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Original Research

Diagnosis of Intestinal Endometriosis: A Multicenter Retrospective Study

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Abstract

Background: Intestinal endometriosis occurs when endometrial-like tissue infiltrates the intestinal wall, most often affecting the sigmoid colon and rectum. **Methods**: Between January 2012 and February 2025, patients with intestinal endometriosis who underwent surgery were examined in five tertiary referral centers: Istanbul Sultan Abdülhamid Han Research and Training Hospital, Izmir Katip Çelebi University, Bakırköy Dr. Sadi Konuk Training and Research Hospital, Başakşehir Çam and Sakura City Hospital, and Izmir City Hospital. Preoperative symptoms, demographic characteristics, menstrual status, operative times, intraoperative blood loss, surgical and pathological findings, antibiotic use, and postoperative complications were retrospectively reviewed. **Results**: Emergency surgery was required in a significant number of patients (n = 35, 71.4%), primarily due to intestinal obstruction or acute abdomen presentations. Resection procedures included anterior or low anterior resections for rectosigmoid involvement and colectomies for colonic disease (n = 21, 42.9%), appendectomies performed for acute appendicitis (n = 26, 53.1%), and small bowel resections for small intestinal diseases (n = 2, 4.1%). Postoperative complications were observed in 8 patients, including ileus (n = 2), infections requiring antibiotics (n = 2, Grade II), intra-abdominal abscess requiring percutaneous drainage (n = 1, Grade IIIa), bleeding requiring reoperation (n = 1, Grade IIIb), incisional hernia (n = 1, Grade IIIa), and fat necrosis (n = 1, Grade I). Histopathological examination revealed transmural (full-thickness) bowel wall involvement in three patients and muscularis propria-limited involvement in two patients. One case involved a 67-year-old postmenopausal woman who presented with bowel obstruction and required emergency surgery. Intraoperatively, a rectosigmoid stricture without a visible tumor was identified. **Conclusion**: Surgeons and clinicians should maintain a high index of suspicion for endometriosis in postmenopausal patients presenting with nonspecific gastrointestinal symptoms or when unexpected findings are encountered during abdominal surgery. Considering intestinal endometriosis in the differential diagnosis, even in the absence of typical risk factors such as hormone replacement therapy or a prior history of endometriosis, is essential for improving diagnostic accuracy and patient outcomes.

Keywords: colon; differential diagnosis; intestinal endometriosis; small bowel

1. Introduction

Endometriosis is a chronic condition characterized by the presence of endometrial-like tissue outside the uterus, affecting up to 15% of women of reproductive age [1]. Clinically, it often presents with pelvic pain, dysmenorrhea, dyspareunia, and infertility, with symptoms that typically fluctuate in response to hormonal changes [1].

When ectopic endometrial tissue involves the gastrointestinal tract, most commonly the sigmoid colon and rectum, it is classified as intestinal endometriosis. This subtype may present with nonspecific gastrointestinal symptoms such as abdominal pain, constipation, rectal bleeding, and tenesmus [2]. However, due to the considerable overlap of these symptoms with other gastrointestinal disorders, including irritable bowel syndrome, inflammatory bowel disease, and colorectal malignancies, establishing an accurate diagnosis remains challenging [3].

Histopathological evaluation typically reveals endometriotic lesions composed of endometrial glands and stroma, often accompanied by hemorrhage and fibrosis. In cases of deeply infiltrative disease, dense adhesions and extensive fibrosis may develop, potentially leading to bowel obstruction or stricture formation. The extent of intestinal wall involvement can vary and may include:

- Serosal involvement, which typically leads to adhesions between the bowel and adjacent structures, contributing to anatomical distortion.
- Muscularis propria and submucosal involvement, more commonly observed in deep infiltrating endometriosis, often leads to fibrosis and luminal narrowing, potentially necessitating surgical intervention.
- Mucosal involvement, although rare, may clinically and endoscopically mimic inflammatory bowel disease or colorectal cancer (Fig. 1). Histologically, it is characterized by the presence of endometrial glands and stroma within the mucosa, sometimes accompanied by ulceration or bleeding [4].

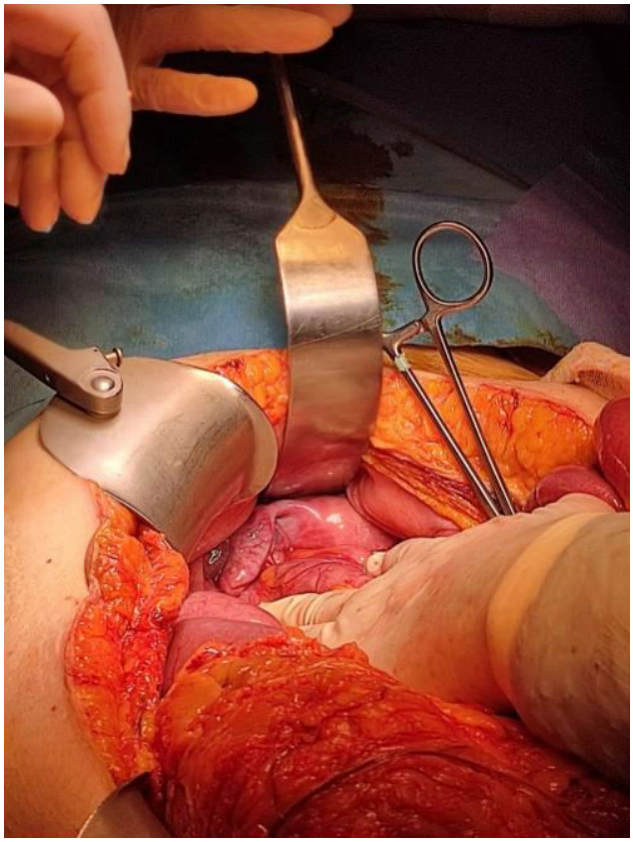

Fig. 1. Intraoperative image of a strictured rectosigmoid colon segment in a patient with postmenopausal intramural endometriosis.

The reported prevalence of intestinal endometriosis varies widely, ranging from 3% to 37% [5]. Symptoms such as dysmenorrhea, dyspareunia, and dyschezia are often significantly alleviated after surgical treatment [6]. Among the surgical approaches, segmental resection is generally preferred in cases of deep rectal involvement. Although this technique is associated with higher postoperative complication rates, it provides a lower risk of recurrence compared to shaving or disc excision procedures [7].

Available surgical options for colorectal endometriosis include shaving, disc resection, and segmental resection. Segmental resection is generally indicated for extensive or deep wall infiltration but is associated with an increased risk of complications, including postoperative fever, transfusion requirements, and rectovaginal fistula formation [8]. Nevertheless, the recurrence rate after segmental resection is lower than that of more conservative techniques [9]. Long-term follow-up studies have demonstrated that surgical treatment significantly improves both symptoms and quality of life in patients with rectal endometriosis [10].

In this study, we retrospectively analyzed cases of intestinal endometriosis treated surgically across five tertiary referral centers, with a focus on clinical presentation, surgical approaches, and histopathological findings.

2. Materials and Methods

Between January 2012 and February 2025, patients with intestinal endometriosis who underwent surgery were retrospectively evaluated across five tertiary referral centers: Istanbul Sultan Abdülhamid Han Training and Research Hospital, Izmir Katip Çelebi University, Atatürk Training and Research Hospital, Bakırköy Dr. Sadi Konuk Training and Research Hospital, Başakşehir Çam and Sakura City Hospital, and Izmir City Hospital.

All pathology reports diagnosed as “endometriosis” between January 2012 and February 2025 were reviewed. From these, only patients with histopathologically confirmed intestinal involvement, defined by the presence of endometriotic glands and stroma within the bowel wall, were included. Patients with endometriosis confined to genital or other extragenital sites without intestinal involvement were excluded. No additional clinical or radiological criteria were applied for inclusion; patient selection was based solely on pathological confirmation.

Histopathological Diagnosis

Intestinal involvement was confirmed on hematoxylin and eosin (H&E)-stained sections by the presence of endometrial glands and stroma within the intestinal wall layers, including the serosa, muscularis propria, or submucosa. Cases with involvement limited to the peritoneal surface, without deeper infiltration into the bowel wall, were excluded. Immunohistochemical staining supported the diagnosis, demonstrating estrogen receptor (ER) positivity in glandular structures and CD10 (cluster of differentiation 10) positivity in the surrounding spindle cell stroma. Pathological evaluations were performed independently at each participating center by experienced gastrointestinal pathologists. Although no central pathology review was conducted, all centers adhered to uniform diagnostic criteria and applied immunohistochemistry (ER, CD10, PAX8 [Paired Box Gene 8]) when necessary, ensuring diagnostic consistency across the study population.

To ensure methodological consistency across the five participating tertiary centers, a standardized data collection form was developed prior to data extraction. This form included predefined variables such as age, menopausal status, presenting symptoms, surgical indications, procedures performed, and complications. Investigators at each center independently extracted data using the same form, and all completed datasets were centrally compiled into a unified Excel spreadsheet. Any discrepancies were resolved through cross-checking among investigators and, when necessary, direct review of surgical or pathology reports. This standardized approach minimized reporting heterogeneity and ensured methodological consistency across centers.

A comprehensive set of patient data was systematically recorded and analyzed, including demographic characteristics, menopausal status, preoperative symptoms, operative time (minutes), estimated intraoperative blood loss (milliliters), surgical and pathological findings, antibiotic regimens, and postoperative complications graded according to the Clavien-Dindo classification system. Although the study was conducted across five tertiary centers, standardized data collection protocols were applied. Surgical indications and procedures followed current clinical guidelines. Pathological assessments were performed by experienced gastrointestinal pathologists using routine H&E staining and, when necessary, immunohistochemistry. A uniform data collection form was employed across all centers to ensure consistency in the recorded variables.

In our study, to evaluate the effect of surgical site and emergency versus elective status on complications, patients were categorized into four localization groups: (1) appendix, (2) small intestine, (3) colon, and (4) rectum. Complication severity was graded using the Clavien-Dindo classification system. Nonparametric tests (Kruskal-Wallis H test and Mann-Whitney U test) were applied to assess differences in complication severity between groups. The relationship between emergency versus elective status and complication severity was analyzed using the Mann-Whitney U test. For comparisons among localization groups, statistical significance was set at $p < 0.05$. If the Kruskal-Wallis test yielded significance, post hoc Dunn's test was performed for multiple comparisons to identify the source of the difference. In addition, the Chi-square test was used to examine differences in complication rates between groups. All statistical analyses were conducted using SPSS Statistics version 29.0 (IBM Corp., Armonk, NY, USA).

This study was conducted in accordance with the Declaration of Helsinki and was approved by the Ethics Committee of Izmir Katip Çelebi University (Approval Number: 0060; dated July 18, 2024). Because this was a retrospective analysis using anonymized patient data, the committee waived the requirement for individual informed consent. Continuous variables were expressed as mean $\pm$ standard deviation (SD) or as median with interquartile range (IQR), while categorical variables were presented as frequencies and percentages (%). American Society of Anesthesiologists (ASA) scores were recorded to assess preoperative health status but were not used in subgroup comparisons or clinical decision-making.

3. Results

A total of 49 patients with histologically confirmed intestinal endometriosis were identified, and their medical records were retrospectively reviewed. All patients presented with nonspecific symptoms, including abdominal pain, rectal bleeding, and constipation.

The mean body mass index among postmenopausal patients was 24.5 kg/m^2. Patient characteristics, including age, menopausal status, surgical setting (emergency vs. elective), ASA scores, preoperative diagnosis, type of surgical procedure (open, laparoscopic, robotic), operative time, intraoperative blood loss, antibiotic use, length of hospital stay, postoperative complications (graded using the Clavien-Dindo classification), follow-up duration, and 30- and 90-day readmission rates, are summarized in Table 1. The mean intraoperative blood loss was 30 mL.

All patients were evaluated preoperatively by the Department of Gynecology and Obstetrics. Transvaginal ultrasonography (TVUS) was performed in all but five cases; however, none demonstrated findings suggestive of intestinal endometriosis, highlighting the diagnostic challenges and frequent under-recognition of bowel involvement in routine gynecological evaluations. In emergency cases, abdominal contrast-enhanced computed tomography (CE-CT) was routinely performed. In elective cases, rectal lesions were evaluated with pelvic magnetic resonance imaging (MRI), while sigmoid colon pathologies were typically assessed using abdominal CT. Nevertheless, in none of the cases did preoperative imaging indicate endometriosis. Consequently, preoperative gynecologic consultation was not obtained for any patient. Neither endoscopic ultrasound (EUS) nor positron emission tomography-CT (PET-CT) was utilized. All surgeries were performed by general surgeons without preoperative multidisciplinary team (MDT) involvement. None of the patients had received hormonal or conservative medical therapy for endometriosis prior to surgery. The mean interval between initial imaging and surgery was 48.6 $\pm$ 12.4 days. In all cases, the diagnosis of intestinal endometriosis was established postoperatively through histopathological evaluation, and patients were subsequently referred to gynecology for further management. These findings underscore the underdiagnosis of bowel endometriosis despite adequate imaging and clinical evaluation and highlight the need for heightened awareness and multidisciplinary collaboration in suspected cases.

Emergency surgery was performed in 35 patients (71.4%). The types of surgical procedures included:

Table 1. Demographic characteristics and surgical data.

Variables	Value
Menopausal status	N (%)
Premenopausal	41 (83.7%)
Postmenopausal	8 (16.3%)
Age (Mean ± SD)	42.4 ± 10.8 years
Emergency	N (%)
Elective surgery	14 (28.6%)
Emergency surgery	35 (71.4%)
Acute appendicitis	26
Obstruction	8
Perforation	1
Operation time (Median [IQR])	142.5 (35–240) min
Preliminary diagnosis	N (%)
Rectosigmoid cancer	10 (20.4%)
Acute appendicitis	29 (59.2%)
Mass in the small intestine	2 (4.1%)
Complex polyp	4 (8.2%)
Diverticulitis	4 (8.2%)
ASA	N (%)
1	25 (51%)
2	22 (44.9%)
3	2 (4.1%)
Mean hospital stay	4.4 ± 4.5 days
Surgical Technique	N (%)
Open	20 (40.8%)
Laparoscopic	26 (53.1%)
Robotic	3 (6.1%)
Surgery	N (%)
Resection (colon and rectal diseases)	21 (42.9%)
Appendectomy (acute appendicitis)	26 (53.1%)
Small bowel resection (small intestinal diseases)	2 (4.1%)
Intraoperative blood loss	30 cc
Antibiotics used	
Cefazolin + ornidazole	7 (14.3%)
Only cefazolin	42 (85.7%)
Postoperative complications (Clavien-Dindo)	
0–No complication	41 (83.7%)
I–Minor (e.g., wound issues, oral antibiotics)	3 (6.1%)
II–Pharmacological treatment	2 (4.1%)
IIIa–Radiologic intervention	2 (4.1%)
IIIb–Reoperation	1 (2.0%)
IV–V	0 (0%)
Follow-up Duration (Median)	30 days (11–702 days)
Readmission	
Within 30 days	1 (2.0%)
Within 90 days	2 (4.0%)

Abbreviations: N, number; SD, standard deviation; IQR, interquartile range; ASA, American Society of Anesthesiologists; min, minutes.

- Anterior or low anterior resection, primarily performed for presumed diagnoses such as rectosigmoid carcinoma, rectal polyps, or sigmoid diverticulitis.
- Right hemicolectomy, conducted in patients suspected of having right-sided colon cancer.
- Appendectomy, performed in cases presumed to be acute appendicitis.

Table 2. Comparison of postoperative complication rates and Clavien-Dindo scores across different surgical sites.

Group (surgical site)	Complication rate	Median Clavien-Dindo score	Notes
Appendix (Group 1)	19%	0.0	Lowest risk; many emergency appendectomies
Small Intestine (Group 2)	Intermediate	Intermediate	—
Colon (Group 3)	Intermediate	Intermediate	—
Rectum (Group 4)	80%	2.0	Highest complication rate
p-value	0.033 (Chi-square)	0.020 (Kruskal-Wallis)	Statistically significant difference

- Small bowel resection, carried out in patients with suspected small intestinal masses on radiological imaging.

3.1 Postoperative Complications

Postoperative complications occurred in 8 patients (16.3%). These included:

- 2 cases of postoperative ileus**,** all successfully managed with conservative treatment.
- 2 cases of postoperative pneumonia accompanied by fever, requiring intravenous antibiotic therapy.
- 1 pelvic abscess, drained under interventional radiology guidance on postoperative day 7.
- 1 case of postoperative hemorrhage**,** requiring surgical reoperation on the following day.
- 1 wound dehiscence (eventration)**,** necessitating early surgical repair.
- 1 case of subcutaneous fat necrosis with wound discharge, managed conservatively.

No cases of anastomotic leakage, enteric fistula, or stoma-related complications were observed.

3.2 Notable Cases

In one patient, intramural endometriosis was identified. A 67-year-old postmenopausal woman underwent emergency surgery for a suspected rectosigmoid tumor causing obstruction. Intraoperatively, a stricture was observed without a visible tumor. The resected segment exhibited a 2.5 cm luminal narrowing over a 5 cm length of bowel, with 1 cm wall thickening. Histopathological evaluation revealed endometrial glands and stroma localized to the muscularis propria. ERs were focally positive, and PAX8 was diffusely positive, confirming the diagnosis of intestinal endometriosis.

Another notable case involved a 41-year-old premenopausal woman who underwent urgent low anterior resection for suspected rectosigmoid obstruction. A 6 cm stenotic segment with 1.8 cm luminal narrowing and marked bowel wall thickening was identified. Histopathology revealed deep infiltrating endometriosis with transmural involvement, affecting the mucosa, submucosa, muscularis propria, and serosa, closely mimicking a neoplastic lesion. Immunohistochemistry showed diffuse ER and PAX8 positivity in glandular cells, along with CD10 positivity in stromal tissue.

In all cases, intestinal endometriosis was not suspected preoperatively and was diagnosed postoperatively solely based on histopathological evaluation. No coexisting pathological conditions were identified in the surgical specimens, and the clinical symptoms were attributed exclusively to intestinal endometriosis.

Statistical analyses revealed statistically significant differences between the surgical localization groups in both complication severity (Clavien-Dindo score) and complication rates. The Kruskal-Wallis H test showed that the distribution of complication severity differed significantly between the groups ($p = 0.020$). Post-hoc analyses showed that this difference was primarily driven by the comparison between the Rectum group (Group 4) and the Appendix group (Group 1) ($p < 0.01$). The Rectum group had a significantly higher median Clavien-Dindo score (2.0) and complication rate (80%) compared to the Appendix group, which had a median score of 0.0 and a complication rate of 19%. However, no statistically significant difference in Clavien-Dindo complication scores was observed between the emergency and elective surgery groups ($p > 0.05$). This finding is likely because the vast majority (71.4%) of the emergency surgery group consisted of appendectomy procedures, which carry a relatively low risk of complications. The Chi-square test also confirmed that complication rates differed significantly between the localization groups ($p = 0.033$). The complication profiles of the Small Intestine and Colon groups were intermediate between those of the Rectum and Appendix groups. A comparative summary of complication severity and rates across surgical sites is shown in Table 2.

4. Discussion

Intestinal endometriosis, particularly in postmenopausal women, poses a significant diagnostic challenge due to its rarity and nonspecific clinical and radiological features. This condition often mimics other gastrointestinal pathologies, including colorectal carcinoma, inflammatory bowel disease, and diverticulitis, thereby complicating preoperative diagnostic accuracy. Conventional imaging modalities, such as CT, MRI, and colonoscopy, frequently fail to detect the disease, especially in early or atypical cases, since the pathological process typically originates at the serosal surface and progresses inward toward the mucosa [11]. A notable finding of our study is the complete absence of

preoperative suspicion of endometriosis in all patients, including one with intramural endometriosis. Intramural localization, confined to the muscularis propria without involvement of the mucosa or serosa, represents one of the most diagnostically challenging forms. Its lack of radiological and endoscopic detectability underscores the limitations of current noninvasive diagnostic strategies and highlights the necessity of intraoperative assessment and histopathological confirmation.

Another remarkable aspect is the occurrence of intestinal endometriosis in postmenopausal women, a population traditionally considered hypoestrogenic. Despite the cessation of ovarian estrogen production, several mechanisms may sustain ectopic endometrial activity. Peripheral aromatization of androgens in adipose tissue and skin contributes to extragonadal estrogen production, while local estrogen biosynthesis within endometriotic lesions—mediated by aromatase expression in stromal cells—plays a pivotal role in lesion maintenance and progression [12,13]. In addition, proinflammatory cytokines and growth factors, including interleukins, prostaglandins, and tumor necrosis factor-alpha, contribute to the persistence of endometriotic inflammation and tissue remodeling, even in the absence of systemic hormonal stimulation [14]. This complex interplay of endocrine and paracrine mechanisms may explain the persistence and progression of the disease in this patient subgroup .

In our cohort, a substantial proportion of patients, particularly postmenopausal women, underwent emergency surgical intervention due to acute symptoms, such as bowel obstruction or suspected malignancy. These emergency procedures served a dual purpose: alleviation potentially life-threatening symptoms and providing a definitive histopathological diagnosis. Intraoperative findings frequently revealed fibrotic, stenotic bowel segments that had been misinterpreted preoperatively as neoplastic lesions. The absence of typical risk factors, such as hormone replacement therapy or a prior diagnosis of endometriosis, further contributed to diagnostic delays.

Our findings align with the broader surgical literature, which emphasizes that procedural complexity is a key determinant of postoperative outcomes. This is particularly evident in pelvic surgery, where anatomical constraints markedly increase technical difficulty. Jago *et al.* [15] observed that bowel surgeries, such as rectal resections for endometriosis, carry a significant risk of both short- and long-term complications, underscoring the importance of meticulous preoperative planning and surgical expertise. Our results support this perspective, showing that the inherently higher complexity of rectal procedures was the primary factor influencing complication rates, effectively outweighing the effect of surgical urgency. This reinforces the principle that risk assessment should be procedure-specific rather than relying solely on broad classifications, such as emergency versus elective status.

Although subgroup analyses demonstrated a statistically significant difference in complication rates between rectal and appendiceal endometriosis cases, this disparity likely reflects the inherent complexity and technical challenges of rectal surgery rather than differences in disease biology. The lower complication rates observed in appendiceal cases, typically managed with less complex procedures, may account for this contrast. Given the limited sample size, these findings should be interpreted with caution and considered hypothesis-generating rather than definitive.

Overall, the rate of postoperative complications in our series was low, and no cases of long-term bowel dysfunction were observed, supporting the feasibility and safety of surgical management even in emergency settings. Nevertheless, the requirement for segmental resection in several patients underscores the severity of luminal involvement and the potential for transmural disease progression in long-standing or undiagnosed cases.

Given these findings, clinicians should maintain a high index of suspicion for intestinal endometriosis in female patients, regardless of age or menopausal status, who present with unexplained gastrointestinal symptoms, recurrent subocclusive episodes, or imaging findings suggestive of malignancy without confirmatory biopsy. This consideration is particularly important during diagnostic laparoscopy or laparotomy, where direct visualization may provide the first—and sometimes only—opportunity to identify and resect endometriotic lesions.

Despite the availability of conventional imaging modalities, including TVUS, abdominal/pelvic CT, and MRI, none of the patients in our cohort exhibit a preoperative suspicion of endometriosis. This diagnostic gap underscores the limitations of current techniques, particularly in cases lacking classic symptoms or visible pelvic masses. Contributing factors may include submucosal or intramural localization, nonspecific radiologic features, and limited gynecologic assessment in emergency settings. Future clinical practice may benefit from incorporating advanced modalities, such as MRI enterography or EUS, when evaluating patients with unexplained gastrointestinal symptoms and suspected deep infiltrating endometriosis.

This study contributes to the growing body of literature emphasizing the heterogeneous presentation of intestinal endometriosis. Previous epidemiological reviews have shown that demographic and reproductive factors—such as early age at menarche, short menstrual cycle length, lean body habitus, and parity—may influence the overall risk of endometriosis [16]. Although our dataset did not allow direct comparison with ovarian endometriosis, these characteristics may also affect the likelihood of intestinal involvement. Unlike prior series that primarily focused on reproductive-age women with classic gynecologic symptoms, our findings highlight that intestinal endometriosis can also occur in asymptomatic or postmenopausal women,

often presenting in contexts unrelated to suspected gynecologic disease. By underscoring this overlooked entity in atypical clinical scenarios, we aim to enhance diagnostic awareness and promote earlier surgical referral when appropriate. Ultimately, a multidisciplinary approach involving surgeons, gynecologists, and pathologists remains essential to improve diagnostic accuracy and optimize outcomes in patients with suspected or incidentally discovered intestinal endometriosis.

Limitations

This study has several limitations. First, its retrospective design introduces the potential for selection and reporting bias. Second, although data were collected from five tertiary centers—increasing the generalizability of findings—variations in surgical technique and pathological evaluation may have introduced heterogeneity. Furthermore, due to the retrospective nature of the study and data availability, the median follow-up duration was limited to 30 days, which allowed for the assessment of perioperative outcomes but prevented evaluation of long-term recurrence or functional results.

The relatively small sample size over a 13-year period reflects the rarity of pathologically confirmed intestinal endometriosis requiring surgical intervention. Although this may limit statistical power and generalizability, the strict inclusion criteria aimed to ensure diagnostic accuracy and cohort homogeneity.

5. Conclusion

Intestinal endometriosis can present with a wide range of nonspecific symptoms and may mimic other gastrointestinal pathologies, such as malignancy or inflammatory diseases. Our multicenter series highlights the diagnostic challenges of bowel endometriosis, particularly in emergency surgical settings, where definitive diagnosis is often established postoperatively through histopathological examination. Increasing clinical awareness, especially in reproductive-age women with unexplained gastrointestinal complaints, may facilitate earlier recognition. A multidisciplinary approach and individualized treatment plans are essential to improve outcomes and avoid unnecessary extensive surgeries.

Availability of Data and Materials

The datasets generated and analyzed during the current study are available from the corresponding author on reasonable request. All data are stored securely in compliance with ethical guidelines and patient confidentiality regulations.

Author Contributions

NK, FM, and FC designed the research study. NK, AUU, SK, HOS, and SB performed the research and collected the data. MT provided pathological interpretation and contributed to histopathological evaluation. FC, EK and ÖFO contributed substantially to the conception and design of the study, supervised surgical management, and participated in the interpretation of clinical data. SB contributed to data tabulation and figure editing. All authors contributed to editorial changes in the manuscript. All authors read and approved the final manuscript. All authors have participated sufficiently in the work and agreed to be accountable for all aspects of the work.

Ethics Approval and Consent to Participate

This study was approved by the Ethics Committee of İzmir Katip Çelebi University in July 18, 2024, with the decision number 0060. As this is a retrospective study using anonymized data, individual informed consent for participation was not required. However, one intraoperative image is included in the manuscript, for which written informed consent for publication was separately obtained from the patient. The study was carried out in accordance with the guidelines of the Declaration of Helsinki.

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Conflict of Interest

The authors declare no conflict of interest.

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