical, and treatment characteristics of the study cohort

Variables		
Age, (mean ± SD)		57.7±12.3
Sex	**Male n (%)**	9 (69.2%)
	Female n (%)	4 (30.8%)
Body mass index, kg/m² (mean ± SD)		25.3±1.6
Tumor distance from anal verge, cm (mean ± SD)		7.7±3.7
Anastomotic leak level from anal verge, cm (mean ± SD)		4.7±1.8
Time to diagnosis of anastomotic leakage, days (median, range)		10 (6-115)
Leakage cavity diameter, mm (median, range)		20 (15-30)
Neoadjuvant therapy, n (%)		11 (84.6%)
Protective stoma, n (%)		13 (100%)
Time to EVT initiation after surgery, days (median, range)		12 (8-120)
Number of EVT sessions (median, range)		3 (2-6)
Time to clinical healing, days (median, range)		16 (12-34)
Follow-up duration, months (median, range)		23 (6-62)
EVT clinical success, n (%)		12 (92.3%)
EVT failure, n (%)		1 (7.7%)
ISREC grade B, n (%)		13 (100%)
ASA II, n (%)		8 (61.5%)
ASA III, n (%)		5 (38.5%)
Intraoperative air leak test performed, n (%)		13 (100%)
EVT-related stricture (Clavien-Dindo IIIa), n (%)		1 (7.7%)
Late fistula requiring Hartmann procedure (Clavien-Dindo IIIb)		1 (7.7%)

The anastomotic stricture was successfully managed endoscopically and, therefore, was not considered EVT failure

EVT: Endoluminal vacuum therapy, SD: Standar deviation, ISREC: International Study Group of Rectal Cancer

Table 2. Individual patient-level perioperative characteristics, EVT treatment details, and clinical outcomes

Patient no.	Age (years)	Sex	BMI (kg/m²)	Comorbidity	ASA class	Tumor distance from anal verge (cm)	Leak diagnosis (POD)	EVT initiation (POD)	EVT sessions (n)
1	64	M	26.4	None	III	10	14	17	3
2	34	F	23.2	None	II	6	6	9	4
3	67	F	25.4	Diabetes	III	5	10	12	2
4	68	M	26.1	Hypertension	II	15	7	8	3
5	60	M	24.2	None	II	7	16	18	4
6	59	M	24.5	Arrhythmia	III	3	45	50	6
7	42	M	24.9	None	II	5	10	12	3
8	45	M	26.5	None	II	15	115	120	4
9	58	M	24.5	CAD	III	8	12	15	3
10	48	F	25.2	None	II	6	8	9	3
11	73	F	29.7	Diabetes, COPD	III	7	9	12	3
12	74	M	24.1	Hypertension, Diabetes	II	12	6	8	3
13	58	M	24.5	Hypertension	II	5	14	16	5

Table 2. Continued

Patient no.	Cavity Diameter (mm)	Healing time (days)	Post-treatment complication	Neoadjuvant Therapy	Follow-up (months)	TNM Stage	Surgical procedure	Anastomotic technique
1	20	34	None	Yes	62	Stage 1	Lap LAR	31 mm Circular stapler
2	15	21	Rectovaginal fistula	Yes	48	Stage 2	Lap LAR	31 mm Circular stapler
3	30	14	None	Yes	44	Stage 1	Lap LAR	31 mm Circular stapler
4	25	12	None	Yes	38	Stage 0	Open LAR	31 mm Circular stapler
5	20	16	None	Yes	26	Stage 1	Lap LAR	31 mm Circular stapler
6	30	25	None	Yes	24	Stage 1	Lap LAR (pull-through coloanal anastomosis)	No stapler
7	25	15	Stricture	Yes	23	Stage 0	Lap LAR	29 mm Circular stapler
8	15	19	None	No	17	Stage 1	Open LAR	31 mm Circular stapler
9	20	26	None	Yes	12	Stage 0	Lap LAR	31 mm Circular stapler
10	15	12	None	Yes	12	Stage 1	Lap LAR	29 mm Circular stapler
11	25	16	None	Yes	9	Stage 2	Lap LAR	31 mm Circular stapler
12	30	15	None	Yes	8	Stage 2	Open LAR	31 mm Circular stapler
13	20	16	None	No	6	Stage 1	Lap LAR	31 mm Circular stapler

POD: Postoperative day, EVT: Endoluminal vacuum therapy, ASA: American Society of Anesthesiologists physical status classification, BMI: Body mass index, LAR: Low anterior resection, Lap: Laparoscopic, Open: Open surgery, CAD: Coronary Artery Disease, COPD: Chronic Obstructive Pulmonary Disease TNM stages represent pathological staging (ypTNM after neoadjuvant therapy when applicable). Stage 0 indicates complete pathological response.

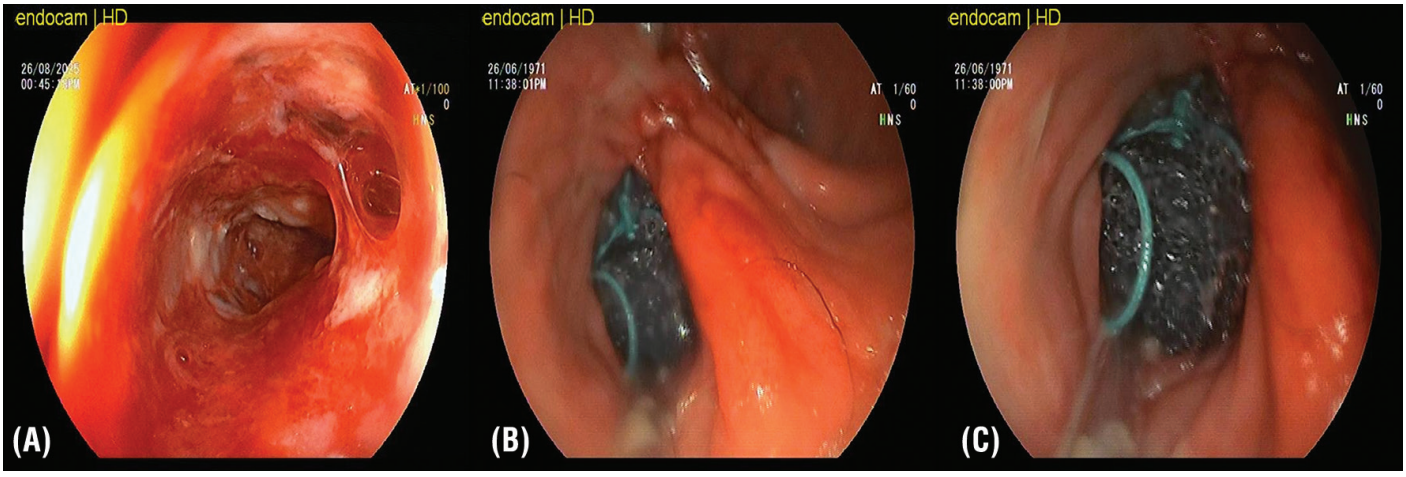

Figure 1. Endoscopic views of rectal anastomotic leakage and endoluminal vacuum therapy (EVT)
(A) *Endoscopic appearance of the fistula tract following rectal cancer resection,* ***(B)*** *Endoscopic view demonstrating placement of the vacuum sponge within the fistula tract,* ***(C)*** *Endoscopic view showing the vacuum sponge positioned inside the fistula tract during EVT.*

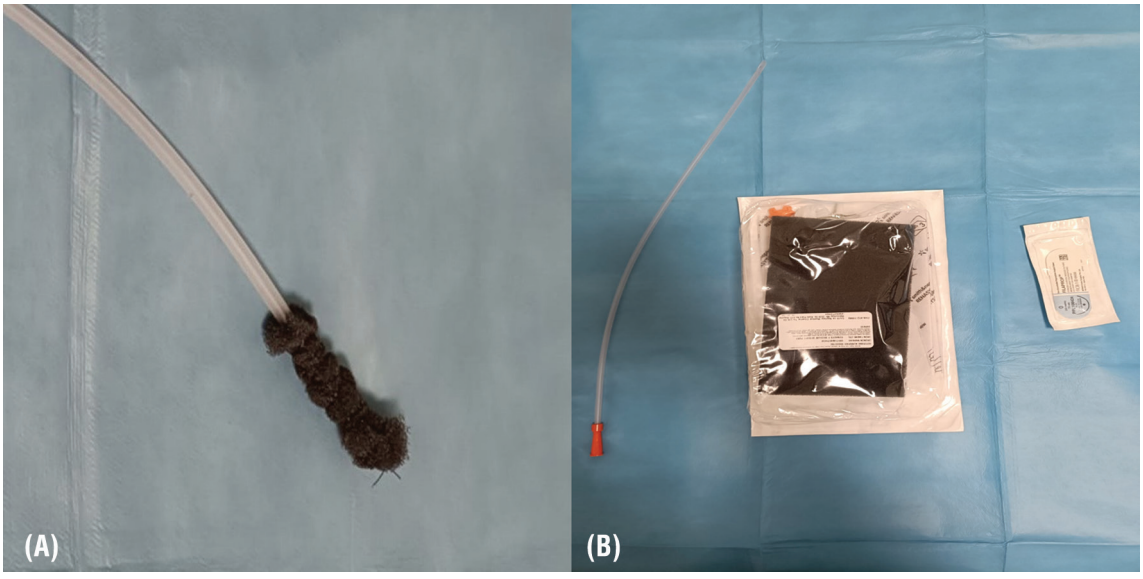

Figure 2. Preparation of the endoluminal vacuum therapy (EVT) system
(A) *Vacuum sponge prepared by fixation to a Nelaton catheter prior to insertion,* ***(B)*** *Materials used for EVT, including the polyurethane sponge and drainage components.*

in 17 of 18 patients (94.4%), with a mean treatment duration of 22 days and an average of six procedures per patient. Similarly, in the initial description of EVT, Weidenhagen et al.[7] achieved treatment success in 28 of 29 patients (96.6%), albeit with a longer mean treatment duration of 34 days and a higher number of endoscopic procedures. In contrast, van Koperen et al.[14] reported lower closure rates in patients treated later after surgery, with successful closure in 75% of patients who started EVT within 6 weeks, compared with 38% in those treated later. These findings suggest that treatment timing may contribute to outcome differences, although patient selection and leak complexity should also be considered. In the present study, EVT achieved an overall clinical success rate of 92.3%, which is comparable to the higher success rates reported in previous series. Although the median time to diagnosis of AL was 10 days (range, 6-115), the limited sample size precluded formal analysis of the relationship between treatment timing and outcome. Therefore, no definitive conclusions regarding the impact of EVT timing can be drawn from our data. Nevertheless, the favorable results observed in our cohort further support the effectiveness of EVT in managing low colorectal AL.

In a recent study comparing different non-operative treatment modalities for AL in patients with rectal cancer, EVT was reported to achieve the highest success rate among the evaluated approaches, with leak resolution in approximately

90% of cases.[15] Importantly, this comparison was limited to non-surgical management strategies, and EVT outperformed other conservative and endoscopic treatment options within this context.

These findings further support the effectiveness of EVT as a key non-operative treatment modality for AL following rectal cancer surgery, particularly in patients for whom an anastomosis-preserving approach is desirable. When interpreted alongside our results, the available evidence suggests that EVT represents an effective component of non-surgical leak management in appropriately selected patients.

Treatment burden and timing of therapy are important considerations in EVT for AL. In a recent retrospective series of 25 patients with rectal cancer treated with EVT, Kaya et al.[16] reported that earlier initiation of EVT was significantly associated with shorter treatment duration (p=0.0003) and a higher likelihood of ileostomy closure (p=0.035). These findings support the concept that timely EVT initiation may improve treatment efficiency and downstream recovery. In our series, EVT was initiated at a median of 12 postoperative days (range, 8-120), and clinical healing was achieved in 92.3% of patients. Although direct comparisons should be interpreted with caution due to differences in cohort characteristics and treatment protocols, the available evidence suggests that earlier EVT initiation may be an important determinant of treatment outcomes. Notably, Patient 6 in our cohort underwent a technically challenging hand-sewn pull-through coloanal anastomosis without circular stapling and required the highest number of EVT sessions. This distinct anastomotic configuration may have contributed to the prolonged EVT course observed in this patient.

Economic considerations are also relevant when evaluating EVT in routine clinical practice. Although repeated endoscopic procedures, anesthesia or sedoanalgesia requirements, and use of endoscopy unit resources may increase short-term treatment costs, successful non-operative management may reduce the need for major reoperation, permanent stoma formation, and prolonged hospitalization. In addition, timely stoma reversal in eligible patients may provide further clinical and economic benefits. Formal cost-effectiveness analyses were beyond the scope of the present study and should be addressed in future prospective investigations.

Reported complication rates associated with EVT vary widely in the literature. In a meta-analysis by Kühn et al.[17], the weighted mean complication rate associated with EVT was reported as 12.1% (95% CI: 9.7%-15.2%). Similarly, Shalaby et al.[10] reported complication rates ranging from 0% to 34.5%, with a pooled mean complication rate of 11.1% across published studies. According to the review by Nagell and Holte[18], pelvic abscess represents the most frequently reported complication, accounting for approximately 11.5% of cases, a finding also supported by Shalaby et al.[10] In most cases, pelvic abscesses can be managed conservatively or with repeated EVT, achieving success rates of 71%-75%, whereas Hartmann or Miles procedures are generally reserved for treatment failure.

In the present series, EVT-related complications were observed in two patients (15.4%). One patient developed an anastomotic stricture during follow-up, which was successfully managed with endoscopic balloon dilatation. Another patient developed a rectovaginal fistula following initial clinical closure of the AL and subsequently required reoperation with a Hartmann procedure, which was considered EVT failure. Notably, no pelvic abscess was observed in our cohort. These findings indicate that, although EVT-related complications may occur, they are generally manageable, and serious septic complications can be effectively avoided in appropriately selected patients.

The effectiveness of EVT is not limited to colorectal surgery. In a comprehensive review by Virgilio et al.[19], EVT was shown to be a highly effective treatment modality for AL following major resective surgery for esophageal and gastric cancer, with reported closure rates ranging from 66.7% to 100% across 209 patients. These findings suggest that EVT is applicable across different gastrointestinal regions and anastomotic configurations, further supporting its role as a versatile and effective treatment option for postoperative AL.

It should be emphasized that the favorable outcomes observed in our cohort may, at least in part, be influenced by careful patient selection and close multidisciplinary management, underscoring the importance of individualized treatment strategies when considering EVT.

Study Limitations

This study has several limitations that should be acknowledged. First, its retrospective design and case series structure limit the generalizability of the findings. Second, the relatively small sample size reduces the statistical power of the analysis and precludes a formal evaluation of factors that may influence EVT outcomes, including the timing of therapy initiation. In addition, the absence of a control group treated with alternative management strategies prevents direct comparison of EVT with other therapeutic approaches. Moreover, selection bias cannot be excluded, as EVT was applied in clinically stable patients deemed suitable for endoscopic management. Additionally, denominator data regarding the total number of rectal resections and the overall incidence of AL during the study period were not systematically available. Therefore, the relative proportion of patients treated with EVT and the distribution of alternative management strategies could not be accurately determined, potentially limiting the contextual interpretation of the reported success rates. Finally, long-term functional outcomes and quality-of-life measures were not

systematically assessed. In addition, detailed data regarding the timing of adjuvant chemotherapy were not uniformly available, precluding assessment of the potential impact of leak management and EVT treatment on postoperative oncological care. Despite these limitations, the present study provides valuable real-world data supporting the feasibility and potential clinical utility of EVT in the management of low rectal AL.

Conclusion

EVT appears to be a promising and feasible minimally invasive treatment option for AL following rectal cancer surgery, particularly in carefully selected clinically stable patients with low rectal anastomoses. In this case series, EVT achieved a high clinical success rate with acceptable morbidity, a low need for reoperation, and preservation of the anastomosis in the majority of patients. These findings, together with growing evidence from the literature, suggest that EVT may represent a useful non-operative management strategy for rectal AL. Larger prospective, multicenter studies are warranted to better define optimal patient selection, treatment timing, and long-term functional and oncological outcomes.

Ethics

Ethics Committee Approval: This study was approved by the Scientific Research Ethics Committee of Kocaeli City Hospital (approval no: 2025-186, date: 25.12.2025).

Informed Consent: Given the retrospective design of the study, the requirement for informed consent was waived.

Footnotes

Authorship Contributions

Surgical and Medical Practices: A.G., M.Ö., Concept: A.G., M.Ö., Design: A.G., Ö.A., Data Collection or Processing: A.G., Ö.A., Analysis or Interpretation: A.G., M.Ö., Literature Search: Ö.A., M.Ö., Writing: A.G., Ö.A.

Conflict of Interest: The authors declare that they have no conflicts of interest relevant to the content of this article.

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RESEARCH ARTICLE

Doppler-Guided Hemorrhoidal Artery Ligation: Effects on Quality-of-Life and Symptomatic Outcomes-A Retrospective Study

Onur Bayraktar[1], Yasemin Yıldırım[2], İlknur Erenler Bayraktar[3], Mehmet Koçak[4]

[1]Liv Hospital Vadi İstanbul, Clinic of General Surgery, İstanbul, Türkiye
[2]Demiroğlu Science University, Department of General Surgery, İstanbul, Türkiye
[3]Private Clinic, Clinic of General Surgery, İstanbul, Türkiye
[4]Medipol University, International Faculty of Medicine, Department of Biostatistics, İstanbul, Türkiye

ABSTRACT

Aim: Minimally invasive surgical techniques for hemorrhoidal disease aim to reduce symptom burden while preserving anorectal function and improving patient-centered outcomes. However, real-world data on both clinical severity and quality-of-life (QoL) outcomes following these procedures remain limited.

Method: This single-center retrospective observational study included patients who underwent Doppler-guided hemorrhoidal artery ligation (DG-HAL) for symptomatic hemorrhoidal disease. Demographic data, operative time, and postoperative complications were recorded. Symptoms such as bleeding, soiling, prolapse, and pain were assessed both preoperatively and postoperatively using validated assessment tools; QoL was measured using the Short Form Survey-36 (SF-36) and the World Health Organization QoL-BREF (WHOQOL-BREF) questionnaire. The Hemorrhoidal Disease Symptom Score (HDSS), Wexner Score, and visual analogue scale (VAS) scores were also used to assess the symptomatic improvement. The primary outcome measures were patient satisfaction, QoL, hemorrhoidal symptom scores, and postoperative pain levels. The secondary outcomes were complete healing and recurrence rates.

Results: Treatment with DG-HAL was associated with a clinically meaningful reduction in HDSS scores following the procedure. Exploratory analyses demonstrated improvements across multiple domains of WHOQOL-BREF and SF-36; VAS scores also showed improvement on postoperative day 7. Only one patient experienced a complication, namely, persistent anal pain lasting for 1 month; however, by the 2nd postoperative month, the pain had completely resolved. Two patients experienced recurrence postoperatively and subsequently underwent hemorrhoidectomy.

Conclusion: In this real-world cohort, DG-HAL was associated with improvement in symptom severity and exploratory QoL measures. These findings require further prospective studies focusing on patient-centered outcomes following minimally invasive surgical treatment.

Keywords: Doppler-guided hemorrhoidal artery ligation, quality of life

Introduction

Hemorrhoids are natural anatomical cushions located just above the dentate line in the anal canal, composed of clusters of venous vessels and connective tissue. Some hemorrhoidal structures lack the muscular wall typical of arteries or veins and may therefore be appropriately referred to as sinusoids.[1] These vascular cushions engorge in situations that increase intra-abdominal pressure, thereby contributing to complete closure of the anal canal. In this way, they help prevent fecal leakage and maintain continence. Hemorrhoidal disease is a condition resulting from pathological changes in the natural vascular cushions of the anal canal, triggered by various factors, such as a low-fiber diet and constipation, prolonged straining during defecation, diarrhea, hereditary predisposition, pregnancy, occupational and recreational activities, psychological disorders,

Address for Correspondence: Yasemin Yıldırım MD, Demiroğlu Science University, Department of General Surgery, İstanbul, Türkiye
E-mail: yasemin_yildirim_@hotmail.com **ORCID ID:** orcid.org/0000-0003-0538-7753
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and spinal paralysis.[2] These pathological changes give rise to symptoms such as pain, swelling, and rectal bleeding, which can be distressing for patients and significantly impair their quality-of-life (QoL).

Although conservative management is the initial approach in treating hemorrhoidal disease, surgical procedures may become necessary in more advanced stages or when non-operative methods are ineffective. Specifically in cases where external hemorrhoids are also removed during surgery, the resulting postoperative pain can significantly impact the patient's comfort and QoL. This has prompted the search for surgical techniques that minimize postoperative discomfort and enhance patient recovery. Among the various minimally invasive options, Doppler-guided hemorrhoidal artery ligation (DG-HAL), originally described by Morinaga et al.[3] in 1995, constitutes a notable technique. Since its introduction, an expanding body of literature has evaluated its clinical efficacy and outcomes across diverse patient populations.[4-6] Although it generally yields favorable patient satisfaction outcomes, the technique has also been associated with a relatively high recurrence rate.[7,8]

The Short Form-36 (SF-36) is a widely used generic health-related QoL questionnaire assessing eight domains of physical and mental health.[9] The World Health Organization QoL (WOHQoL)-BREF is a brief version of the WOH's QoL instrument[10], evaluating four broad domains: physical health, psychological well-being, social relationships, and environment. Both instruments have been utilized in studies assessing QoL outcomes in patients with hemorrhoidal disease.[11,12] In addition to the SF-36 and WHOQOL-BREF scales, the Hemorrhoidal Disease Symptom Score (HDSS) and visual analogue scale (VAS) were used to specifically evaluate symptom severity and pain intensity. This comprehensive approach allows for a more detailed assessment of both the biopsychosocial aspects of QoL and the physical symptoms experienced by patients, thereby providing a holistic perspective on recovery and treatment effectiveness.

Materials and Methods

Study Design and Patients

This study was designed as a retrospective analysis of prospectively collected data and follows an observational cohort methodology. A total of 116 consecutive patients who underwent surgical treatment for hemorrhoidal disease between March 2020 and August 2024 were screened for eligibility. Among these, 70 patients treated exclusively with DG-HAL met the inclusion criteria and were included in the final analysis.

Patients were excluded if they underwent concomitant excisional procedures for external hemorrhoids, had a history of inflammatory bowel disease, prior pelvic radiotherapy, or coexisting pelvic floor disorders such as rectocele or rectal prolapse. Patients with incomplete or missing QoL questionnaire data at baseline or follow-up assessments were also excluded to ensure data integrity and comparability (Figure 1).

Baseline demographic and clinical characteristics, including age, sex, body mass index (BMI), comorbidities, presenting symptoms, and associated anal pathologies, were recorded prospectively. Operative variables, including operative time, number of ligated arteries, and any concomitant surgical interventions, were documented intraoperatively.

QoL and symptom severity were assessed using validated instruments. On the morning of surgery, all patients completed the SF-36, the WHOQOL-BREF, and the HDSS. Postoperative pain intensity was evaluated using the VAS and recorded in the medical records. All patients were evaluated in person on postoperative day 7 and at 1 month to assess early complications and initial symptom control. Subsequent assessments, including QoL (SF-36 and WHOQOL-BREF) and symptom scores (HDSS, VAS, Wexner), were conducted at 3, 6, and 12 months using a combined communication approach (telephone interviews and email-based questionnaires) performed concurrently to maximize response rates and minimize loss to follow-up.

The primary outcome measures included patient-reported satisfaction, QoL scores, HDSS, and postoperative pain levels. Secondary outcome measures were complete healing and recurrence rates during the follow-up period. Recurrence was defined as the reappearance of hemorrhoidal symptoms (bleeding, prolapse, pain, or pruritus) after an initial symptom-free period, with or without the need for additional medical or surgical intervention. Given the lack of a universally accepted definition in current guidelines, recurrence was defined based on commonly used criteria in the literature.

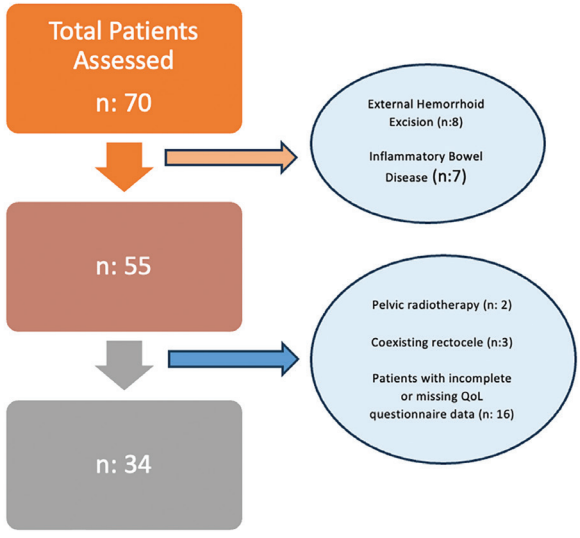

Figure 1. Flow diagram of patient inclusion
QoL: Quality-of-life

Surgical Procedure

Prior to surgery, all patients received comprehensive counseling regarding available treatment options, including DG-HAL, Longo hemorrhoidectomy, rubber band ligation, and conventional excisional hemorrhoidectomy. The final choice of surgical procedure was based on clinical indication and patient preference. All DG-HAL procedures were performed under general anesthesia with the patient in the lithotomy position. Doppler guidance was used to identify terminal branches of the superior rectal artery, which were subsequently ligated using synthetic absorbable polyglactin sutures. Following ligation, Doppler signal verification was performed; persistent arterial pulsation prompted repeat ligation until complete signal abolition was achieved. This protocol was applied circumferentially, with a mean of 10 ligation sites per patient. Mucopexy was performed selectively when mucosal prolapse was identified intraoperatively.

Ethical Considerations

All procedures performed in this study complied with the ethical standards of the institutional and/or national research committee and with the 1964 Declaration of Helsinki and its later amendments, or comparable ethical standards. The study was approved by the local Ethics Committee of Memorial Şişli Hospital with decision no: 001, date: 28.03.2025. Informed consent was obtained from all patients.

Statistical Analysis

Data were analyzed using SPSS version 28.0 (IBM Corp., Armonk, NY, USA). Continuous variables are presented as mean ± standard deviation for normally distributed data or median (range) for non-normally distributed data, whereas categorical variables are summarized as frequencies and percentages. Associations between categorical variables were examined using the chi-square test or Fisher's exact test when appropriate. Comparisons of continuous variables across categorical groups were performed using the Wilcoxon-Mann-Whitney or Kruskal-Wallis tests. Relationships between continuous variables were evaluated using scatter plots and Spearman's rank correlation coefficients. A p-value <0.05 was considered statistically significant.

Results

A total of 34 patients were included in the analysis, of whom 27 (79.4%) were men. The mean age of the cohort was 45.5±12.6 years, and the median duration of follow-up was 25.5 months. Five patients (14.7%) were diagnosed with grade IV hemorrhoidal disease, and the remaining 29 patients (85.3%) had grade III disease. Swelling and pain were the most frequently reported presenting symptoms, with a median symptom duration of 48 months. Concomitant anal pathologies were identified in eight patients, including anal fistula in three and anal fissure in five. Fourteen patients underwent additional concurrent procedures. Anal botulinum toxin injection was performed in six patients, and mucopexy was added in six. One patient underwent fistulotomy, and one received laser treatment for pilonidal sinus disease. Clinicodemographic characteristics are summarized in Table 1.

Table 1. Clinicodemographic characteristics of the patients

Patients	n (%)
Age (Mean, SD)	**45.5±12.6**
Gender	
Female	7 (20.59)
Male	27 (79.41)
BMI (kg/m^2, median)	24.9
Smoking	
Non-smoker	16 (47.06)
Smoker	18 (52.94)
Comorbidities	
No comorbidities	21 (61.76)
1+ comorbidities	13 (38.24)
Goligher grade	
Grade III	29 (85.3)
Grade IV	5 (14.7)
Concurrent anal disease	
No concurrent anal disease	26 (76.47)
Concurrent anal disease	8 (23.53)
Surgery history	
No previous surgery	22 (64.71)
Previous surgery	12 (35.29)
Preop bleeding	
No	10 (29.41)
Yes	24 (70.59)
Preop pain	
No	13 (38.24)
Yes	21 (61.76)
Preop swelling	
No	12 (35.29)
Yes	22 (64.71)
Symptom duration (median, months)	48
Operative time (mean, min)	65.9 (25)
Additional concurrent surgery	
No	20 (58.82)
Anal botox	6 (17.65)
Mucopexy	6 (17.65)
Others	2 (5.88)
LoHS (mean, day)	1.7 (0.7)
Follow-up (median, months)	25.5

BMI: Body mass index, LoHS: Length of hospital stay, SD: Standard deviation

Postoperative complications were observed in one patient (2.94%), who reported persistent anal pain lasting approximately 1 month following surgery, which resolved with conservative management and did not recur during follow-up. Another patient presented with altered bowel habits and abdominal pain at postoperative month 6; subsequent colonoscopic evaluation revealed a rectosigmoid adenocarcinoma, for which surgical resection was performed.

Two patients experienced recurrence at postoperative months 1 and 2, respectively, and both subsequently underwent conventional hemorrhoidectomy. Both cases of recurrence occurred in patients with grade IV hemorrhoidal disease. No statistically significant associations were observed between recurrence and gender [odds ratio (OR): 0.231, CI: 0.013-4.238, p=0.374)], smoking status (OR: 0.882, CI: 0.051-15.36, p=0.93), BMI (r=0.13, p=0.45), symptom duration (r=0.33, p=0.056), preoperative HDSS (r=0.24, p=0.17), Wexner score (r=0.07, p=0.69), or VAS pain score (r=0.29, p=0.08). Among the evaluated variables, symptom duration showed the strongest association with recurrence (r=0.33).

Patient-reported QoL scores showed postoperative increases; SF-36 scores increased from 75 to 90, with a median change of 15 (r=0.919, p<0.0001); WHOQOL scores improved from 81 to 88 (median change of 7; r=0.797, p<0.0001); HDSS decreased from 7 to 0 (median reduction of -7; r=0.611, p<0.0001); VAS score declined from 4 to 0.5 (median change of -3; r=0.400, p<0.0001); Wexner scores improved from 2 to 0 (median change of -2; p<0.0001). Changes in QoL and symptom scale scores are shown in Table 2.

In addition, the relationship between changes in these scores and variables such as gender, smoking status, comorbidities, and preoperative symptoms was evaluated. A statistically significant association was identified between preoperative bleeding and postoperative changes in VAS pain scores (95% CI: -0.689 to -0.121, r=-0.45, p=0.01). Another objective of this study was to assess the effect of the DG-HAL procedure on hemorrhoidal symptom improvement. A significant reduction in all symptoms was observed following surgery. Preoperatively, bleeding was present in 24 patients (70.59%), which decreased to 2 patients (5.88%) postoperatively (95% CI: 0.967-1.231; p<0.001). Pain was reported in 21 patients (61.76%) preoperatively and in 4 patients (11.7%) postoperatively (OR: 2.29; 95% CI: 0.213-24.67; p<0.001). Prolapse was present in 22 patients (64.71%) preoperatively and decreased to 1 patient (2.94%) postoperatively (CI: 0.956-1.148; p<0.001). The degree of symptom improvement is summarized in Table 3.

Table 2. Changes in Patient-Reported Outcome Measures (PROMs)

PROMs	Preoperative	Postoperative	p*	r**
SF-36 (Median)	75	90	**<0.001**	**0.919**
WHOQOL-BREF (Median)	81	88	**<0.001**	**0.797**
HDSS (Median)	7	0	**<0.001**	**0.611**
Wexner (Median)	2	0	**<0.001**	
VAS (Median)	4	0.5	**<0.001**	**0.400**

Bold values indicate statistical significance, p* Wilcoxon test, r** Effect size

SF-36: Short-Form 36, WHOQOL-BREF: World Health Organization quality of life-BREF, HDSS: Hemorrhoidal Disease Symptom Score, VAS: Visual analogue scale, PROMs: Patient-reported outcome measures

Table 3. Symptoms before and 1-month after surgery

Symptoms	Preoperative n (%)	Postoperative n (%)	OR	CI	p-value
Bleeding	24 (70.59)	2 (5.88)	-	0.967-1.231	**<0.001**
Pain	21 (61.76)	4 (11.7)	2.29	0.213-24.67	**<0.001**
Protrusion	22 (64.71)	1 (2.94)	-	0.956-1.148	**<0.001**

Bold values indicate statistical significance, p* McNemar test

OR: Odds ratio, CI: Confidence interval

Discussion

The DG-HAL technique is a minimally invasive surgical technique that has been introduced as an alternative to conventional hemorrhoidectomy, primarily with the aim of reducing postoperative morbidity and facilitating recovery. Although generally favorable clinical outcomes have been reported, concerns regarding postoperative recurrence remain a topic of ongoing discussion.[13,14] Although several studies have focused on clinical efficacy, data regarding QoL outcomes following DG-HAL remain limited. In the present study, DG-HAL was associated with postoperative improvements in QoL measures among patients with grade III and IV hemorrhoidal disease. To evaluate postoperative QoL, a combination of validated instruments was used, including the SF-36, WHOQoL-BREF, HDSS, Wexner score, and VAS. The HDSS is a disease-specific tool designed to assess symptom severity in hemorrhoidal disease, whereas the SF-36 and WHOQoL-BREF are generic instruments intended to evaluate broader aspects of physical, psychological, and social well-being. Although disease-specific instruments may provide more focused information on hemorrhoidal symptoms, the inclusion of generic QoL tools allowed for a more comprehensive assessment of overall well-being. Despite the absence of condition-specific validation, the SF-36 has been frequently used in studies evaluating treatment outcomes in hemorrhoidal disease.[12,15,16] In this cohort, postoperative increases in SF-36 scores were observed, findings that are generally consistent with those reported in previous studies evaluating QoL following DG-HAL using this instrument.[17,18] The study by Talha et al.[17] evaluated 13 patients, whereas the HAL group in the study by Carvajal López et al.[18] included 20 patients. With 34 patients, the present study represents a moderately sized cohort for assessing SF-36 outcomes following HAL. Compared with the literature, this sample size can be considered acceptable; however, it remains relatively small given the heterogeneity of the clinical outcomes assessed. The study remains underpowered to detect small but clinically relevant differences, particularly in recurrence rates, and yields other non-significant findings. Accordingly, the results should be interpreted with caution, and prospective studies with larger sample sizes are warranted to validate these findings. Unlike the study by Talha et al.[17], the present study did not perform domain-specific analyses of SF-36 scores, which should be considered a limitation. Potential associations between changes in SF-36 scores and patient-related variables were also explored. Although the relationship between preoperative bleeding and postoperative changes in SF-36 scores did not reach statistical significance (p=0.09), this observation may warrant further investigation in larger cohorts.

The WHOQoL-BREF, a shortened version of the WHOQoL-100 developed by the WOH, is a widely used instrument for assessing QoL across various patient populations.[10,19,20] Although it has been applied in studies involving hemorrhoidal disease, disease-specific validation has not yet been established. Nevertheless, given the symptom burden associated with hemorrhoidal disease and its potential impact on daily functioning, the inclusion of a broad QoL assessment tool may still be considered informative. The concurrent use of two different QoL instruments may also help reduce the influence of measurement bias inherent to subjective patient-reported outcomes. To the best of our knowledge, this study is among the first to report WHOQoL-BREF outcomes following DG-HAL.

These changes in SF-36 and WHOQoL-BREF likely reflect not only symptom relief but also improvements in the physical, psychological, and social aspects of QoL, as well as enhanced functional capacity in both daily activities and occupational settings. Although significant changes were observed in the SF-36 and WHOQoL-BREF scores following DG-HAL treatment, the minimal clinically important difference (MCID) for these questionnaires in these patients has yet to be determined. Consequently, the clinical importance of the change could only be assessed by the magnitude of score improvements and their respective effect sizes, rather than by MCID values. The increase in SF-36 and WHOQoL-BREF scores indicates a considerable improvement in patients' QoL, which would be clinically significant.

Moreover, the baseline VAS and Wexner scores were relatively low, indicating no severe symptoms during the initial period. This may have caused a floor effect, making it difficult to see any substantial improvement following surgery using the same tools.

Symptom control represents an important objective in the management of hemorrhoidal disease. In the present study, patient-reported symptoms were documented preoperatively and reassessed following treatment. Symptoms such as itching (n=1), soiling (n=1), and tenesmus (n=2) were excluded from individual symptom analyses due to their low frequency, which limited meaningful statistical evaluation. However, these symptoms were included within the overall HDSS assessment. The HDSS, developed by Rørvik et al.[21] as a modification of the Hemorrhoidal Symptom Score originally described by Nyström[22] in 2009, evaluates five key symptoms: pain, itching, soiling, bleeding, and prolapse. In this cohort, postoperative reductions in HDSS scores were observed. Given the limited data available regarding HDSS outcomes following DG-HAL, these findings may add to the existing literature.

Reduced postoperative pain is often cited as a potential advantage of DG-HAL compared with more invasive surgical approaches. In this study, lower VAS pain scores were observed in the early postoperative period. Although concomitant anal botulinum toxin injections could theoretically influence pain perception, they are unlikely to fully explain the observed early postoperative findings. In addition, although not systematically recorded, the use of pudendal nerve blocks in some patients should be acknowledged as a potential confounding factor in early pain assessment.

Recurrence remains an important parameter when evaluating long-term outcomes in hemorrhoidal surgery. Despite the inclusion of patients with advanced-stage (grade IV) hemorrhoidal disease and a relatively long follow-up period, the recurrence rate observed in this cohort (5.88%) was lower than rates reported in some previous studies, which have been reported to reach up to 59%.[23] Several factors may have influenced this observation, including surgeon experience (the procedure has been performed by the operating surgeon for over 15 years), selective use of mucopexy in patients with prominent prolapse, and demographic characteristics of the study population (relatively lower BMI values and an older mean age compared with other study populations). Although the literature reports mixed findings on factors associated with recurrence, hemorrhoid grade is generally considered an important determinant.[5,24-26] Notably, both patients who developed recurrence in the current study had grade IV disease.

We acknowledge that concomitant procedures may have influenced the observed outcomes. In the current study, mucopexy was performed in six patients, anal botulinum toxin injection in six patients, fistulotomy in one patient, and laser treatment for pilonidal disease in one patient. Among these, mucopexy may have affected recurrence rates; however, it is widely considered an integral component of DG-HAL in many centers and is routinely performed. Regarding botulinum toxin, although it may influence postoperative pain, its effect typically becomes evident after days, and therefore may not fully explain the lower early postoperative pain scores observed. The relatively small sample size limits the reliability of subgroup and correlation analyses; therefore, these findings should be interpreted with caution and considered exploratory.

Postoperative follow-up assessments and patient-reported outcome measures (PROMs) were collected by a clinician independent of the operating surgeon, thereby providing a degree of assessor separation; however, formal blinding was not implemented, which represented a source of assessment bias. In addition, the inherently subjective nature of QoL assessments, being based on PROMs, constitutes another limitation of the study.

Conclusion

This study suggests that DG-HAL is a safe and well-tolerated treatment option for patients with grade III and IV hemorrhoidal disease and is associated with postoperative improvement in hemorrhoidal symptoms. However, these findings should be interpreted with caution, given the retrospective, single-center design, and further studies with larger cohorts and longer follow-up periods are warranted to more comprehensively assess recurrence rates and late postoperative outcomes.

Ethics

Ethics Committee Approval: The study was approved by the local Ethics Committee of Memorial Şişli Hospital with decision no: 001, date: 28.03.2025.

Informed Consent: Informed consent was obtained from all patients.

Footnotes

Authorship Contributions

Surgical and Medical Practices: O.B., Y.Y., İ.E.B., Concept: O.B., Y.Y., İ.E.B., Design: O.B., Y.Y., Data Collection or Processing: O.B., Y.Y., M.K., Analysis or Interpretation: O.B., Y.Y., M.K., Literature Search: O.B., Y.Y., İ.E.B., Writing: O.B., Y.Y., İ.E.B.

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LETTER TO THE EDITOR

Letter to the Editor: Comments on "Outcomes of Loose Seton Followed by Fistulotomy in Transsphincteric Perianal Fistulas"

Ender Ergüder[1], Sezai Leventoğlu[2], David Zimmerman[3]

[1]University of Health Sciences Türkiye, Ankara Etlik City Hospital, Clinic of Surgery, Ankara, Türkiye
[2]Gazi University Faculty of Medicine, Department of Surgery, Ankara, Türkiye
[3]Elisabeth-TweeSteden Hospital, Clinic of Surgery, Tilburg, The Netherlands

Keywords: Anal fistula, proctology, surgery

Dear Editor,

We read with great interest the article by Bük et al.[1] entitled "Outcomes of Loose Seton Followed by Fistulotomy in Transsphincteric Perianal Fistulas: A Retrospective Study," published in the Turkish Journal of Colorectal Disease. The authors should be commended for addressing an important clinical question and reporting favorable continence outcomes in a relatively large cohort.

However, we would like to raise a methodological concern that may influence the interpretation of the results: the absence of systematic preoperative magnetic resonance imaging (MRI) for fistula classification. Although all patients are reported as having transsphincteric fistulas, it is unclear whether MRI was performed in every case. Differentiation between simple and complex fistulas is difficult on clinical examination alone, particularly after an abscess or inflammation, and a lack of routine MRI risks misclassification.[2]

This point is clinically relevant because many intersphincteric and low transsphincteric fistulas can be safely managed with primary fistulotomy without the need for prolonged loose seton placement.[3] The low incontinence rate and universal healing reported in this series, therefore, raise the possibility that some patients labeled "transsphincteric" may have had simple fistulas amenable to straightforward fistulotomy. In a retrospective cohort, such uniformly favorable outcomes should be interpreted cautiously in light of potential case selection and baseline classification.

Consequently, the excellent functional outcomes observed may reflect underlying fistula anatomy rather than the intrinsic superiority of a staged loose-seton strategy. MRI is the most accurate preoperative imaging modality for delineating tracts and extensions and can influence operative planning and outcomes.[4] Radiologic consensus statements likewise recommend MRI as a core component of systematic fistula evaluation to avoid misclassification.[5]

In a large operative-MRI correlation study, Garg et al.[6] reported that 34% of clinically simple fistulas were upgraded after MRI, whereas MRI revealed additional complex parameters in 52.5% of fistulas already considered complex on clinical examination, with direct implications for operative decision-making. These findings underscore that MRI modifies the perceived anatomical extent of disease and highlight the risk of both over- and under-classification in the absence of standardized preoperative imaging.[6,7] In this context, the absence of standardized preoperative MRI in the current study may limit generalizability and

Address for Correspondence: David Zimmerman MD, Elisabeth-TweeSteden Hospital, Clinic of Surgery, Tilburg, The Netherlands
E-mail: d.zimmerman@etz.nl **ORCID ID:** orcid.org/0000-0002-0393-9350
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could overestimate the benefit of loose seton use in transsphincteric fistulas.

Moreover, the manuscript does not clarify how fistulas initially classified as transsphincteric became suitable for fistulotomy during follow-up, and no objective reassessment (clinical or imaging based) is reported to confirm true anatomical "downgrading." In an MRI before–after study of trans– and suprasphincteric fistulas, Verkade et al.[2] found no significant distal migration relative to the external sphincter/puborectalis and observed downgrading in only 1/40 tracts (3%), concluding that loose silicone seton drainage should not be offered as a strategy to downgrade (simplify) a complex fistula.

We believe this study reinforces the importance of preoperative MRI as a determinant of strategy and patient selection. We suggest that future studies incorporate routine preoperative MRI to ensure accurate classification and valid outcome comparisons.

Footnotes

Authorship Contributions

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LETTER TO THE EDITOR

Upfront Surgery Without Neoadjuvant Chemotherapy After Stenting for Malignant Colonic Obstruction May Increase Recurrence Rates

Cüneyt Kayaalp

University Faculty of Medicine, Department of General Surgery, İstanbul, Türkiye

Keywords: Malignant colonic obstruction, self-expandable metallic stent, bridge to surgery, recurrence, neoadjuvant chemotherapy

Dear Editor,

I read with great interest the article by Öçal and Torun[1] entitled "Endoscopic Stenting Followed by Laparoscopic Resection in Malignant Colonic Obstruction: Oncological Safety of the Bridge-to-Surgery Approach." I congratulate the authors for presenting a large series of patients with malignant colonic obstruction treated by self-expandable metallic stent (SEMS) as a bridge to surgery followed by elective laparoscopic colectomy. To my knowledge, this represents one of the largest Turkish series on this subject, and the reported 100% technical success of stenting is noteworthy (Table 1).[2-7]

The perioperative findings are clinically relevant. In acute malignant colonic obstruction, SEMS can shift treatment from emergency surgery to a planned setting, allowing staging, patient optimization, bowel preparation, and elective minimally invasive resection. Higher laparoscopic completion, greater chance of primary anastomosis, and reduced need for stoma are important short-term benefits. In this series, the laparoscopic completion rate of 84.2%, R0 resection rate of 93.7%, no 30-day mortality, and low stoma rate support the perioperative value of this strategy in experienced centers.[1]

Table 1. Series of stenting for acute malignant colorectal obstruction from Türkiye

Author (Year)	No. of patients	Success	Perforation	Neoadjuvant CT
Öçal and Torun[1]	95	100%	No	No
Kesgin et al.[2]	40	90%	NA	No
Seyit et al.[3]	20	85%	3 cases	NA
Gürbulak et al.[4]	82	94%	1 case	NA
Bozkurt et al.[5]	53	81%	2 cases	No
Yanar et al.[6]	42	93%	2 cases	NA
Karabulut et al.[7]	67	96%	2 cases	NA

CT: Chemotherapy, NA: Not available

However, the main concern with SEMS as a bridge to surgery remains long-term oncological safety. Radial tumor compression, endoscopic manipulation, overt or occult perforation, and microscopic tumor dissemination have all been proposed as possible mechanisms. The absence of clinical perforation in this cohort is reassuring, but it does not fully exclude microscopic transmural injury or subclinical tumor spread. Therefore, the lack of a non-stented control group and the median follow-up of 31.8 months warrant cautious interpretation of the oncological conclusions.[1]

The literature also remains unsettled. Recent systematic reviews and meta-analyses have reported signals of increased overall, systemic, or distant recurrence after stent placement compared with emergency surgery, although findings are heterogeneous and influenced by study design, perforation definitions, and patient selection.[8,9] These uncertainties are especially relevant in patients treated with curative intent.

In this context, one of the most important points in the present series is that neoadjuvant therapy was not used. After successful

Address for Correspondence: Prof. Cüneyt Kayaalp, Atlas University Faculty of Medicine, Department of General Surgery, İstanbul, Türkiye
E-mail: cuneytkayaalp@gmail.com **ORCID ID:** orcid.org/0000-0003-4657-2998
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decompression, neoadjuvant chemotherapy before resection has increasingly been discussed for left-sided obstructive colon cancer. The rationale is that systemic treatment may counterbalance the potential risk of micrometastatic disease promoted by tumor manipulation or occult dissemination. Emerging analyses suggest that SEMS followed by neoadjuvant chemotherapy may improve survival outcomes compared with SEMS followed directly by surgery.[10]

The study by Öçal and Torun[1] shows that SEMS followed by laparoscopic colectomy is feasible and may improve perioperative comfort in experienced hands. Nevertheless, these results should not be interpreted as definitive proof of oncological safety for all curative candidates. Future multicenter Turkish studies should compare stented and non-stented patients by stage; report local, peritoneal, and distant recurrences separately; distinguish clinical from pathological or occult perforation; and analyze patients receiving post-stent neoadjuvant chemotherapy as a separate subgroup.

In conclusion, the authors' work is a valuable contribution to the Turkish experience with malignant colonic obstruction. Its high technical success and favorable perioperative outcomes are commendable, but long-term oncological risk and the potential role of neoadjuvant chemotherapy after stenting should remain central considerations.

Sincerely,

Footnotes

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