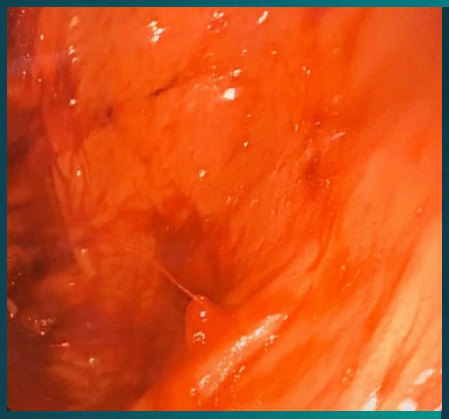
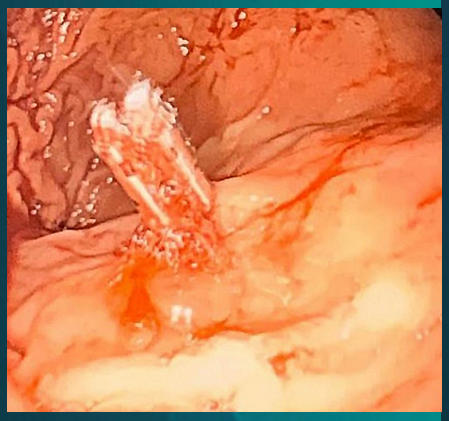
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Courtesy from the authors: Ana María Thorne-Vélez, Pedro Luis Imbeth-Acosta.

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Editorial

Forty Years of History: Science, Academia, and Transformation

Robin Germán Prieto-Ortiz.[1]

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The year 2025 marked a significant milestone for *Revista Colombiana de Gastroenterología*: forty years of uninterrupted scientific, academic, and editorial work. This endeavor was formally consolidated in 1985 with the publication of the first issue, although its origins date back to the early 1980s, when the presidents of the Colombian Association of Gastroenterology, Dr. Alberto Orduz Suárez (1981–1983) and Dr. Juan Francisco Di Doménico Buraglia (1983–1985), began shaping a vision that ultimately materialized during the presidency of Dr. Paulo Emilio Archila Falla (1985–1987). He appointed Dr. Germán Liévano Rodríguez as the first editor, who would later serve as president between 1987 and 1989. Together, they became the founders and first editors[(1)].

Throughout these forty years, the Journal has had fifteen editors. Few journals celebrating their fourth decade can claim the privilege of continued engagement with one of their two founding editors. Last year, an interview was conducted with Dr. Germán Liévano (available at: https://youtu.be/QnwHg6b_324), in which he recounted the circumstances surrounding the Journal's founding. In addition, during the ACADI Congress, he participated in a panel discussion alongside other editors. Each editor, shaped by their respective context and historical moment, has contributed a distinctive vision that has strengthened the quality, scientific rigor, and clinical relevance of the published content.

Reaching forty years is not merely a symbolic milestone. It represents evidence of sustained continuity, collective commitment, and renewed responsibility. For four decades, *Revista Colombiana de Gastroenterología* has served as a fundamental academic and scientific reference for the specialty in Colombia and the region. It has consolidated its role as a platform for knowledge dissemination, rigorous scholarly debate, and the development of a professional community.

Since its founding, the Journal has both witnessed and actively contributed to the evolution of gastroenterology in Colombia. Its pages document diagnostic and therapeutic advances, shifts in clinical paradigms, the strengthening of local research, and the progressive integration of the discipline into the international scientific community. Each volume constitutes a living archive of recent medical history and reflects the collective efforts of authors, reviewers, editors, and readers who recognize the value of shared knowledge.

Commemorating these forty years necessarily involves looking back with gratitude and recognition. It requires honoring those who promoted the editorial project in its early years, when publishing scientific research in the country posed even greater technical, logistical, and academic challenges. It also entails acknowledging the generations of gastroenterologists who found in the Journal a means to communicate their findings, reflect on clinical practice, and contribute to the advancement of the specialty. However, any meaningful commemoration must also include a critical perspective on the present

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and a clear vision for the future. As Dr. David Benigno Páramo Hernández noted in the editorial of the previous issue[2], significant commitments and challenges lie ahead if the Journal is to remain a relevant scientific publication in the twenty-first century. How can editorial processes be modernized without losing institutional identity? How can emerging technological, methodological, and collaborative tools be integrated to ensure continued relevance for authors and readers? These are not rhetorical questions. Rather, they represent strategic considerations necessary to continue transforming the Journal into a platform with meaningful influence on professional practice and public health.

Across these four decades, and under the guidance of those who have assumed editorial responsibility, *Revista Colombiana de Gastroenterología* has demonstrated that science is built through reflection on the past and steady progress toward the future. Beginning with this issue, the current President of the Colombian Association of Gastroenterology, Dr. Alejandro Concha, has honored Dr. Gerardo Puentes as Associate Editor and the author as Editor-in-Chief, supported by Ms. Olga Mejía, who has served as editorial assistant for the past twenty-three years. Together, they assume responsibility for this important undertaking with the objective of ensuring that the Journal continues to contribute high-quality knowledge capable of advancing gastroenterology in Colombia and beyond national borders.

The current context of scientific communication differs profoundly from that of four decades ago. Digital transformation, open access, open science, the application of artificial intelligence to research, new models of academic evaluation, and increasing demands for visibility and impact pose unavoidable challenges for contemporary scientific journals. Within this context, *Revista Colombiana de Gastroenterología* has both the opportunity—and the responsibility—to implement changes that enable updating and modernization without compromising its identity. Modernization does not imply abandoning tradition; rather, it strengthens it. It does not mean compromising rigor, but rather enhancing it through new tools, formats, and strategies for scientific communication. Updating editorial processes, optimizing review and publication timelines, strengthening transparency and editorial ethics, expanding international visibility, and promoting the participation of new generations of researchers are essential steps to ensure the Journal's continued relevance. Furthermore, exploring innovative formats—including visual articles, multimedia content, integration with academic networks and digital platforms—may bring knowledge closer to broader and more diverse audiences without compromising scientific quality.

Modernization also entails rethinking the role of the journal as a space for critical reflection. Beyond the publication of results, the journal may consolidate its position as a forum for addressing current challenges in gastroenterology, including equity in access to healthcare, evidence-based medicine in local contexts, continuing medical education, translational research, and the social impact of scientific knowledge.

These forty years serve as a reminder that the history of *Revista Colombiana de Gastroenterología* must continue to be written. The past provides roots, the present demands action, and the future calls for responsible innovation. Embracing change as a natural component of editorial evolution represents the most appropriate way to honor the legacy established by preceding generations.

May this anniversary therefore represent not only a celebration, but also a pause for reflection—a moment to reaffirm commitment to academic excellence while promoting the transformations necessary for the Journal to remain relevant, influential, and valuable to the specialty in the years ahead.

Forty years of history provide a strong foundation. The willingness to evolve and modernize constitutes the key to continued progress.

Informed consent

This article does not require approval from an Institutional Ethics Committee and is not subject to informed consent requirements. It represents the personal opinion of the author.

Conflicts of interest

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Use of artificial intelligence

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Original article

Clinical Utility of Capsule Endoscopy in the Evaluation of Small Bowel Pathology in Hospitalized Patients in Colombia: The *CAPHOCOL* Study

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Abstract

Introduction: Capsule endoscopy (CE) is an essential tool for small bowel evaluation; however, experience in hospitalized patients in Colombia remains limited. This multicenter study provides novel data regarding its safety, diagnostic yield, and clinical utility. **Materials and Methods:** A cross-sectional study was conducted between November 2019 and December 2021 at two referral centers. A total of 68 hospitalized patients (≥18 years) with indications for CE and negative conventional endoscopic evaluations were included. Clinical variables, bowel preparation quality, endoscopic findings, and adverse events were assessed. **Results:** The cohort consisted of 42 men (61.8%) and 26 women (38.2%), with a median age of 60.5 years (standard deviation [SD]: 24.3; range: 18–96). The main indications were obscure gastrointestinal bleeding (77.9%; 95% confidence interval [CI]: 65.8–86.9) and suspected inflammatory bowel disease (22.1%; 95% CI: 13.1–34.2). The devices used were CapsoCam SV-1 (54.4%), PillCam SB3 (25%), and PillCam Colon (20.6%). Bowel preparation was rated as adequate or excellent in 92.6% of cases. Diagnostic yield reached 88.2% in obscure bleeding and 89.2% in inflammatory bowel disease, with Crohn's disease confirmed in 22% of cases. The most frequent lesions were ulcers/erosions (72%) and angiectasias (19.5%). Only one mild adverse event (1.5%) was documented, which resolved spontaneously. **Conclusions:** Capsule endoscopy demonstrated an outstanding safety profile and a diagnostic yield exceeding 85% in hospitalized patients. These findings support its implementation as a first-line strategy for obscure gastrointestinal bleeding and inflammatory bowel disease in Latin America.

Keywords (DeCS)

Capsule endoscopy, small intestine, endoscopy, Crohn disease, hemorrhage, diagnosis.

INTRODUCTION

Video capsule endoscopy (VCE) has transformed gastroenterology practice by providing a minimally invasive method for evaluating the small bowel. Since its introduction in 2000, this technology has demonstrated high diagnostic yield in clinical scenarios such as obscure gastrointestinal bleeding, inflammatory bowel disease (IBD), celiac disease, polyposis syndromes, and other small bowel and colonic disorders. It offers important advantages over conventional techniques, as it does not require sedation, is well tolerated, and is associated with low complication rates[1-3].

Technological advances in capsule endoscopy systems have improved image quality, recording time, lesion detec-

tion, and patient acceptability. Among the most widely used devices are the PillCam SB3 and PillCam Colon systems, both extensively validated in international studies. More recent technologies, such as the CapsoCam SV-1, which provides a 360° panoramic view, offer additional diagnostic opportunities. However, clinical experience remains limited and is still evolving[4-7].

In the Latin American context, and particularly in Colombia, published studies evaluating the clinical utility of VCE are scarce and have focused primarily on outpatient populations[8,9]. Evidence regarding its implementation in hospitalized patients is even more limited, despite the greater clinical complexity of this population, characterized by comorbidities, reduced mobility, and a potentially different risk profile. Robust evidence in this setting is essential to optimize timely diagnostic and therapeutic decision-making, particularly for common indications such as obscure gastrointestinal bleeding and IBD.

In this context, a multicenter experience in Colombia using capsule endoscopy in hospitalized patients is presented. The study employed PillCam SB3, PillCam Colon, and CapsoCam SV-1 technologies. It represents the first national series describing diagnostic yield, bowel preparation quality, and safety profile in this patient population and provides locally relevant clinical evidence to support improved management in this setting.

MATERIALS AND METHODS

Study design and data extraction

A descriptive observational cross-sectional study was conducted using convenience sampling between November 2019 and December 2021 in two referral centers for gastroenterology and digestive endoscopy in Bogotá, Colombia. The study population included patients aged ≥18 years with an indication for capsule endoscopy (CE) for any reason, according to the treating physician's clinical judgment, and with initial negative endoscopic studies for a bleeding source in both the upper and lower gastrointestinal tract (including ileoscopy with evaluation of the distal 15 cm of the ileum). Eligible patients had no obstructive symptoms or known intestinal stenosis and were hospitalized in general inpatient wards. Patients who had used nonsteroidal anti-inflammatory drugs (NSAIDs) within two months prior to the endoscopic procedure were excluded. Additional exclusion criteria included absence of ileocolonoscopy and the presence of obstructive symptoms, such as abdominal distension, nausea, vomiting, or recurrent episodes of intestinal obstruction.

Data collection

Medical records and official procedure reports were used as primary sources of information. Sociodemographic and clinical variables were collected, and a descriptive analysis was conducted to assess diagnostic effectiveness, endoscopic findings, bowel preparation quality, and adverse events. Collected variables included age, sex, clinical indication, endoscopic findings, findings suggestive of small bowel Crohn's disease (CD), and clinical and technical complications.

Definitions

The quality of bowel preparation for capsule endoscopy was assessed using the small bowel cleansing scale described by Hooks et al.[10], based on overall evaluability. This scale incorporates qualitative and quantitative criteria, ease of assessment, reduced time requirements, and endoscopist preference. In this classification, excellent preparation is defined as the presence of small fragments of adherent solid material with clear or lightly colored fluid; good preparation as the presence of small amounts of liquid, minimal solid material, or dark fluid that does not interfere with the examination; fair preparation as the presence of sufficient solid material or dark fluid to impair reliable examination; and poor preparation as the presence of a large volume of food residue or fecal material that precludes complete examination. Findings suggestive of small bowel CD were defined according to criteria established by the Japanese Society, specifically the presence of at least one major criterion proposed by Matsui et al.[11] and validated by Hisabe et al.[12]. These criteria included longitudinal ulcers, cobblestone appearance, or non-caseating epithelioid cell granulomas. In the colon, findings suggestive of ulcerative colitis (UC) included mucosal edema, loss of vascular pattern, erythema, mucosal granularity and friability, erosions, ulcers, and pseudopolyps. Findings suggestive of Crohn's disease included aphthous ulcers, cobblestone pattern, and discontinuous ("skip") lesions[13].

Statistical analysis

Data were processed using SPSS version 25 (IBM Corp., Armonk, NY). Categorical variables were expressed as absolute and relative frequencies (%). Continuous variables were summarized using means and standard deviations (SD) or medians and ranges, according to data distribution. Comparisons among groups (PillCam SB3, PillCam Colon, and CapsoCam SV-1) were performed using the chi-square test or Fisher's exact test for categorical varia-

bles, and ANOVA or Kruskal–Wallis tests for continuous variables. Ninety-five percent confidence intervals (95% CI) were calculated, and statistical significance was defined as $p < 0.05$.

Ethical considerations

The study was approved by the Ethics Committee of Gastroadvanced IPS, which provides gastroenterology services at two tertiary-level institutions and serves as a local referral center for gastroenterology and digestive endoscopy. The study design adhered to the principles of the Declaration of Helsinki (2013 revision, Fortaleza, Brazil) and Resolution 8430 of 1993 issued by the Colombian Ministry of Health. The study was classified as minimal risk research. Confidentiality and data protection were strictly ensured. All patients were informed and provided written informed consent. No records contained sensitive patient-identifying information.

Procedure

All patients received the same bowel preparation protocol. Two days before the procedure, patients were advised to consume a soft diet and clear liquids without artificial coloring. On the day prior to the study, patients followed a clear liquid diet and initiated fasting at 17:00 hours, followed by oral administration of 3 L of polyethylene glycol solution (NULYTELY®; formulation containing more than 105 g of polyethylene glycol 3350, 2.8 g NaCl, 0.37 g KCl, and 1.43 g $NaHCO_3$), according to institutional availability. No additional laxative boosters were used.

The technologies employed included PillCam SB3, PillCam Colon, and CapsoCam SV-1 (CapsoVision), available at the time of the study. The sole objective was evaluation of the small intestine. The PillCam SB3 and PillCam Colon systems are cylindrical devices with adaptive image capture rates. PillCam SB3 is designed for small bowel endoscopy and operates at an adjustable frame rate ranging from 2 to 6 frames per second, allowing acquisition of high-quality images during transit through the small intestine. PillCam Colon, primarily designed for colon evaluation, uses an adaptive frame rate typically ranging between 4 and 6 frames per second to ensure adequate coverage of the intestinal tract, although its principal function focuses on imaging the colonic mucosa. Both devices are equipped with a camera, light source, batteries, and transmitter, and can capture up to 60,000 images during gastrointestinal transit. Images are transmitted to an external recording device, after which they are downloaded and analyzed by two gastroenterologists experienced in VCE interpretation.

The CapsoCam SV-1 system provides a 360° panoramic view of the small intestine. This capsule uses wireless technology and is equipped with four high-speed cameras that enable detailed visualization of the intestinal mucosa. During the first two hours of examination, the capsule captures images at 20 frames per second (fps), after which the capture rate decreases to 12 fps while maintaining adequate coverage for complete evaluation of the gastrointestinal tract. The CapsoCam SV-1 has a battery life of up to 15 hours, sufficient for most small bowel examinations. Images are stored directly in the capsule's internal memory; therefore, the patient does not need to carry an external receiver. After completion of the examination, the capsule is naturally excreted, and stored images are downloaded for analysis using specialized software. The software allows simultaneous visualization of up to four images and achieves a total viewing rate of approximately 32 frames per second (eight frames per second per image). The study was independently evaluated by two expert endoscopists, who recorded findings for each patient and issued a written report[14-17].

For analysis, a retrospective database was created including the following variables: patient name, sex, age, study results, and technical and clinical complications identified.

RESULTS

Clinical characteristics

A total of 68 hospitalized patients were included, of whom 61.8% were male (n = 42; 95% CI: 49.6–73.0). The median age was 60.5 years (range: 18–96; SD: 24.3), with no significant differences by sex ($p = 0.27$). Bowel preparation quality was optimal in 92.6% of cases (75.0% excellent; 17.6% adequate), whereas only 7.4% were classified as fair, supporting high diagnostic reliability. Regarding clinical indications, the most frequent was obscure gastrointestinal bleeding (77.9%; 95% CI: 65.8–86.9), followed by suspected inflammatory bowel disease (IBD) (22.1%; 95% CI: 13.1–34.2). In terms of technology used, CapsoCam SV-1 was employed in 54.4% of cases (n = 37), PillCam SB3 in 25.0% (n = 17), and PillCam Colon in 20.6% (n = 14), reflecting device availability and clinical preference at participating centers. Detailed clinical and technical characteristics of the cohort are presented in **Table 1**, including proportions, measures of central tendency, and corresponding 95% confidence intervals.

Capsule endoscopy procedure

Capsule ingestion was successful in all patients. No failures were documented in device activation or image transmis-

Table 1. Clinical and technical characteristics of patients undergoing inpatient capsule endoscopy (n = 68)

Variable	n (%)	95% CI
Male sex	42 (61.8)	49.6-73.0
Age, years (mean ± SD; range)	60.5 ± 24.3 (18–96)	—
Previous studies		
- Ileocolonoscopy	68 (100)	—
- Contrast-enhanced abdominal CT	34 (50.0)	37.6-62.4
- Upper gastrointestinal endoscopy	56 (82.4)	71.2-90.3
Technology used		
- PillCam SB3	17 (25.0)	15.2-37.1
- PillCam Colon 2*	14 (20.6)	11.9-32.8
- CapsoCam SV-1	37 (54.4)	41.9-66.4
Main indication		
- Suspected obscure gastrointestinal bleeding	53 (77.9)	65.8-86.9
- Suspected inflammatory bowel disease	15 (22.1)	13.1-34.2
Bowel preparation quality (modified Boston scale)		
- Excellent	51 (75.0)	62.9-84.7
- Adequate	12 (17.6)	9.7-28.8
- Fair	5 (7.4)	2.8-16.9

*For PillCam Colon 2, activation was performed in the stomach to avoid hibernation periods. SD: standard deviation; IBD: inflammatory bowel disease; 95% CI: 95% confidence interval. Table prepared by the authors.

sion to the recording systems. The mean time from ingestion to esophageal passage was 5.9 seconds (range: 3.7–8.1). Mean gastric transit time was 43.8 minutes (range: 26–74) and mean small bowel transit time was 384 minutes (range: 228–468). Regarding colonic progression, complete colonic imaging was obtained in 19 patients (27.9%; 95% CI: 18.2–40.0), with a mean colonic residence time of 110 minutes. Gastrointestinal transit parameters, compared across the three capsule systems used (PillCam SB3, PillCam Colon, and CapsoCam SV-1), are presented in detail in **Table 2**, including dispersion measures and 95% confidence intervals.

Clinical findings

Endoscopic findings obtained through capsule endoscopy are summarized in **Tables 3** and **4**. In studies performed with PillCam SB3 and PillCam Colon, the most frequent lesions were ulcers and erosions (67.8%), followed by angiectasias (19.5%). In all cases, prior ileocolonoscopy was negative for clinically relevant findings, highlighting the added diagnostic value of capsule endoscopy in this patient population.

Safety profile and adverse events

A single adverse event (1.5%) was recorded with the CapsoCam SV-1 system in a patient with serpiginous ulcers and areas of ileal stenosis, who presented delayed capsule progression with an incomplete study. Fluoroscopic follow-up documented capsule retention in the right iliac fossa on day 5 and spontaneous progression to the transverse colon on day 7. Expulsion occurred on day 8 without the need for therapeutic intervention. This case did not meet criteria for capsule retention, and no clinical complications were observed.

Table 2. Gastrointestinal transit times according to capsule endoscopy system used in hospitalized patients (n = 68)*

Parameter	PillCam SB3 (n = 17)	PillCam Colon 2 (n = 14)	CapsoCam SV-1 (n = 37)	*p*-value
Esophageal transit (seconds), mean ± SD	5.1 ± 1.2	5.2 ± 1.4	4.9 ± 1.1	0.74
Gastric transit (minutes), mean ± SD	40.3 ± 9.5	42.6 ± 10.1	41.5 ± 8.9	0.62
Small bowel transit (minutes), mean ± SD	279 ± 65	290 ± 71	217 ± 54	0.03**
Colonic residence time (minutes), mean ± SD	109.4 ± 28.3	117.0 ± 30.1	112.9 ± 26.7	0.58

*Small bowel transit time was significantly shorter with CapsoCam SV-1 compared with PillCam systems ($p = 0.03$), whereas no significant differences were observed in other parameters. **$p < 0.05$ indicates statistical significance (one-way ANOVA). SD: standard deviation. Table prepared by the authors.

Table 3. Endoscopic findings in patients evaluated with PillCam SB3 or PillCam Colon capsule endoscopy (n = 31)

Finding	n (%)	95% CI
Erosions or ulcers	21 (67.8)	48.6-82.8
Small bowel angiectasias	6 (19.5)	8.0-37.0
Phlebectasias	2 (6.4)	1.1-21.1
Lymphangiectasias	3 (9.6)	2.6-25.9
Ulcerated jejunal gastrointestinal stromal tumor (GIST)	1 (3.2)	0.2-19.0

Ulcers/erosions and vascular lesions represented more than 85% of diagnoses in this subgroup. IBD: inflammatory bowel disease; GIST: gastrointestinal stromal tumor; 95% CI: 95% confidence interval; SB: small bowel. Table prepared by the authors.

Table 4. Endoscopic findings in patients evaluated with CapsoCam SV-1 capsule endoscopy (n = 37)

Overall findings	n (%)	95% CI
Erosions or ulcers	28 (75.7)	59.9-87.1
Small bowel angiectasias	9 (24.3)	12.5-41.0
Phlebectasias	4 (10.8)	3.4-25.0
Lymphangiectasias	5 (13.5)	5.0-28.9
Findings attributable to IBD (n = 15)	**n (%)**	**95% CI**
Ileal ulcer	9 (60.0)	35.8-80.2
Jejunal ulcer	5 (33.3)	14.6-58.9
Stenotic lesions	1 (6.6)	0.3-28.7

IBD: inflammatory bowel disease; 95% CI: 95% confidence interval; SB: small bowel. Table prepared by the authors.

No adverse events were reported with the PillCam SB3 or PillCam Colon systems. This confirms an overall favorable safety profile in hospitalized patients.

Diagnostic yield of PillCam SB3 and PillCam Colon

All cases in which PillCam SB3 and PillCam Colon were used corresponded to indications for obscure gastrointestinal bleeding. Capsule endoscopy established the diagnosis in 27 of 31 patients (87.1%; 95% CI: 71.2–95.1). The most frequent etiologies were ulcers, angiectasias, and vascular lesions (**Table 3**). **Figures 1** and **2** illustrate representative examples of findings detected with PillCam SB3 and PillCam Colon, including stigmata of recent bleeding, subepithelial lesions, and ulcerated gastrointestinal stromal tumors that had not been identified in prior conventional endoscopic studies.

CapsoCam SV-1 capsule endoscopy findings

A total of 37 patients were evaluated using CapsoCam SV-1. Among them, 22 corresponded to indications for obscure gastrointestinal bleeding (59.5%), and 15 to suspected Crohn's disease (40.5%). Capsule endoscopy established a diagnosis in 33 of 37 cases (89.2%; 95% CI: 74.6–96.9). This indicates a high diagnostic yield in the hospitalized patient population (**Table 4**, **Figure 3**). The most frequent lesions were deep ileal ulcers with irregular borders and fibrin deposition, predominantly located in the distal ileum. This pattern was observed primarily in younger patients, with a mean age <35 years, consistent with the age distribution described for more aggressive IBD phenotypes. In a single case (2.7%), stenosis with delayed capsule progression was documented, which resulted in an incomplete study. Imaging follow-up confirmed spontaneous device migration without the need for medical intervention, and the patient was subsequently diagnosed with stenosing Crohn's disease. These findings support the clinical utility of CapsoCam SV-1 in the evaluation of the small bowel in the inpatient setting, both for the diagnosis of obscure gastrointestinal bleeding and for early detection of lesions consistent with inflammatory bowel disease.

The most frequent findings were ulcers/erosions (75.7%), followed by vascular lesions (24.3%). In the subgroup with suspected IBD (n = 15), deep ileal ulcers were most commonly documented (60%), with one case of stenosis associated with delayed capsule excretion that did not require therapeutic intervention.

DISCUSSION

This study demonstrates the clinical utility of capsule endoscopy using the PillCam SB3, PillCam Colon, and CapsoCam SV-1 systems in hospitalized patients in Colombia. The results show high diagnostic yield, adequate safety, and high-quality image acquisition in both obscure gastrointestinal bleeding and inflammatory bowel disease. A distinguishing feature of this study is that it represents the first national

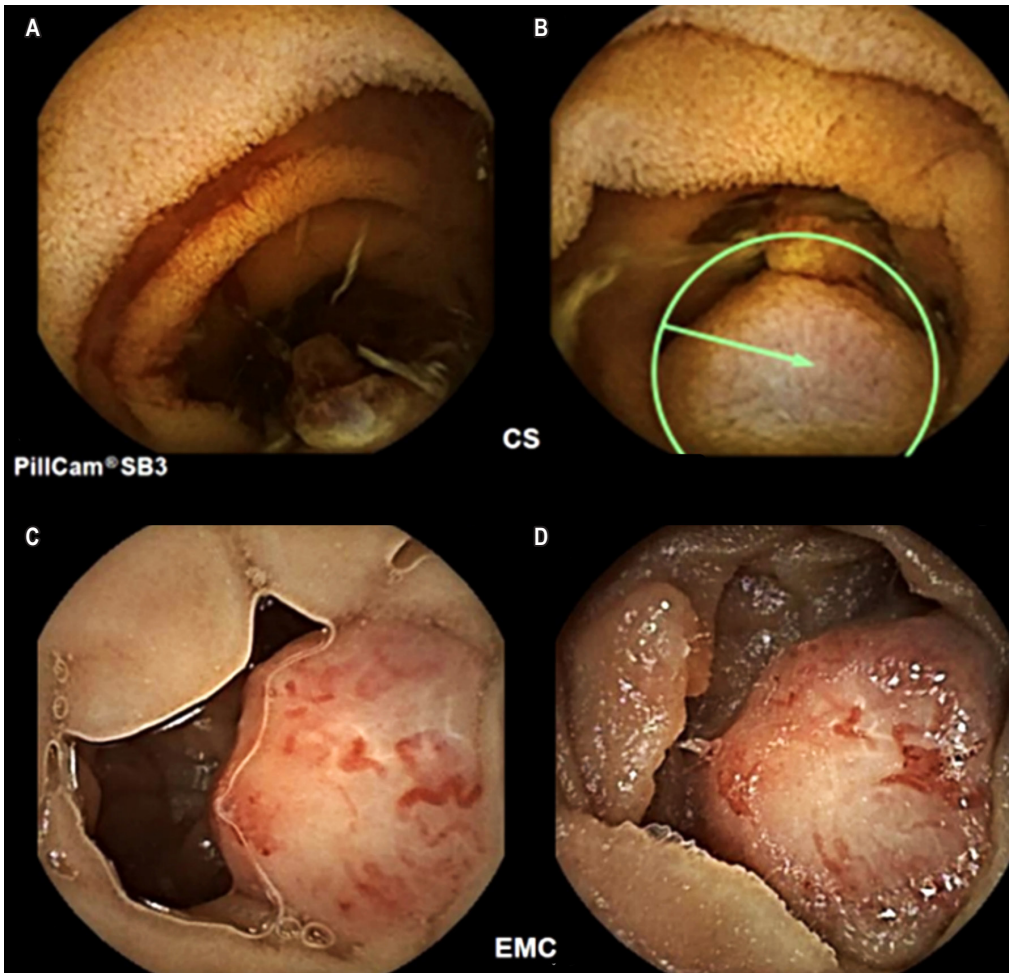


Figure 1. Images obtained using PillCam SB3 capsule endoscopy in patients with obscure gastrointestinal bleeding. **A.** Stigmata of recent bleeding. **B.** Non-ulcerated subepithelial lesion. **C–D.** Ulcerated gastrointestinal stromal tumor. Images property of the authors.

report describing the use of CapsoCam SV-1 in a hospitalized population, providing novel evidence in a clinical setting characterized by increased complexity and risk.

The findings indicate that capsule endoscopy is feasible and reliable in this patient population and achieves a diagnostic yield exceeding 75% for obscure gastrointestinal bleeding. This result is consistent with previous studies conducted in Latin America (60%–78%)[18–21] and comparable to the Colombian registry reported by Galiano et al., which demonstrated an effectiveness of 91.7%[8]. These variations may be attributed to differences in technological availability, timing of the procedure, bowel preparation quality, and lesion interpretation, which remains operator-dependent. Internationally, variability in the diagnostic yield of capsule endoscopy for obscure gastrointestinal bleeding ranges from 38% to 93%[22,23]. This variability underscores the need to standardize interpretation criteria and establish the clinical relevance of detected lesions[24,25].

Findings related to Crohn's disease are of particular relevance. In this cohort, capsule endoscopy using CapsoCam SV-1 identified deep ileal ulcers and stenotic lesions, predominantly in younger patients, consistent with more aggressive disease phenotypes. Although Crohn's disease is a heterogeneous condition requiring integration of clinical, endoscopic, radiologic, and histologic findings for diagnosis[26], capsule endoscopy provides high-resolution imaging and facilitates early detection of inflammatory lesions. According to the STRIDE II strategy[27,28], endoscopic remission is a key therapeutic target in Crohn's disease management. The present findings support the role of capsule endoscopy as a complementary diagnostic tool to achieve treatment targets in the inpatient setting.

Regarding safety, a single case of delayed capsule excretion was documented with CapsoCam SV-1 in a patient with stenosing Crohn's disease, without the need for medical intervention. This observation is consistent with inter-

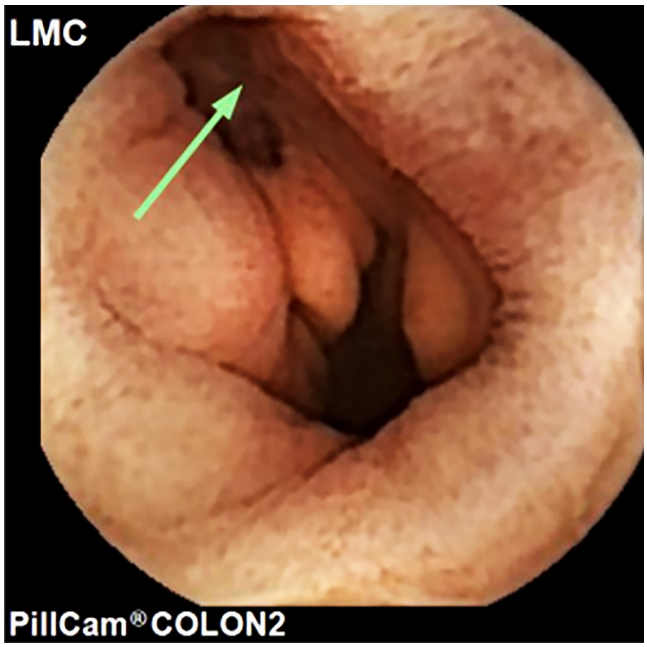


Figure 2. Image obtained using PillCam Colon capsule endoscopy in patients with obscure gastrointestinal bleeding demonstrating a deep lesion in the distal ileum. Image property of the authors.

national reports identifying capsule retention as the most clinically relevant complication, particularly in patients with inflammatory bowel disease[29-31]. Current literature supports the use of complementary diagnostic tools, such as patency capsules or CT enterography, to identify patients at risk of retention prior to capsule endoscopy[31,32].

Bowel preparation remains a subject of ongoing debate. In this study, polyethylene glycol preparation achieved adequate or excellent quality in more than 90% of cases, consistent with national registry data[9] and international studies such as that of Calabrese et al.[26], which reported optimal preparation quality in more than 90% of patients with Crohn's disease. These findings support the routine use of polyethylene glycol as a safe and cost-effective strategy in this clinical context.

Notably, the rate of complete visualization of the small bowel and colon exceeded 70%, which is an encouraging finding considering that the study population consisted of hospitalized patients with limited mobility and multiple comorbidities—factors that often impair capsule progression.

An additional finding of interest is the difference in Crohn's disease clinical phenotype compared with Asian populations, where proximal involvement predominates

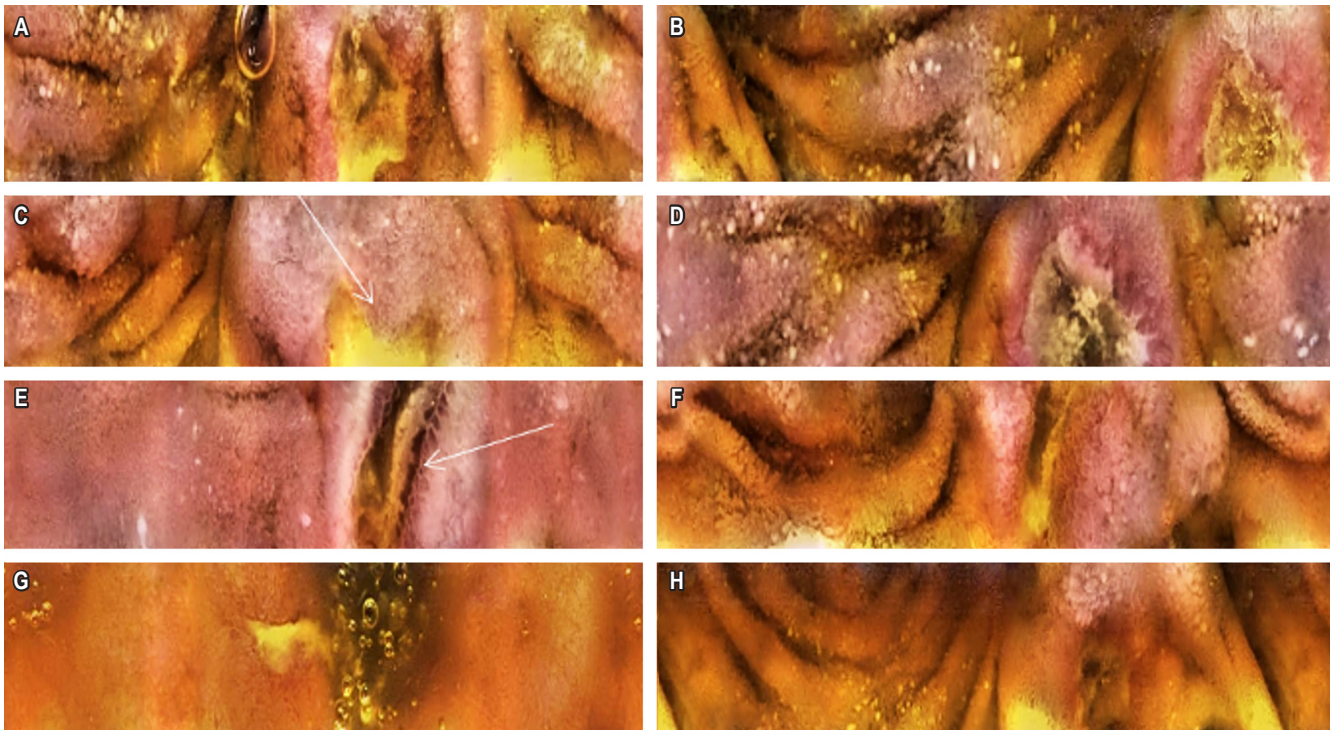


Figure 3. Images obtained using CapsoCam SV-1 (CapsoVision) capsule endoscopy in patients with Crohn's disease involving the small bowel. **A-E.** Ileal ulcer. **F–G.** Jejunal ulcers. **H.** Area of stenosis. Images property of the authors.

and patients are typically younger (mean age 25 years)[33-35]. In the present series, involvement was primarily distal and observed in older patients (mean age >42 years). These differences suggest potential geographic and genetic variability in disease expression and highlight areas for future research in the region.

This study has limitations, including its retrospective design, relatively small sample size, and conduct in only two tertiary referral centers, which may limit generalizability. Unequal availability of capsule systems (PillCam and CapsoCam) may have introduced selection bias. Although interpretation of findings was performed by experienced endoscopists, a degree of subjectivity remains inherent. Nevertheless, independent data verification by two investigators minimized the risk of transcription errors.

CONCLUSIONS

This study demonstrates that capsule endoscopy is a safe and effective diagnostic tool in hospitalized patients in Colombia, with notable performance in the evaluation of obscure gastrointestinal bleeding and inflammatory small bowel disorders. The technique enables detection of clinically relevant lesions and supports timely therapeutic decision-making.

The PillCam SB3, PillCam Colon, and CapsoCam SV-1 systems demonstrated comparable performance in terms of image quality and diagnostic capability. This study represents the first national report describing the use of CapsoCam SV-1 in the inpatient setting. These findings suggest that capsule endoscopy, even in patients with greater clinical complexity, can be safely integrated into routine hospital practice.

Although the observed safety profile was overall favorable, prospective multicenter studies are needed to robustly compare available technologies, identify predictors of complications (such as capsule retention in patients with stenosis), and develop regional protocols adapted to the characteristics of the Latin American population.

Capsule endoscopy emerges as a high-value diagnostic strategy in the hospital setting. Its systematic implementation may optimize comprehensive management of patients with small bowel disorders in this context.

Conflicts of interest

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Original article

Performance of the AST/ALT Ratio as a Diagnostic Marker for Cholelithiasis: Insights from a Retrospective Study in Peruvian Patients with Biliary Colic

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Abstract

Objective: This study evaluated the association and diagnostic performance of the aspartate aminotransferase/alanine aminotransferase (AST/ALT) ratio in the detection of cholelithiasis in patients presenting with biliary colic. **Methods:** A cross-sectional retrospective study was conducted through the analysis of medical records of patients treated for biliary colic in the emergency department of a regional hospital in Peru. Confirmatory diagnosis of cholelithiasis was established based on clinical evaluation and abdominal ultrasonographic findings. Serum AST and ALT activity levels were obtained to calculate the AST/ALT ratio. Diagnostic performance was assessed using receiver operating characteristic (ROC) curve analysis. **Results:** A total of 191 medical records were reviewed, corresponding to 94 patients with cholelithiasis and 97 without. The mean age was 49.6 ± 15.1 years, and 72% of the cohort were women. Elevated ALT and AST levels were observed in 34% and 31.9% of patients, respectively. The area under the curve (AUC) for the AST/ALT ratio was 0.52, indicating minimal diagnostic value, while the AUCs for AST and ALT were 0.67 and 0.65, respectively. In the model adjusted for age and sex, the association between the AST/ALT ratio and cholelithiasis showed a prevalence ratio of 1.16 (95% confidence interval [CI]: 0.56–2.41). **Conclusion:** The AST/ALT ratio demonstrated limited efficacy as a diagnostic marker for cholelithiasis in patients with biliary colic. Although individual AST and ALT levels showed moderate diagnostic potential, the AST/ALT ratio did not significantly enhance the identification of cholelithiasis within this clinical context.

Keywords

Aspartate aminotransferase, alanine aminotransferase, AST/ALT ratio, cholelithiasis, biliary colic.

INTRODUCTION

Cholelithiasis, commonly known as gallstone disease, is a prevalent medical condition affecting between 5% and 20% of the general population[1]. Epidemiological evidence indicates a higher incidence in women than in men, as well as a greater burden in South American populations[2]. Cholelithiasis is a leading cause of biliary colic, characterized by severe abdominal pain resulting from obstruction of the biliary duct by gallstones[3]. In most cases, cholelithiasis is benign and is not associated with significant morbidity or mortality. However, in prolonged or severe cases, or in predisposed individuals, it may increase the risk of fibrosis and cirrhosis, hepatocellular carcinoma, or cholangiocarcinoma[4]. This condition not only represents a burden for healthcare systems but also significantly affects patients' quality of life[5].

The pathophysiology of cholelithiasis involves complex interactions among genetic predisposition, metabolic factors, and environmental influences. These interactions

lead to bile supersaturation with cholesterol or bilirubin and subsequent gallstone formation[6]. Despite advances in understanding the mechanisms underlying gallstone formation, early and accurate diagnosis of cholelithiasis remains a challenge in clinical practice[7], particularly in settings with limited imaging resources, the need for invasive diagnostic methods, or in cases involving "silent stones"[8], Mirizzi syndrome[9], and other atypical presentations.

The aspartate aminotransferase (AST) to alanine aminotransferase (ALT) ratio, known as the De Ritis ratio, is a key indicator of liver function and has traditionally been used to evaluate various hepatic disorders[10]. The AST/ALT ratio (De Ritis ratio) is useful for guiding the etiological assessment of hepatic dysfunction, as in alcoholic liver disease the ratio is typically >2. This pattern reflects mitochondrial injury and increased AST release, whereas in acute viral hepatitis and nonalcoholic fatty liver disease ALT elevation predominates and AST/ALT values are typically <1. However, in the latter condition, the ratio may increase as fibrosis progresses[11]. Recent studies have also associated this ratio with extrahepatic conditions such as insulin resistance[12], COVID-19[13], and increased risk of cardiovascular and all-cause mortality[14].

Some studies suggest that the AST/ALT ratio may also have diagnostic potential in biliary disorders[15,16]. Previous research has documented an association between liver enzyme abnormalities and biliary obstruction. However, the reported cutoff values vary widely[17,18], and choledocholithiasis has been reported to present with mild to moderate elevations of aminotransferases, generally up to 10 times the upper limit of normal, whereas higher levels are uncommon[19,20]. According to the American Society for Gastrointestinal Endoscopy (ASGE) guidelines, abnormalities in liver function tests together with age greater than 55 years constitute moderate predictors of choledocholithiasis, rather than uncomplicated cholelithiasis, as these criteria were designed to estimate common bile duct obstruction. Furthermore, subsequent updates excluded biliary pancreatitis as an independent predictor due to its negative association with choledocholithiasis. Therefore, these criteria should not be extrapolated to the diagnosis of isolated cholelithiasis[21].

Monitoring individuals at risk of cholelithiasis, in its various forms (intrahepatic or extrahepatic), should be ensured through multiple diagnostic methods. These include enzymatic markers such as alkaline phosphatase, γ-glutamyl transferase, and, in some cases, transaminases, to support prediction and diagnosis[22]. Assessment of transaminases provides valuable clinical information, and the De Ritis ratio may help differentiate cholelithiasis from other conditions, such as infectious or inflammatory processes; however, its routine use in clinical laboratories has not been widely reported[11,23].

In Peru, the prevalence of cholelithiasis is approximately 10%[24] and may reach up to 14% in asymptomatic cases[25]. Nevertheless, few publications have focused on specific risk groups, such as pregnant women[26] and populations living in high-altitude cities[27]. Peruvian clinical guidelines do not include these markers for early diagnosis[25], and the application of the AST/ALT ratio in the context of cholelithiasis remains insufficiently explored. This situation underscores the need to improve current understanding of the diagnostic potential of the AST/ALT ratio in biliary disorders.

METHODS

Ethical considerations

This study was approved by the Evaluation Committee of Universidad Alas Peruanas (Resolution No. 347-2019-FCS-EPTM-UAP). Authorization was also obtained from the General Management of Hospital II de Huamanga. As this study used retrospective patient data, informed consent was not required. However, all data were used exclusively for research purposes. Strict patient anonymity was maintained, and no personal identifiers were accessed.

Study design and population

This cross-sectional diagnostic test study, conducted in 2019 in the emergency department of Hospital Regional II de Huamanga (Ayacucho, Peru), evaluated the diagnostic performance and operating characteristics of the AST/ALT ratio for identifying cholelithiasis in patients with a clinical diagnosis of biliary colic.

The study population included patients diagnosed with biliary colic based on clinical presentation, primarily characterized by episodes of severe abdominal pain assessed using the visual analog scale. Patients were subsequently classified into two groups: those with confirmed cholelithiasis and those without cholelithiasis. The diagnosis of cholelithiasis[8] was established by abdominal ultrasound, considered the reference standard for gallstone detection. From a population of patients with a clinical diagnosis of biliary colic (presence of severe right upper quadrant pain, nausea, vomiting, fever, and chills reported within the previous 12 hours), two groups were defined: patients with ultrasonographic evidence of cholelithiasis and patients without gallstone findings on ultrasound. The latter constituted the comparison group for evaluating the diagnostic performance of the AST/ALT ratio.

Materials and procedures

Primary materials included medical records and laboratory results. Data collection was conducted systematically using a standardized form based on the review of medical records and routine biochemical test results. Serum enzymatic activity of AST and ALT was measured in samples obtained as part of routine clinical care using automated biochemical analyzers (Roche Diagnostics, Cobas c311, United States). Results were reported in international units per liter (IU/L). The AST/ALT ratio was calculated by dividing the AST value by the ALT value for each patient, with normal values defined as <40 U/L for AST and <45 U/L for ALT. No normal reference value has been established for the AST/ALT ratio in identifying cholelithiasis; however, previous studies[10,11] have defined values <1.0 as normal in individuals without liver disease.

Patients aged ≥18 years with biliary colic who underwent abdominal ultrasound were included. Two patients with hepatitis A infection and one patient with a history of cirrhosis were excluded. Data collection was performed by three individuals previously trained in the data collection process. All information was anonymized and recorded in a secure database for analysis.

Data analysis

Descriptive statistics were used to summarize demographic and clinical characteristics. The primary analysis employed receiver operating characteristic (ROC) curves to evaluate the diagnostic performance of the AST/ALT ratio for detecting cholelithiasis. The area under the curve (AUC) with a 95% confidence interval (CI) was calculated to determine discriminative ability. Additionally, the association between the AST/ALT ratio and the presence of cholelithiasis was analyzed using a generalized linear model with log link and Poisson distribution. The prevalence ratio (PR) was estimated with adjustment for age and sex, and statistical significance was defined as $p < 0.05$. The analysis was performed using Stata version 18 (StataCorp LLC, TX, United States).

RESULTS

A total of 191 medical records were evaluated, and patients were divided into two groups: 94 with cholelithiasis and 97 without cholelithiasis. The median age was 47 years, and women predominated (72.3%). In the biochemical analysis, 42.6% of patients in the cholelithiasis group presented elevated ALT activity and 41.5% elevated AST activity, according to the established reference values. Bivariate analysis showed significant differences in transaminase levels (AST and ALT) among patients with cholelithiasis, particularly for AST ($p < 0.001$). However, no significant difference was observed in the De Ritis ratio (**Table 1**).

Receiver operating characteristic (ROC) analysis evaluated the diagnostic performance of the AST/ALT ratio, as well as AST and ALT individually. The area under the curve (AUC) for the AST/ALT ratio was 0.52, indicating minimal discriminative ability. In contrast, the AUC values for AST and ALT were 0.67 and 0.65, respectively, indicating moderate diagnostic potential (**Figure 1**).

Table 1. Descriptive characteristics of the evaluated records (n = 191)

Characteristic	Cholelithiasis, n (%)		Value-*p*
	No (n = 97)	Yes (n = 94)	
Age (years)	47 (37-59)[a]	53 (39-62)[a]	0.082[c]
Sex			
- Male	25 (25.8)	28 (29.8)	0.536[b]
- Female	72 (74.2)	66 (70.2)	<0.001[c]
AST Activity (U/L)	30 (24-38)[a]	39 (29-48)[a]	0.002[c]
ALT Activity (U/L)	31 (25-42)[a]	38.5 (33-55)[a]	0.002[b]
Elevated AST			
- No	76 (78.4)	54 (57.4)	0.032[b]
- Yes	21 (21.6)	40 (42.6)	
Elevated ALT			
- No	71 (73.2)	55 (58.5)	0.592[c]
- Yes	26 (26.8)	39 (41.5)	
AST/ALT ratio	0.90 (0.77-1.11)[a]	0.87 (0.79-1.15)[a]	

[a]Median and interquartile range. [b]Pearson's chi-square test. [c]Mann–Whitney U test. Table prepared by the authors.

The association between the AST/ALT ratio and cholelithiasis, assessed using a generalized linear model, showed a crude prevalence ratio (PR) of 1.19 (95% confidence interval [CI]: 0.57–2.47). After adjustment for age and sex, the PR was 1.16 (95% CI: 0.56–2.41) (**Table 2**).

DISCUSSION

The present study evaluated the diagnostic performance of the De Ritis ratio for detecting cholelithiasis in patients presenting with biliary colic. The findings indicate that the AST/ALT ratio does not significantly differentiate between individuals with and without cholelithiasis; therefore, its applicability as a biomarker in this specific clinical context appears limited, with a limited discriminative capacity of the AST/ALT ratio observed for distinguishing cholelithiasis

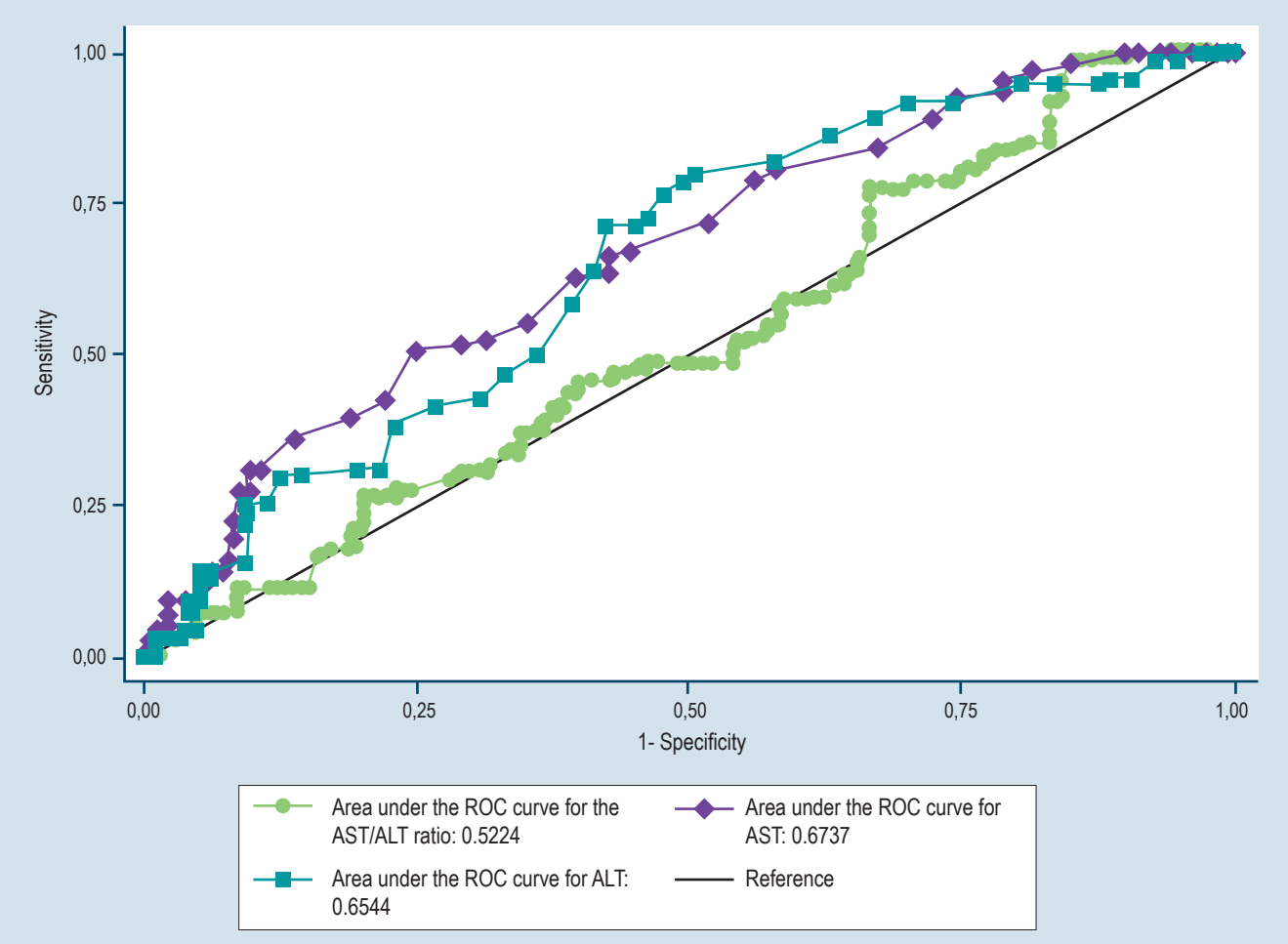


Figure 1. Diagnostic performance of the AST/ALT ratio and the independent enzymatic activity of AST and ALT. Image property of the authors.

Table 2. Association between the AST/ALT ratio and cholelithiasis in multivariable analysis

Independent variables	Crude model[a]			Adjusted model[a]		
	PR	95% CI	*p*-value	PR[b]	95% CI	*p*-value
AST activity (U/L)	1.01	1.00-1.02	0.017	1.01	1.01-1.02	0.024
ALT activity (U/L)	1.01	1.00-1.01	0.084	1.01	1.00-1.01	0.109
AST/ALT ratio	1.19	0.57-2.47	0.644	1.16	0.56-2.41	0.689

[a]GLM (Poisson family with log link). [b]Adjusted for age and sex. ALT: alanine aminotransferase; AST: aspartate aminotransferase; CI: confidence interval; PR: prevalence ratio. Table prepared by the authors.

from other causes of biliary colic. With an AUC of 0.52, the index exhibited only minimal diagnostic utility, a finding that contrasts with its well-established value in other hepatic and extrahepatic conditions[3]. A plausible explanation for these results may lie in the pathophysiological differences between cholelithiasis and other liver diseases in which the AST/ALT ratio has demonstrated diagnostic relevance[11]. Studies of hepatic conditions such as viral hepatitis and alcoholic liver disease have shown the usefulness of this index in those contexts, which suggests that its diagnostic value may

be condition-specific[28]. Unlike these disorders, cholelithiasis primarily affects the biliary tract rather than the hepatic parenchyma, which may explain the absence of significant alterations in the AST/ALT ratio in this setting[29].

When evaluated individually, transaminase activity (AST and ALT) demonstrated moderate diagnostic performance (AUC = 0.67 and 0.65, respectively). This suggests that isolated elevations of these enzymes may reflect pathophysiological processes associated with the disease, although their utility as standalone diagnostic tests is limited. Enzymatic elevations in cholelithiasis are typically transient and associated with episodic biliary obstruction, which may not be adequately captured by the AST/ALT ratio alone[30]. Another possible explanation is that enzymatic activity in cholelithiasis may be influenced by factors such as intermittent obstruction or coexisting hepatic conditions, which may obscure the relationship between the AST/ALT ratio and the presence of gallstones[18].

These findings are consistent with existing literature suggesting the need for more specific biomarkers for the diagnosis of cholelithiasis and underscore the importance of contextual interpretation of hepatic enzyme abnormalities[19]. Previous studies have highlighted the limitations of traditional hepatic biomarkers in differentiating biliary pathologies. For instance, Contreras-Omaña et al. proposed that elevated AST and ALT levels represent a "cholestatic" pattern of bile duct obstruction and that this differentiation may be achieved through indices incorporating alkaline phosphatase and ALT levels, in which values below 2 suggest cholestasis[31]. This observation is relevant because it indicates that cholelithiasis may be associated with mild to moderate hepatic injury. Furthermore, it is essential to recognize that cholelithiasis is inherently a chronic condition[32]. However, the present study did not include data regarding the extent of gallstone disease, which would have enabled a more comprehensive analysis.

It is important to distinguish between gallbladder cholelithiasis and choledocholithiasis. Some clinical guidelines have proposed abnormalities in liver function tests as predictors of common bile duct obstruction. However, these criteria were developed to estimate the risk of choledocholithiasis and not to diagnose uncomplicated cholelithiasis[21,25]. Extrapolation of these parameters to isolated gallbladder disease may lead to misinterpretation. This reinforces the need to contextualize the use of hepatic biomarkers according to the specific clinical scenario.

Despite the novelty of this finding, the results may be limited by the retrospective design and reliance on medical records, which may introduce selection bias or incomplete data capture. Additionally, ultrasonography is not the definitive reference standard for cholelithiasis, and magnetic resonance cholangiography would have provided a more robust diagnostic reference. However, the regional hospital lacks access to this technology. Furthermore, the study was conducted in a single regional hospital in Peru, which may limit generalizability to other populations or healthcare settings. Notably, this is the first study to critically evaluate the diagnostic utility of the AST/ALT ratio specifically in the context of cholelithiasis within a Peruvian population.

This study highlights the importance of a contextualized evaluation of diagnostic tools and suggests that reliance solely on the AST/ALT ratio for diagnosing cholelithiasis is not advisable without supporting evidence. Although the AST/ALT ratio has demonstrated value in the assessment of certain hepatic conditions, the present findings indicate that its diagnostic utility for cholelithiasis is limited.

CONCLUSION

This study provides the first comprehensive evaluation of the AST/ALT ratio as a diagnostic tool for cholelithiasis in a Peruvian hospital setting. The findings suggest that reliance solely on the AST/ALT ratio may be insufficient for accurately diagnosing cholelithiasis. This underscores the need for more reliable biomarkers in clinical practice.

Further research is required to identify alternative biomarkers or combinations of markers that may improve the diagnostic accuracy of cholelithiasis. Future studies should involve larger multicenter cohorts to validate these findings and to assess the integration of additional clinical parameters or novel biochemical markers. Longitudinal studies may also provide insight into the temporal dynamics of hepatic enzymatic alterations as cholelithiasis progresses. Such evidence may facilitate identification of early indicators of disease development.

The identification of alternative biomarkers or composite diagnostic criteria tailored to the pathophysiological characteristics of cholelithiasis may improve diagnostic accuracy and optimize the clinical management of patients with this prevalent condition.

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Institutional review board statement

This study was approved by the Evaluation Committee of Universidad Alas Peruanas (Official Letter No. 347-2019-FCS-

EPTM-UAP). Authorization was also obtained from the General Management of Hospital II de Huamanga.

Informed consent statement

As this retrospective study used human data, informed consent was not required.

Data availability statement

Data supporting the findings of this study are available from the corresponding author upon reasonable request.

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Conflicts of interest

The authors declare no conflicts of interest.

Authors' contributions

TL, LRT, JL, GBQ, and JRR contributed as follows. TL: conceptualization, methodology, data curation, formal analysis, investigation, writing – original draft. LRT: data curation, investigation, formal analysis, writing – review and editing. JL: data curation, formal analysis, visualization, writing – review and editing. GBQ: validation, writing – review and editing, project administration. JRR: conceptualization, methodology, formal analysis, supervision, writing – original draft, writing – review and editing, project administration. All authors read and approved the final version of the manuscript.

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Original article

Ulcerative Colitis: Clinical and Endoscopic Characteristics and Therapeutic Management in the Colombian Caribbean Region

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Abstract

Introduction: Ulcerative colitis (UC) has shown a global increase in incidence in developing countries. In Colombia, its prevalence exceeds that of Crohn's disease, and adherence to clinical practice guidelines remains uncertain, making regional epidemiological characterization essential. **Objective:** To identify clinical patterns, histoendoscopic findings, and therapeutic approaches in patients with UC at a referral center in Barranquilla, Colombia, in 2024. **Methods:** A retrospective descriptive case series was conducted, including 49 adults with histologically confirmed UC treated at a referral center in the Colombian Caribbean region during 2024. Sociodemographic, clinical, endoscopic, histological, and therapeutic variables were collected and analyzed. **Results:** A total of 49 patients were evaluated (mean age: 53.9 years), with a predominance of females and urban residents. Low consumption of alcohol, nonsteroidal anti-inflammatory drugs, and oral contraceptives was observed. The absence of prior appendectomy and the presence of conditions such as anxiety and depression were notable findings. Inflammatory activity assessed by acute-phase reactants and rectal bleeding were frequent. Anatomical extension predominantly corresponded to left-sided colitis and pancolitis, and endoscopic severity was mainly classified as Mayo score 2. Monotherapy with 5-ASA was the most commonly used regimen, with a transition toward combination therapy as endoscopic severity increased and more specific therapeutic regimens were required. **Conclusions:** The findings highlight heterogeneity in the management of UC and a discordance between clinical and endoscopic severity classifications. Integrating demographic, clinical, and histoendoscopic data is essential to optimize treatment strategies and clinical outcomes within the Colombian healthcare context.

Keywords

Ulcerative colitis, inflammatory bowel disease, colitis.

INTRODUCTION

Ulcerative colitis (UC) is one of the two principal manifestations of inflammatory bowel disease (IBD). It is a chronic immune-mediated condition characterized by persistent inflammation of the colonic mucosa. This inflammation is typically superficial and continuous, generally beginning in the rectum and extending proximally in a progressive manner[(1)]. Although IBD was initially considered a disorder predominantly affecting Western populations, recent studies describe a dynamic pattern consistent with a four-stage epidemiological transition model (emergence, acceleration, compounding prevalence, and prevalence equilibrium). Over the past two decades, a marked increase in incidence has been observed in recently industrialized countries, particularly in regions of the Middle East, Asia, and South America. In contrast, incidence rates of IBD in Western countries appear to have entered a stabilization phase at the transition into the twenty-first century, which may reflect saturation of previously prevalent risk factors or the impact of early preventive strategies[(2)].

Globally, approximately 4.9 million individuals were living with IBD in 2019, and although age-adjusted prevalence experienced a slight decline between 1990 and 2019, the absolute number of affected individuals has increased. UC specifically affects between 156 and 291 individuals per 100,000 inhabitants annually and is more commonly observed among adults in Western countries. Crohn's disease (CD), by contrast, has an estimated prevalence of 320 per 100,000 inhabitants in these same regions and occurs less frequently in other parts of the world[3]. In the Colombian context, IBD demonstrates a distinctive epidemiological profile in which UC shows greater prevalence compared with CD. Data corresponding to the 2012–2017 period indicate an annual prevalence of UC of 58.14 per 100,000 inhabitants, compared with 8.9 per 100,000 inhabitants annually for CD. This reflects an approximate UC-to-CD ratio of 4:1[4].

Understanding the factors contributing to the origin and development of IBD remains an active area of research, as its etiology has not yet been fully elucidated, and several exposure-related factors have been described as potentially involved in the etiopathogenesis of the disease, including smoking, alcohol use, nonsteroidal anti-inflammatory drug (NSAID) use, oral contraceptives, prior surgical interventions, and psychiatric disorders. However, the most widely accepted hypothesis involves an exaggerated and persistent mucosal immune response directed toward components of the intestinal microbiota in genetically susceptible individuals. This chronic inflammatory response leads to destruction of the colonic epithelium, ulcer formation, and the development of characteristic clinical manifestations of the disease[5,6].

Within the complex landscape of UC diagnosis and management, clinical decision-making continues to represent a significant challenge. Although multiple clinical practice guidelines and evidence-based consensus recommendations have been developed by scientific societies at both international and national levels, including in Colombia[7–10], translation of these recommendations into routine clinical practice is not always implemented consistently. This gap between evidence and clinical practice underscores the need for studies conducted within the Colombian context to evaluate adherence to these recommendations. Such studies would facilitate objective assessment of the clinical implementation of national and international guidelines for comprehensive UC management and help identify potential areas for optimization in patient care. Validation of the applicability of these guidelines within the local population is essential, as characteristics of the health system, resource availability, and specific patient factors may influence both implementation and effectiveness.

MATERIALS AND METHODS

A retrospective descriptive case series was conducted in accordance with the ethical principles of the Declaration of Helsinki. Patients older than 18 years with histologically confirmed UC who attended outpatient gastroenterology consultation at a referral center in Barranquilla, Colombia, between January and December 2024 were included. To minimize selection bias, inclusion criteria were defined as patients older than 18 years, of Colombian nationality, with biopsy-confirmed UC diagnosis obtained through endoscopic evaluation, presence of active gastrointestinal symptoms (chronic diarrhea, rectal tenesmus, food intolerance), and available fecal calprotectin measurement at the time of evaluation. Patients with gastrointestinal cancer, unclassifiable IBD, nonspecific ileitis, infectious colitis, or UC with concomitant IBD were excluded. Pregnant or breastfeeding women were also excluded.

A non-probabilistic convenience sampling strategy was employed. Methodologically, a list of 49 patients was identified, including type and number of identification document, who were evaluated in outpatient consultation by three different gastroenterologists at a single hospital center. Additionally, a data collection team was established consisting of a third-year internal medicine resident and a specialist in gastroenterology. Data were obtained from a primary source of information (medical records), following prior notification and approval by the institutional research ethics committee, using the ICD-10 diagnostic coding system for codes K51.9 (ulcerative colitis, unspecified) and K52.8 (other specified noninfective colitis and gastroenteritis). A structured data collection instrument designed in Excel® was used to allow systematic data entry and tabulation. To minimize information bias, a standardized data collection protocol was developed in which each variable included in the study was precisely and explicitly defined. The data collection team received repeated training regarding the data collection protocol, operational definitions of variables, and appropriate use of the Excel® instrument. Calibration exercises were also conducted, in which both data collectors independently extracted data from the same medical records and subsequently compared results to identify and resolve discrepancies.

The variables included were as follows: sociodemographic variables (SD): age, age at diagnosis, and sex; exposure-related variables (EX): geographic origin, alcohol use, oral contraceptive use, smoking status, smoking cessation, appendectomy, anxiety, and depression; clinical variables (C): abdominal pain, proctalgia, temperature >38°C, heart rate >80 beats per minute (bpm), blood in stool, fecal incontinence, number of bowel movements per day, hemoglobin, leukocyte count, C-reactive protein (CRP) level, erythro-

cyte sedimentation rate (ESR), Truelove and Witts severity index, American College of Gastroenterology (ACG) severity index, and fecal calprotectin; endoscopic variables (EN): anatomical location and Mayo endoscopic score; histological variable (H): pathology findings; therapeutic variables (T): initial therapeutic regimen and type of treatment.

Collected data were processed using Jamovi Version 2.4.5 (Sydney, Australia) for statistical analysis. Qualitative variables were summarized using frequencies and percentages, whereas quantitative variables were described using measures of central tendency and dispersion (median and interquartile ranges). No hypothesis testing or inferential analyses were conducted due to the case series design. The manuscript was structured following principles of transparency and quality in the reporting of descriptive observational studies. Given the case series design, no analytical comparisons or control for confounding variables were performed.

Regarding participant risk, according to the criteria established in Article 11 of Resolution 8430 of 1993 issued by the Colombian Ministry of Health, this research was classified as minimal risk, as it involved the collection of data recorded in medical records[11].

RESULTS

During the study period, from January 2024 to December 2024, 49 patients with histologically confirmed UC were identified. The mean age of the study population was 53.9 ± 16.6 years, with a mean age at diagnosis of 48.3 ± 16.3 years. Regarding sex distribution, 57.1% of patients were female and 42.9% were male. A substantial majority (95.9%) resided in urban areas, compared with 4.1% from rural regions (**Table 1**).

Alcohol consumption was absent in the majority of the population (77.6%), whereas 22.4% reported alcohol use. NSAID use was reported in 30.6% of patients, while 69.4% reported no use. Among female participants, 67.8% did not report oral contraceptive use, whereas 32.2% reported current or prior use. Notably, 37.5% of patients reported being smokers, while 62.5% were non-smokers; smoking cessation was achieved in 34% of individuals, whereas 66% continued smoking. Regarding prior surgical procedures and mental health conditions, 87.8% of participants reported no history of appendectomy, while 12.2% had undergone this procedure. In the evaluation of mental health conditions, anxiety was present in 12.2% of patients and depression in 4.1% (**Table 1**).

With respect to the clinical profile, laboratory chemistry and hematologic parameters showed a mean erythrocyte sedimentation rate (ESR) of 22.8 ± 11.0 mm/h and a median C-reactive protein (CRP) level of 0.360 mg/L, both relevant markers in the context of systemic inflammation.

Table 1. Demographic and exposure-related characteristics (n = 49)

Variable	n (%) / Median ± SD
Sociodemographic variables	
Age (years), median (IQR)	53.9 ± 16.6
Age at diagnosis (years), median (IQR)	48.3 ± 16.3
Sex	
- Male	21 (42.9)
- Female	28 (57.1)
Exposure-related variables	
Alcohol use	
- No	38 (77.6)
- Yes	11 (22.4)
NSAID use	
- No	34 (69.4)
Oral contraceptives	
- Yes	9 (32.2)
Smoking	
- No	30 (62.5)
- Yes	18 (37.5)
Smoking cessation	
- No	31 (66)
- Yes	16 (34)
Appendectomy	
- No	43 (87.8)
- Yes	6 (12.2)
Anxiety	
- No	43 (87.8)
- Yes	6 (12.2)
Depression	
- No	47 (95.9)
- Yes	2 (4.1)

SD: standard deviation; NSAID: nonsteroidal anti-inflammatory drug; IQR: interquartile range. Table prepared by the authors.

Median hemoglobin level was 13.0 g/dL, and median leukocyte count was 11.7 × 10^3/µL. Fecal calprotectin levels, indicative of intestinal inflammatory activity, showed a median value of 589 µg/g (interquartile range [IQR]: 88.4–1736). Based on fecal calprotectin interpretation, 67.3% of patients were classified as having active disease, 4.1% as indeterminate, and 28.6% as in remission within the overall population (**Table 2**). From a symptomatic perspective, abdominal pain was the most frequently reported symptom, present in 59.2% of patients. None of the participants exhibited body temperature >38 °C or heart rate >80 beats

per minute (bpm). However, the presence of blood in stool was reported in 71.4% of patients, compared with 28.6% without this finding. Fecal incontinence was reported in 20.4% of the total population. The number of daily bowel movements was distributed across three clinical categories: 1–4 bowel movements per day in 59.2% of patients, 5–10 in 30.6%, and >10 in 10.2%, demonstrating variability in symptomatic presentation (**Table 2**).

Table 2. Clinical characteristics (n = 49)

Variable	n (%) / Median (IQR)
Hematologic parameters	
ESR (mm/h), median (IQR)	22,8 ± 11,0
Hemoglobin (g/dL), median (IQR)	13 (11,5-14,1)
Leukocytes (10^9/L), median (IQR)	11,7 (7,23-16,05)
CRP (mg/L), median (IQR)	0,360 (0,140-1,15)
Stool sample	
Fecal calprotectin (µg/g), median (IQR)	589 (88,4-1736)
Fecal calprotectin interpretation according to ACG, n (%)	
Activity (>200 µg/g)	33 (67,3)
Indeterminate (110-200 µg/g)	2 (4,1)
Remission (≤100 µg/g)	14 (28,6)
Symptoms*	
Abdominal pain	
- No	20 (40,8)
- Sí	29 (59,2)
Proctalgia	
- No	38 (77,6)
- Yes	11 (22,4)
Body temperature >38 °C	
- No	49 (100)
Heart rate >80 bpm	
- No	49 (100)
Blood in stool	
- No	14 (28,6)
- Yes	35 (71,4)
Fecal incontinence	
- Absent	39 (79,6)
- Present	10 (20,4)
Number of bowel movements per day	
- 1–4 bowel movements	29 (59,2)
- 5–10 bowel movements	15 (30,6)
- >10 bowel movements	5 (10,2)

*Some patients presented more than one symptom. ACG: American College of Gastroenterology; bpm: beats per minute; CRP: C-reactive protein; ESR: erythrocyte sedimentation rate.

With respect to endoscopic and histopathological evaluation, notable heterogeneity was observed in inflammatory patterns within the study population. The anatomical extent of disease showed the following distribution: proctitis was identified in 16.3% of patients, left-sided colitis in 42.9%, and pancolitis in 40.8% of the total population. In contrast, right-sided colitis demonstrated low frequency, documented in only 8.2% of cases. Regarding the Mayo endoscopic score, the distribution showed predominance of Mayo 2, observed in 46.9% of patients, followed by Mayo 1 in 26.5% and Mayo 3 in 26.5%. From a histopathological perspective, biopsy analysis revealed chronic colitis as the predominant finding, documented in 59.2% of individuals. This pattern was followed by severe acute colitis, present in 28.6%, and chronic colitis with acute exacerbation, identified in 12.2% (**Table 3**). Among patients classified as having mild disease severity according to the ACG index, 18.2% were categorized as severe according to the Truelove and Witts index, 27.6% as moderate, and 44.4% as mild. This group predominated in the overall population (69.4%), highlighting discordance in clinical classification prior to endoscopic evaluation. Within the group classified as moderate according to ACG criteria, only one case (2%) was classified as mild according to Truelove and Witts, without significant concordance across other categories (**Table 4**).

Table 3. Endoscopic and histological characteristics (n = 49)

Variable	n (%)
Endoscopic anatomical variables	
Anatomical endoscopic location	
- Proctitis	8 (16.3)
- Left-sided colitis	21 (42.9)
- Pancolitis	20 (40.8)
- Predominant right-sided involvement*	4 (8.2)
Mayo endoscopic score, n (%)	
- Mayo 1 (mild erythema, decreased vascular pattern)	13 (26.5)
- Mayo 2 (marked erythema, absent vascular pattern, erosions)	23 (46.9)
- Mayo 3 (spontaneous bleeding, extensive ulcerations, exudate)	13 (26.5)
Histopathological variables	
Pathology report, n (%)	
- Chronic colitis with mild to moderate activity	29 (59.2)
- Chronic colitis with severe activity	14 (28.6)
- Chronic changes without significant inflammatory activity	6 (12.2)

*Predominant right-sided involvement corresponds to patients with disease extension beyond the left colon within the spectrum of extensive colitis. Table prepared by the authors.

Table 4. Clinical severity characteristics

Clinical variables ACG severity index, n (%)	Truelove and Witts severity index, n = 49			
	Severe	Moderate	Mild	Total
Acute severe	9 (81.8%)	16 (55.2%)	5 (55.6%)	3 (6.1%)
Moderate	0 (0%)	5 (17.2%)	0 (0%)	1(2%)
Mild	2 (18.2%)	8 (27.6%)	4 (44.4%)	34 (69.4%)

Table prepared by the authors.

Finally, regarding the initial therapeutic regimen, monotherapy with 5-aminosalicylate (5-ASA) emerged as the predominant treatment strategy, applied in 69.4% of cases. Alternative therapeutic approaches included pharmacological combinations of two or three active agents. Notable combinations included 5-ASA + corticosteroid in 6.1%, 5-ASA + immunomodulator in 2%, and 5-ASA + corticosteroid + immunomodulator in 6.1%. Anti-TNF therapy was used in 4.1% of patients, while anti-TNF + 5-ASA + corticosteroid was used in 4.1%, anti-TNF + 5-ASA in 6.1%, and anti-TNF + 5-ASA + immunomodulator in 2%. Each of these pharmacological combinations represents the range of treatment strategies implemented in the observed clinical practice (**Table 5**). With respect to endoscopic severity, classified according to the Mayo score, notable heterogeneity was observed in the initial pharmacological strategies. Monotherapy with 5-ASA was consolidated as the predominant regimen, being used in 73.5% of the study population. Its prevalence was most pronounced in Mayo 1, where it represented 84.6% of cases, followed by Mayo 2, in which it reached 87.0%, and, similarly, in Mayo 3, also accounting for 87.0% (**Table 5**). In contrast, polytherapy, characterized by the combined use of two or three medications, showed limited implementation overall, being

Table 5. Therapeutic regimen characteristics (n = 49)

Therapeutic variables Type of treatment, n (%)				
Treatment				n (%)
5-ASA				34 (69.4)
5-ASA + oral corticosteroid				3 (6.1)
5-ASA + immunosuppressant				1 (2)
5-ASA + oral corticosteroid + immunosuppressant				3 (6.1)
Anti-TNF				2 (4.1)
Anti-TNF + 5-ASA				3 (6.1)
Anti-TNF + 5-ASA + oral corticosteroid				2 (4.1)
Anti-TNF + 5-ASA + immunosuppressant				1 (2)
Initial therapeutic regimen, n (%) (distribution according to Mayo endoscopic score)				
Regimen	Mayo 1	Mayo 2	Mayo 3	Total
Monotherapy*	11 (84.6)	20 (87)	20 (87)	36 (73.5)
5-ASA	10 (76.9)	20 (87)	20 (87)	
Anti-TNF	1 (7.7)	0 (0)	0 (0)	
Polytherapy*	2 (15.4)	3 (13)	3 (13)	13 (26.5)
5-ASA + oral corticosteroid	0 (0)	1 (4.3)	1 (4.3)	
5-ASA + immunosuppressant	1 (7.7)	0 (0)	0 (0)	
5-ASA + oral corticosteroid + immunosuppressant	0 (0)	2 (8.7)	2 (8.7)	
Anti-TNF + 5-ASA	1 (7.7)	0 (0)	0 (0)	
Anti-TNF + 5-ASA + oral corticosteroid	0 (0)	0 (0)	0 (0)	
Anti-TNF + 5-ASA + immunosuppressant	0 (0)	0 (0)	0 (0)	

*Monotherapy defined as therapy with a single medication; polytherapy defined as therapy using combined pharmacological agents. 5-ASA: aminosalicylates; anti-TNF: tumor necrosis factor-alpha inhibitors. Table prepared by the authors.

documented in 26.5% of cases. Its frequency was lower in Mayo 1, encompassing 15.4% of patients, while in Mayo 2 it decreased to 13.0%. Conversely, it showed a notable increase in Mayo 3, reaching 61.5% of cases. This finding reflects differences in therapeutic strategies (**Table 5**).

The observed differences in the proportion of polytherapy versus monotherapy across Mayo categories may reflect heterogeneity in clinical management protocols. Likewise, the selection of specific treatment regimens varied meaningfully according to endoscopic severity. This reinforces the variability in therapeutic strategies employed within this clinical population (**Table 5**).

DISCUSSION

The findings of this study provide relevant evidence regarding the clinical, demographic, and therapeutic characteristics of patients with UC. These data challenge established paradigms and highlight the heterogeneity of this form of IBD. The predominance of female patients, representing 57.1% of the study population, and a mean age at diagnosis of 48.3 years are consistent with data reported in the National Registry of Inflammatory Bowel Disease in Colombia[12], which describes similar proportions in local cohorts. However, the mean age at presentation was 53.9 ± 16.6 years, exceeding the typical range of 20–40 years described in international literature. This finding suggests potential diagnostic delay or population-specific influences that warrant further investigation. The high proportion of urban patients (95.9%) compared with rural patients (4.1%) underscores the impact of environmental factors associated with urbanization, such as diet and stress. These factors are consistent with studies linking these elements to increased risk of IBD, a trend also documented in international research[13].

Regarding exposure-related factors, the relatively low prevalence of alcohol consumption (22.4%) and limited NSAID use (30.6%) contrast with international studies demonstrating a greater impact of these variables in other populations[14]. Smoking prevalence reached 37.5%, and 66% of patients continued smoking despite attempts at cessation. These findings reinforce the pro-inflammatory impact of tobacco use, widely documented as an aggravating factor in UC[15]. Further investigation would be valuable to clarify the underlying mechanisms in this population. Similarly, the presence of anxiety (12.2%) and depression (4.1%) is consistent with reports highlighting the psychosocial burden associated with IBD. This affects quality of life and therapeutic management and suggests the importance of incorporating mental health assessment into the clinical management of UC[16].

The clinical profile showed elevations in inflammatory biomarkers, including increased fecal calprotectin levels (as defined by the ACG in relation to disease activity: fecal calprotectin levels >250 µg/g are reliable predictors of endoscopic inflammatory activity, whereas values <150 µg/g suggest deep remission). The median value was 589 µg/g. Systemic markers, including ESR and CRP, were also elevated, confirming their central role in monitoring disease activity. These results are consistent with international clinical standards that position these biomarkers as reliable predictors of inflammatory activity[17]. Heterogeneity in endoscopic inflammatory patterns and anatomical disease extent revealed a relevant distribution, with pancolitis predominating in 40.8% of cases. Additionally, Mayo scores indicated substantial disease severity, with Mayo 2 being the most frequent category (46.9%). This finding supports the need for differentiated clinical management according to inflammatory activity and disease extent[18]. Histopathologically, chronic colitis (59.2%) reflected the persistent nature of UC, with acute colitis (28.6%) and chronic colitis with acute exacerbation (12.2%) representing additional patterns. The discordance between ACG and Truelove and Witts severity indices emphasizes the importance of endoscopic evaluation, consistent with current recommendations.

From a therapeutic perspective, monotherapy with 5-ASA predominated across all levels of disease severity and was selected as the initial treatment regimen in 69.4% of patients. This consolidates its role as the standard first-line therapeutic strategy[8]. However, in cases of greater endoscopic severity, such as Mayo 3, the use of polytherapy increased and reached 61.5%. These differences in therapeutic approaches reflect the need to tailor clinical management protocols to patient-specific characteristics, in accordance with UC management guidelines[19], and highlight the trend toward therapeutic escalation according to disease activity. The observed discrepancy between clinical severity indices (ACG and Truelove and Witts) and endoscopic findings demonstrates variability in patient classification prior to endoscopic evaluation. This finding underscores the need for more robust stratification tools to improve clinical classification accuracy, which may optimize management strategies and improve clinical outcomes.

Although the present study provides valuable insights into the local characterization of UC, several limitations inherent to its design must be acknowledged. The sample size of 49 patients limits generalizability of findings to the heterogeneous Colombian population. The descriptive case series design restricts the ability to establish causal associations or conduct inferential comparisons. Likewise, the single-center nature of the study limits extrapolation of

findings to other regions of the country. Therefore, future multicenter and longitudinal studies with larger sample sizes are recommended to explore the temporal dynamics of the disease and therapeutic response. These studies may expand understanding of UC in Colombia.

These methodological considerations highlight important knowledge gaps. The discordance between initial clinical assessment and endoscopic findings underscores the need for more precise pre-endoscopic severity stratification tools. The heterogeneity observed in initial therapeutic regimens, even among patients with similar endoscopic severity, raises questions regarding adherence to clinical guidelines and the potential need for individualized treatment approaches. Finally, the associations identified with factors such as urban origin and psychiatric comorbidities warrant future research to explore underlying mechanisms and the influence of specific genetic and environmental factors in the Colombian population with UC.

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Original article

Presence of Intestinal Disorder Symptoms and Personality Traits in Patients with Mental Disorders: A Cross-Sectional Study

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Abstract

Introduction: Symptoms of disorders of gut–brain interaction (DGBI) present a high degree of psychiatric comorbidity. Personality, understood as a relatively stable pattern of cognition, emotion, and behavior, may modulate both the expression and severity of gastrointestinal symptoms. **Objective:** To determine the relationship between personality domains and the presence and severity of symptoms associated with DGBI in a clinical sample of patients with mental disorders in Bogotá. **Methods:** An observational, analytical, cross-sectional study was conducted in 131 patients aged over 18 years who were receiving care at a mental health clinic. Gastrointestinal symptoms were assessed using the Irritable Bowel Syndrome Severity Scoring System (IBS-SSS), and personality traits were evaluated using the Personality Inventory for DSM-5 (PID-5). Descriptive analyses, correlation tests, and Kruskal–Wallis comparisons were performed. **Results:** According to IBS-SSS scores, 91.2% of participants presented at least one symptom of DGBI, predominantly within the moderate (42.6%) and mild (31.6%) severity ranges. The domains of negative affect (r = 0.176; p = 0.041), detachment (r = 0.250; p = 0.003), and psychoticism (r = 0.177; p = 0.039) showed significant correlations with greater symptom severity. The detachment domain exhibited significantly higher IBS-SSS symptom severity (χ^2 = 11.5; degrees of freedom [df] = 3; p = 0.009) compared with other personality domains. **Conclusions:** Personality traits of detachment, negative affect, and psychoticism are associated with a greater presence and severity of intestinal disorder symptoms, supporting the gut–brain interaction hypothesis. These findings underscore the importance of assessing personality traits in gastroenterology and, conversely, evaluating digestive symptoms within mental health settings.

Keywords

Brain-Gut Axis, personality, mental health.

INTRODUCTION

The gut–brain axis constitutes a bidirectional communication network between the central nervous system and the gastrointestinal system. This network regulates not only digestive physiological functions but also emotional responses to psychological stressors[1,2]. Disorders of gut–brain interaction (DGBI) are gastrointestinal disorders associated with a combination of altered motility, visceral hypersensitivity, mucosal and immune dysfunction, alterations in the intestinal microbiota, and changes in central nervous system processing[3]. These disorders include symptoms such as abdominal pain, bloating, and changes in bowel habits, and are highly prevalent in gastroenterology practice[4,5]; their classification is based on the assessment of chronic gastrointestinal symptoms occurring

in the absence of structural or organic abnormalities that could explain them[6]. The most extensively studied and clinically relevant DGBI include irritable bowel syndrome (IBS), functional dyspepsia (FD), functional constipation (FC), functional diarrhea, and functional abdominal bloating/distension[3]. A study conducted in Argentina, Brazil, Colombia, and Mexico reported that DGBI are highly prevalent across these four Latin American countries. Intestinal disorders were the most common (35.5%), followed by gastroduodenal (11.9%), anorectal (10.0%), and esophageal disorders (5.8%)[7].

The diagnosis of intestinal disorders is based on patient-reported clinical symptoms and the application of standardized criteria, such as the Rome IV criteria[8]. The severity of gastrointestinal symptoms is mainly assessed using the IBS Severity Scoring System (IBS-SSS), which has been validated in Spanish-speaking populations[9].

Evidence indicates that between 20% and 90% of patients with DGBI, such as irritable bowel syndrome (IBS), present psychiatric symptoms or a formal psychiatric diagnosis, with depression being the most frequent comorbidity, followed by anxiety[10-14]. Personality, understood as the organization of structural and functional characteristics that shape a relatively stable pattern of affect, cognition, behavior, and motivation, determines how individuals respond to different situations and allows, to some extent, prediction of behavior[15,16].

Several studies have explored the relationship between personality traits and IBS using different psychometric instruments. One of the most relevant studies is that by Farnam et al.[17], which evaluated the association between personality traits and IBS in patients without psychiatric comorbidity using the NEO Personality Inventory. Findings indicated that among the five major personality factors assessed (neuroticism, extraversion, agreeableness, conscientiousness, and openness to experience), neuroticism and conscientiousness were the most prevalent traits in patients with IBS[17], with women scoring higher than men in neuroticism, extraversion, and conscientiousness[17].

Despite these advances, evidence regarding the relationship between personality traits and intestinal disorder symptoms of the gut–brain axis (ID-GBA) remains limited, particularly in Latin American populations, where studies are scarce and fragmented. In this context, further investigation into the relationship between personality traits and ID-GBA symptoms is warranted, as it may contribute to a better understanding of associated psychological factors.

Based on the above, the study hypothesis proposed that patients with a greater presence of ID-GBA symptoms exhibit a higher prevalence of personality traits associated with neuroticism and conscientiousness, and that these characteristics are associated with the severity of symptoms of gut–brain axis intestinal disorders.

MATERIALS AND METHODS

An observational, analytical, cross-sectional study was conducted in patients diagnosed with mental disorders treated at the Instituto Colombiano del Sistema Nervioso–Clínica Montserrat, both in the outpatient setting (Day Clinic) and inpatient unit, during the first half of 2025. The sample size was calculated using a 95% confidence interval (CI) and 12% variability, resulting in an initial sample of 136 participants. During data collection, five questionnaires were excluded (two due to failure to meet inclusion criteria and three due to incomplete administration), resulting in a final sample of 131 patients.

Participants aged 18 years or older with a diagnosis of a mental disorder who were receiving care in outpatient and inpatient services were included. Rome IV criteria were not applied to establish a formal diagnosis of irritable bowel syndrome. Accordingly, although participants did not have a confirmed IBS diagnosis, the IBS-SSS scale was administered to evaluate the severity of intestinal disorder symptoms. Patients with organic or oncological gastrointestinal pathology, active psychotic symptoms, psychomotor agitation, substance withdrawal syndrome, or cognitive impairment as determined by the treating clinician were excluded.

Instruments

The Irritable Bowel Syndrome Severity Scoring System (IBS-SSS), developed in 1997 by Francis et al. under the direction of Peter Whorwell, classifies IBS severity[18]. In 2011, the instrument was translated, culturally adapted, and validated in Spanish. Evidence demonstrated that the instrument is reproducible, sensitive to clinically relevant changes, and more applicable when the visual analog scale is replaced with a numerical scale[8]. It includes five items assessing abdominal pain (intensity and frequency), abdominal distension, satisfaction with bowel habits, and the impact of IBS on daily life over the previous 10 days. Each item is scored from 0 to 100 (total range: 0–500): <75 = remission, 75–175 = mild, 175–300 = moderate, and >300 = severe[18].

The Personality Inventory for DSM-5 (PID-5) was developed by the American Psychiatric Association as part of the alternative model for personality disorders proposed in DSM-5. It consists of 220 items with four response options and assesses 25 personality trait facets and five broad personality domains in adults aged 18 years and older[19]. Its application is recommended for adult populations aged 18 years and older[19].

Statistical analysis

Data were recorded using the REDCap platform and exported in CSV format for analysis using Jamovi v2.3 statistical software. A normality test was performed to assess sample distribution. Categorical variables were reported as absolute frequencies, and quantitative variables were summarized using measures of central tendency and dispersion. For bivariate analysis, nonparametric tests were used, including Spearman correlation and median comparison using the Kruskal–Wallis test.

Ethical considerations

The research protocol and informed consent form were approved by the Campo Abierto LTDA Research Ethics Committee (Record No. 221, May 2025). All participants provided written informed consent prior to inclusion. The study was conducted in accordance with the ethical principles of the Declaration of Helsinki and national regulations governing health research (Resolution 8430 of 1993 issued by the Colombian Ministry of Health). All collected data were handled with strict confidentiality and used exclusively for academic and scientific purposes.

RESULTS

The sample consisted of 136 participants, with a mean age of 40.8 years (standard deviation [SD] = 15.5; range: 18–92). The majority were female (76.5%), and most participants received care in outpatient psychiatry and psychology services (56.6%). The predominant mental disorder diagnostic groups were depressive disorders (48.5%) and anxiety disorders (24.3%) (**Table 1**).

Regarding the assessment of gastrointestinal symptoms, the mean IBS-SSS score was 205 (SD = 100). Distribution by severity according to IBS-SSS scores showed that 42.6% of participants were classified within the moderate range, 16.9% within the severe range, 31.6% within the mild range, and 8.8% presented scores compatible with absence of symptoms or remission (**Table 2**, **Figure 1**).

With respect to personality traits, mean scores according to PID-5 results were as follows: negative affect = 1.56 (SD = 0.64), detachment = 1.21 (SD = 0.59), antagonism = 0.79 (SD = 0.58), disinhibition = 1.16 (SD = 0.64), and psychoticism = 0.87 (SD = 0.65).

In the Kruskal–Wallis analysis comparing the severity of ID-GBA symptoms, as measured by the IBS-SSS, across personality domains, a statistically significant difference was observed for the detachment domain (chi-square [χ^2] = 11.5; degrees of freedom [df] = 3; $p = 0.009$). This finding indicates that higher levels of detachment were associated with greater symptom severity (**Table 3**).

Table 1. Sociodemographic and clinical characteristics of the sample

Variable	n (%)
Age, years (mean, SD)	40.8 (+/-15.5)
Sex	
- Female	104 (76.5)
- Male	30 (22.1)
- Other	2 (1.5)
Marital status	
- Single	91 (66.9)
- Married	28 (20.6)
- Cohabiting	11 (8.1)
- Separated	5 (3.7)
- Widowed	1 (0.7)
Care setting	
- Outpatient	77 (56.6)
- Inpatient	59 (43.4)
Diagnostic group	
- Anxiety disorders	33 (24.3)
- Depressive disorders	66 (48.5)
- Bipolar disorder	15 (11.0)
- Personality disorder	1 (0.7)
- Substance-related disorder	4 (2.9)
- Psychotic disorder	1 (0.7)
- Other	16 (11.8)

SD: standard deviation. Table prepared by the authors.

Table 2. Distribution of participants according to severity ranges of ID-GBA symptoms based on IBS-SSS scores

Total IBS-SSS score range	n	(%)
No disease or remission	12	8.8
Mild disease	43	31.6
Moderate	58	42.6
Severe	23	16.9

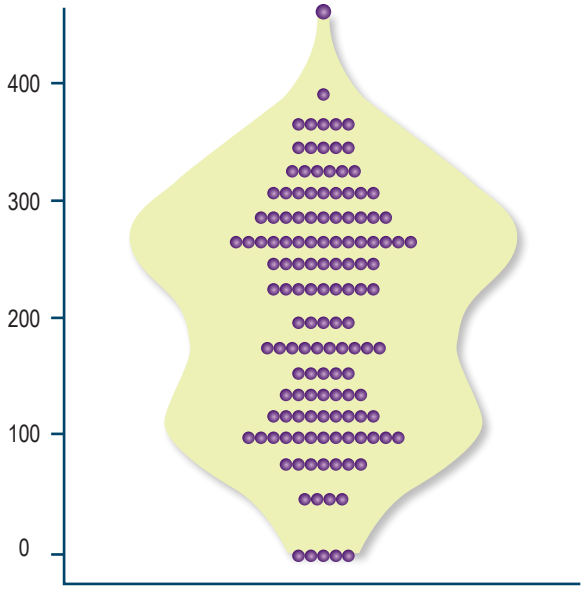


Figure 1. Distribution of severity ranges of ID-GBA symptoms according to IBS-SSS scores. Image property of the authors.

Table 3. Comparison of personality domains according to severity ranges of ID-GBA symptoms assessed using the IBS-SSS scale*

Domain	χ^2	df	*p*
Negative affect	8.80	6	0.185
Detachment	9.48	6	0.148
Antagonism	2.90	6	0.821
Disinhibition	7.84	6	0.250
Psychoticism	4.31	6	0.635

*Results of the Kruskal–Wallis test. χ^2: chi-square; df: degrees of freedom. Table prepared by the authors.

Pearson correlation analysis showed positive associations between total IBS-SSS score and the personality domains of negative affect (r = 0.176; $p = 0.041$), detachment (r = 0.250; $p = 0.003$), and psychoticism (r = 0.177; $p = 0.039$). These associations suggest that greater severity of ID-GBA symptoms is associated with higher scores in these personality traits (**Table 4**).

DISCUSSION

This study aimed to determine whether an association exists between the five personality domains and the presence of intestinal disorder symptoms, with personality domains assessed using the PID-5 and symptom severity measured with the IBS-SSS. The study population consisted of patients with mental disorders receiving care at a mental health unit in Bogotá.

Table 4. Correlations between IBS-SSS total score and personality domains

Domain	r	*p*
Negative affect	0.176	0.041*
Detachment	0.250	0.003*
Antagonism	-0.026	0.766
Disinhibition	0.150	0.081
Psychoticism	0.177	0.039*

*$p < 0.05$. r = Pearson correlation coefficient. Table prepared by the authors.

The literature reports a prevalence of DGBI in Latin America of 35.5%[7], and disorders such as IBS show a strong association with psychiatric comorbidity, primarily depression and anxiety, with frequencies ranging between 40% and 90% according to different authors[10-14]. Consistent with these findings, the analyzed sample showed a high proportion of depressive disorders (48.5%) and anxiety disorders (24.3%). However, these percentages were lower than those reported by authors such as Mariños, who described prevalences exceeding 80%[14].

Although the literature indicates a predominance of DGBI among women[7], the present study did not allow evaluation of this relationship because the sample consisted predominantly of women (76.5%). This represents a limitation associated with convenience sampling. Regarding intestinal disorder symptoms, a mean IBS-SSS score of 205 was observed, corresponding to a moderate severity range. Most participants were classified within mild and moderate ranges, consistent with the clinical heterogeneity described for this disorder[3].

Previous studies, such as that conducted by Farnam et al.[17], have reported that neuroticism and conscientiousness are among the most frequent personality traits in patients with ID-GBA symptoms, including those diagnosed with IBS. Higher scores in neuroticism, extraversion, and conscientiousness have also been observed in women. In contrast, the findings of the present study showed that the domains of negative affect, detachment, and psychoticism were significantly correlated with the severity of ID-GBA symptoms, with no relevant differences observed across psychiatric diagnostic categories. This divergence may be explained by the use of different psychometric instruments and by the clinical characteristics of the sample, which included patients with psychiatric comorbidity. Nevertheless, both prior evidence and current findings

highlight the relevance of personality traits as modulators of clinical expression and symptom severity in disorders of gut–brain axis.

The gut–brain axis, described as a bidirectional communication system between the central nervous system and the enteric nervous system, regulates both gastrointestinal functions and psychological responses associated with anxiety and depression[1,2]. In the sample analyzed in this study, a predominance of depressive disorders (48.5%) and anxiety disorders (24.3%) was observed, together with a high frequency of ID-GBA symptoms. According to the IBS-SSS, 42.6% of participants were classified within moderate ranges and 16.9% within severe ranges. However, given the sampling method and cross-sectional study design, causal relationships between these variables cannot be established. The positive correlation observed between severity of ID-GBA symptoms and the personality traits of negative affect, detachment, and psychoticism suggests that personality factors may amplify the clinical expression of this symptomatology. These findings reinforce the hypothesis that dysfunction of the gut–brain axis constitutes a shared mechanism linking affective disorders with gastrointestinal symptomatology.

In this regard, the finding of a significant correlation between the detachment domain and greater severity of ID-GBA symptoms provides a novel contribution relative to previous literature and suggests the relevance of integrating these dimensions into future therapeutic interventions, particularly among patients presenting with more severe gastrointestinal symptomatology.

Future studies could incorporate explicit comparisons between patients with ID-GBA symptoms and those without such symptoms. This approach would allow evaluation of potential differences in personality profiles within clinical populations.

Among the study limitations, its cross-sectional design precludes the establishment of causal relationships. Furthermore, the non-probabilistic convenience sampling resulted in a predominance of female participants (76.5%) and a high frequency of diagnoses of depression (48.5%) and anxiety (24.3%). These characteristics limit the generalizability of the findings to populations with different clinical profiles.

It is important to note that the findings of this study correspond to a population of patients with mental disorders in whom ID-GBA symptoms were identified, rather than to patients with a confirmed diagnosis of IBS according to Rome IV criteria. Therefore, caution is warranted when extrapolating these results to clinical gastroenterology populations. It is plausible that, in samples with a formal diagnosis of IBS, personality profiles and the magnitude of observed associations may differ. This underscores the need for future comparative studies in populations with and without a confirmed diagnosis.

The IBS-SSS scale, originally designed to assess symptom severity in patients with a confirmed diagnosis of IBS, was applied in this sample to quantify the intensity of ID-GBA symptoms rather than for diagnostic purposes. This application outside a confirmed diagnostic context represents a methodological limitation, and findings should be interpreted within this framework. Nevertheless, the findings highlight the potential for longitudinal research exploring the directionality between personality traits and the progression of gastrointestinal symptomatology, as well as studies integrating physiological biomarkers with psychological measures in order to further elucidate these associations.

CONCLUSIONS

The association between the personality traits of detachment, negative affect, and psychoticism and greater severity of intestinal disorder symptoms supports the hypothesis of an interaction between the gut–brain axis and psychological factors. These findings underscore the need for comprehensive therapeutic approaches that incorporate assessment of personality traits.

Conflicts of interest

The authors declare no conflicts of interest.

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Consensus

Colombian Consensus on the Diagnosis and Management of Eosinophilic Esophagitis in the Pediatric Population: Treatment. Part 2

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Abstract

Introduction: Eosinophilic esophagitis (EoE) is a chronic immune-mediated disease characterized by esophageal dysfunction, which may progress to fibrosis or stricture formation if left untreated. **Objective:** To develop evidence-based recommendations through expert consensus for the treatment of EoE in patients under 18 years of age. **Methodology:** A multidisciplinary panel of 16 experts from the Colegio Colombiano de Gastroenterología, Hepatología y Nutrición Pediátrica (COLGAHNP), including allergists, pathologists, adult gastroenterologists, and four international experts, formulated 18 questions (8 diagnostic and 10 therapeutic). A systematic literature search was conducted, analyzing clinical practice guidelines (CPGs), randomized controlled trials (RCTs), and systematic literature reviews (SLRs) from the past 10 years. A total of 27 recommendations (12 diagnostic and 15 therapeutic) were developed and subjected to two rounds of voting using a modified Delphi method. The study was sponsored by COLGAHNP. **Results:** Consensus agreement exceeded 90% for all recommendations. Treatment should be individualized and multidisciplinary, led by pediatric gastroenterologists. Therapeutic strategies are based on an "upward" elimination diet approach, beginning with a single food, the use of proton pump inhibitors, topical corticosteroids, monoclonal antibodies, and, in selected cases, esophageal dilation. Follow-up should incorporate validated tools, such as PEEESv2. Patients should also be prepared for transition into adult care. **Conclusion:** This consensus provides evidence-based treatment recommendations for EoE for patients, families, and healthcare payers within the Colombian and broader Latin American context.

Keywords

Eosinophilic esophagitis, endoscopy, biopsy, dietary therapy, proton pump inhibitors, budesonide, biologic agents.

INTRODUCTION

The management of eosinophilic esophagitis (EoE) should be multidisciplinary and coordinated by pediatric gastroenterologists, working collaboratively with allergists/immunologists (given their expertise in diverse therapeutic approaches and biologic therapies for atopic comorbidities, such as severe atopic dermatitis), nutritionists with training in allergy and EoE, pathologists, pediatricians, and speech-language pathologists[1]. Therapeutic decisions should be discussed with patients and their families and should aim to control symptoms and improve quality of life (**Figure 1**)[2-6].

METHODOLOGY

A literature search was conducted emphasizing the highest level of evidence, including clinical practice guidelines (CPGs) (AGREE-II), randomized controlled trials (RCTs), systematic literature reviews (SLRs), and meta-analyses. The databases PubMed, Medline, Embase, Cochrane, and LILACS were searched in both English and Spanish for the period 2014–2024. MeSH terms were used (eosinophilic esophagitis, guidelines, pediatric, evidence). Three CPGs were identified as the primary basis for the development of this consensus: two focused on pediatric populations—the guideline from the British Society of Gastroenterology (BSG) and the British Society of Pediatric Gastroenterology, Hepatology and Nutrition (BSPGHAN)[7], and the guideline from the European Society for Paediatric Gastroenterology, Hepatology and Nutrition (ESPGHAN)[4]. For adult populations, the Italian consensus on the diagnosis and management of EoE was considered[3]. Two recent SLRs were also included: one addressing swallowed topical corticosteroids[2] and another focused on dietary management[5], as well as a meta-analysis on pharmacologic medical management[6]. These studies were selected based on their methodological rigor and the relevance of their updated evidence.

A multidisciplinary panel of 16 experts was convened, including members from the Colombian College of Pediatric Gastroenterology, Hepatology and Nutrition (COLGAHNP), allergists from the Colombian Association of Allergy, Asthma and Immunology (ACAAI), national pathologists, adult gastroenterologists from the Colombian Association of Gastroenterology (ACG), and four international experts. The panel formulated 18 clinical questions (8 related to diagnosis and 10 related to treatment). Panel members were selected based on their clinical and research expertise in gastroenterology, allergology, and pediatrics, with a minimum of five years of clinical experience and affiliations with academic institutions, referral hospitals, and national scientific societies. Additionally, four epidemiologists supported the process. All participants critically appraised the available literature to develop statements and recommendations.

Each statement was presented alongside the quality of evidence and strength of recommendation (strong or weak),

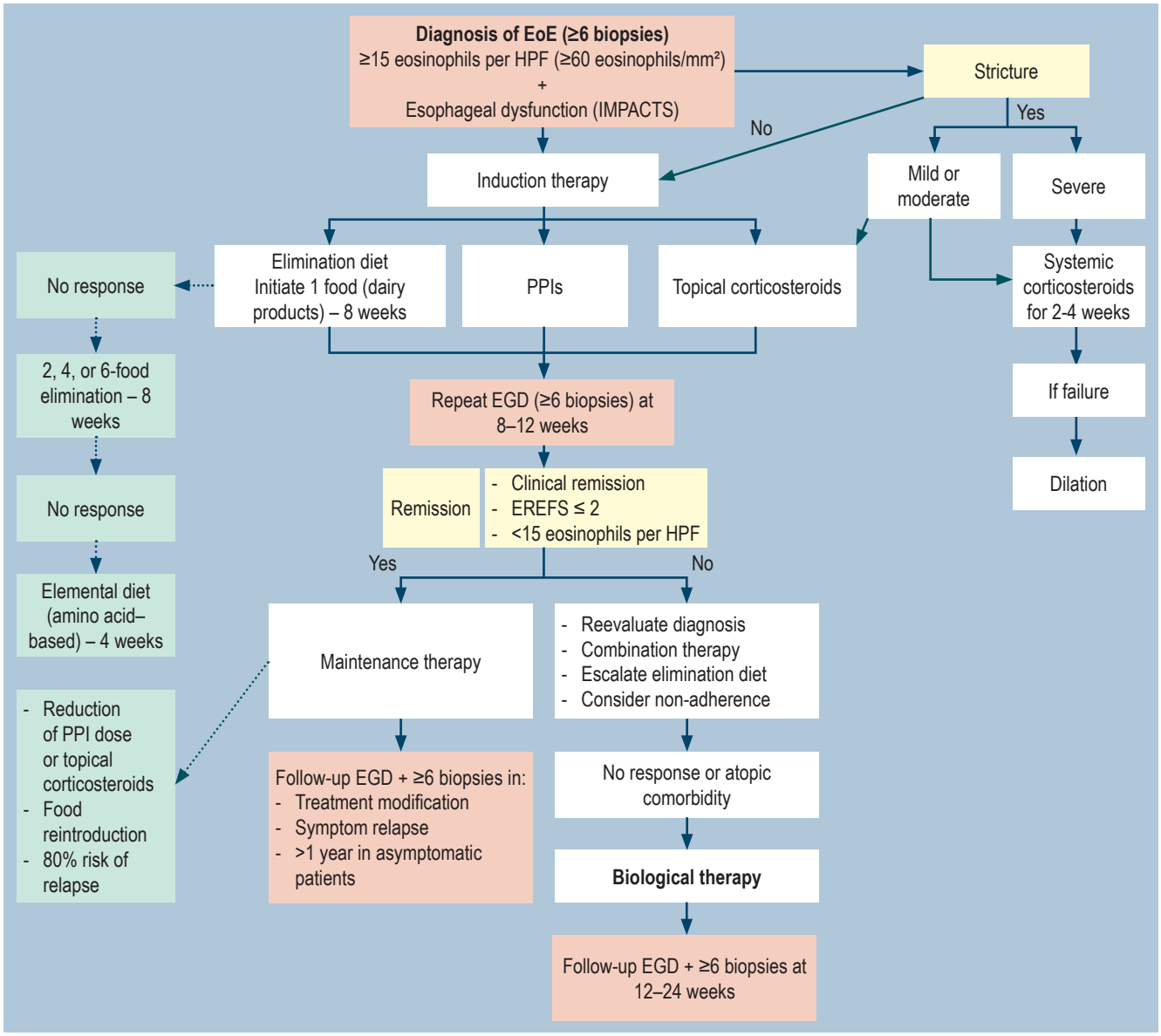


Figure 1. Comprehensive algorithm for the diagnosis and management of eosinophilic esophagitis: clinical evaluation, endoscopic confirmation, and therapeutic interventions. HPF: high-power field; EGD: esophagogastroduodenoscopy; EoE: eosinophilic esophagitis; Eos: eosinophils; EREFS: Endoscopic Reference Score; PPI: proton pump inhibitors; IMPACTS: Index of Symptoms and Impact of Eosinophilic Esophagitis. Adapted from: de Bortoli N, et al. *Dig Liver Dis.* 2024;56(6):951-63[3]; Amil-Dias J, et al. *J Pediatr Gastroenterol Nutr.* 2024;79(2):394-437[4].

according to the U.S. Preventive Services Task Force criteria (**Table 1**)[8]. A modified Delphi method was applied, including an initial round of electronic voting followed by a second in-person round conducted in a hybrid format. Each recommendation was evaluated using three response options: disagree, agree, or agree with modifications. Recommendations were considered approved when agreement reached ≥80% (strong agreement)[9]. The response rate was 100% in both rounds. In the first round, agreement exceeded 90% for all statements. Statements receiving the response "agree with modifications" were discussed collectively, reformulated, and resubmitted for voting during the hybrid meeting until consensus was achieved. An update of the consensus is recommended after 5 years. This study was sponsored by COLGAHNP, with no reported conflicts of interest.

Table 1. Classification of dietary strategies for eosinophilic esophagitis: characteristics, advantages, and limitations

Type of diet		Recommendation	Efficacy (%)	References
Empirical elimination diets*	1 food	Milk and dairy products	41-46	(4,5,10,11)
	2 foods	Milk and dairy products, wheat/gluten	43-44	(4,5,10,11)
	4 foods	Milk and dairy products, wheat/gluten, egg, soy	41-55	(4,5,10,11)
	6 foods	Milk and dairy products, wheat/gluten, egg, soy, peanuts/tree nuts, fish and seafood	40-65	(4,5,10,11)
Elemental diet (amino acid–based)		Formula only, no other foods	95	(4,5,10,11)
Allergy test–directed diets	Skin prick testing	Not recommended	39	(4,5,10,11)
	Patch testing			
Other: IgG4		No robust evidence	39	(12)

*Other eliminated foods: legumes in Spain; sesame in Israel. IgG4: immunoglobulin G4. Adapted from: Amil-Dias J, et al. *J Pediatr Gastroenterol Nutr.* 2024;79(2):394-437[4]; Arias Á, et al. *Nutrients.* 2024;16(14):2231[5]; Harris PR, et al. *Rev Chil Pediatr.* 2020;91(5):809-27[10]; Visaggi P, et al. *Dig Liver Dis.* 2023;55(2):208-22[11]; Chang JW, et al. *Clin Gastroenterol Hepatol.* 2023;21(7):1690-8[12].

WHAT SHOULD BE THE THERAPEUTIC OBJECTIVES IN EOSINOPHILIC ESOPHAGITIS?

Statement 1

Patients and their families should be educated regarding the chronic nature of the disease and the need for long-term treatment. Therapeutic objectives should include control of inflammation in all biopsies (<15 eosinophils per high-power field [HPF]) and prevention of tissue remodeling (fibrosis/stricture formation); achievement of endoscopic remission based on an EREFS score ≤2; reduction in symptom severity, assessed using the Pediatric Eosinophilic Esophagitis Symptom Score (PEESS), version 2.0; and improvement in quality of life, which should be measured using the Pediatric Quality of Life Inventory (PedsQL)[3,13].

Level of evidence: II-2
Grade of recommendation: B
Agreement: 100%

Good Practice Points

A minimum induction period of 8–12 weeks is recommended for patients treated with elimination diets, topical corticosteroids, or proton pump inhibitors (PPIs), and at least 4 weeks for elemental diets prior to endoscopic reassessment (**Figure 1**)[3,13].

WHAT IS THE BEST STRATEGY TO INITIATE DIETARY THERAPY?

Statement 2

The preferred strategy is empiric elimination of one or more food antigens to induce remission, followed by endoscopic reassessment with esophageal biopsies 8–12 weeks later[10], with the goal of achieving the least restrictive diet possible (ideally elimination of a single food antigen). The elemental diet is highly effective; however, it should be reserved for complex cases due to its high cost and lower adherence. Allergy test–directed diets lack robust supporting evidence. The selection of the food(s) to be eliminated should be individualized (**Table 1**)[5,11,14-16].

Level of evidence: I-II
Grade of recommendation: A
Agreement: 100%

Good Practice Points

The elimination diet may follow either a step-up (ascending) approach, beginning with elimination of one or two foods and progressing to four- and six-food elimination (requiring fewer endoscopies), or a top-down (descending) approach, beginning with six-food elimination followed by gradual reintroduction. However, the latter approach requires more endoscopies, greater nutritional support, and is associated with lower adherence (**Figure 2**)[14].

Elimination diets may result in nutritional deficiencies, feeding difficulties, psychological distress, and impaired quality of life. Theoretically, they may also predispose to immunoglobulin E (IgE)-mediated allergies; therefore, careful individualization is required. The selection of dietary strategy depends on disease severity and nutritional status, the presence of feeding difficulties or food allergies, patient and family preferences, financial resources, and the need to evaluate response through esophagogastroduodenoscopy with biopsies at least 6–8 weeks after elimination of a food group[5,11,15-17]. Current research is evaluating transcriptomic profiling in the context of elimination diets[16].

In the step-up elimination diet strategy: is initiation with single-food elimination (milk and dairy products) more effective than four- or six-food elimination for the treatment of eosinophilic esophagitis?

Statement 2.1

Single-food elimination (milk and dairy products) represents a reasonable initial therapeutic option within the step-up strategy and has demonstrated symptomatic and histologic improvement comparable to more restrictive diets (four- or six-food elimination). This approach requires fewer endoscopies, reduces costs, improves adherence, decreases the number of missed school and workdays, and enhances quality of life, achieving remission in 46.4%–51% of cases (**Table 2**, **Figure 2**)[10,14,15,18,19].

Level of evidence: I

Grade of recommendation: A

Agreement: 100%

Good Practice Points

In children, comparison of single-food elimination versus four-food elimination showed response rates of 44% versus 41% (p = 1.00), respectively. In adults, comparison of one-food versus six-food elimination demonstrated response rates of 34% and 40% (p = 0.58), respectively[18]. A recent randomized controlled trial evaluated single-food elimination (milk) (1FED) versus four-food elimination (milk, egg, wheat, and soy) (4FED) in patients aged 6–17 years over 12 weeks. The less restrictive diet was associated with better nutritional status. The discontinuation rate for the 4FED diet (32%) was significantly higher than for the 1FED diet (11%) (p = 0.0496)[10]. The step-up strategy beginning with dairy elimination has demonstrated effectiveness, reducing diagnostic time and the number of endoscopic procedures compared with the top-down strategy[14]. Endoscopic evaluation with biopsy should be performed 6–8 weeks after initiation of the elimination diet to assess treatment response (**Figure 2**)[15].

In elimination diet strategies: which foods are eliminated, and how effective is two-food elimination compared with four- or six-food elimination in the treatment of eosinophilic esophagitis?

Statement 2.2

Standard two-food elimination (cow's milk protein and wheat/gluten), four-food elimination (cow's milk protein, wheat/gluten, egg, soy), or six-food elimination (cow's milk protein, wheat/gluten, egg, soy, peanuts/tree nuts, fish and seafood) induces histologic remission in up to 63.9% of patients[5]. These approaches are slightly more effective than elimination of milk and dairy products alone in both children and adults; however, they are associated with lower adherence and increased nutritional risk[4,5,10,11,14,15].

Level of evidence: I

Grade of recommendation: A

Agreement: 93.7%

Table 2. Comparison of elimination diet strategies: advantages, disadvantages, and indications of step-up and top-down approaches

	Elimination strategy	
	Step-up	**Top-down**
Advantages	- Early identification of food triggers. - Shorter diagnostic process. - Avoidance of unnecessary dietary restrictions.	- More restrictive diets are more effective.
Disadvantages	- May be less effective.	- Greater number of endoscopies. - Lower adherence. - Risk of nutritional deficiencies.
Indication	- Recommended in pediatric patients with mild to moderate symptoms.	- Adults or older pediatric patients. - Significantly limiting symptoms.

Adapted from: Votto M, et al. *Front Pediatr.* 2022;9:820192[17].

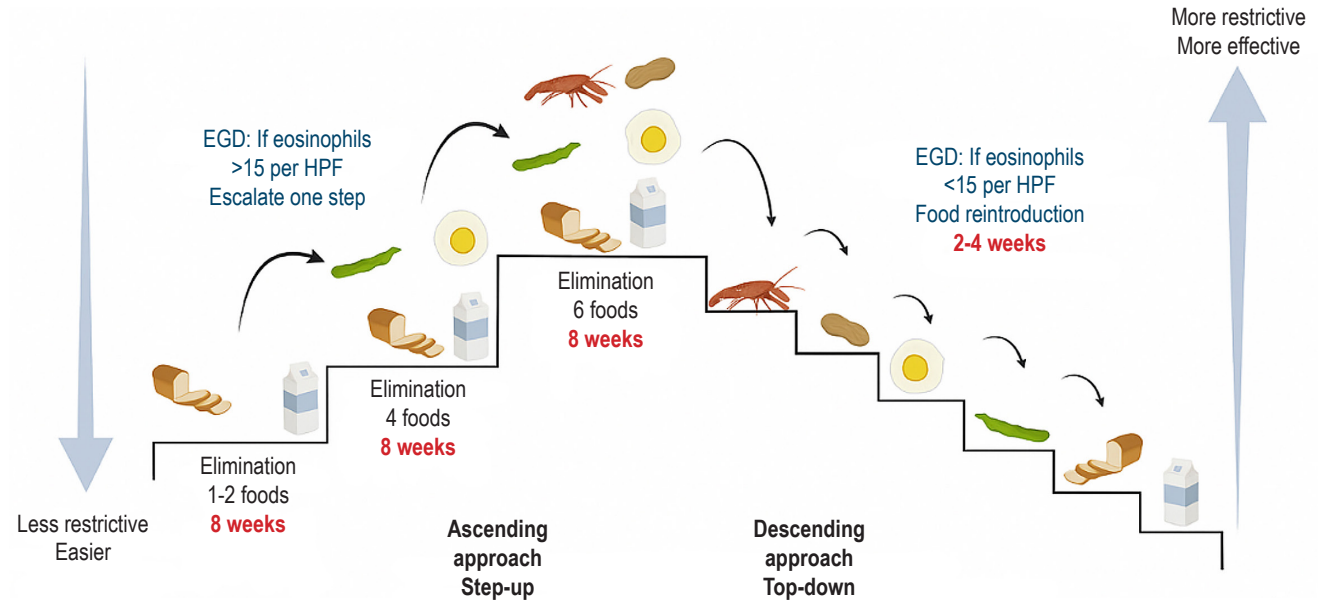


Figure 2. Comparison of step-up and top-down elimination diet approaches: number of foods restricted, duration, and clinical indications. *The elimination diet includes legumes in Spain and sesame in Israel. HPF: high-power field; EGD: esophagogastroduodenoscopy; eos: eosinophils. Adapted from: Visaggi P, et al. *Best Pract Res Clin Gastroenterol.* 2023;62-63:101825[14]; Votto M, et al. *Front Pediatr.* 2022;9:820192[17].

Good Practice Points

Although more restrictive elimination diets may demonstrate greater effectiveness, they require evaluation by a nutrition specialist, involve a higher number of endoscopic procedures (increasing costs), and may be associated with nutritional deficiencies, feeding disorders, psychological disturbances, and reduced quality of life[4,5,10,11]. A recent meta-analysis demonstrated that empiric six-food elimination achieved histologic remission in 63.9% of patients and showed high homogeneity when exclusively pediatric patients with EoE were analyzed (67.5%) compared with adults (63.5%). Four-food elimination demonstrated effectiveness of 54.7% and was more effective in children (59.5%) than in adults (52.7%)[5]. During the food reintroduction phase, at least one daily serving of the reintroduced food should be consumed for 4–6 weeks before reassessment with endoscopy and biopsy[15]. Reintroduction should proceed from less allergenic to more allergenic foods: fish/seafood, peanuts/tree nuts, soy, egg, wheat/gluten, and finally milk (**Tables 1** and **2**; **Figure 2**)[15].

What is the role of allergy test–guided elimination diets?

Statement 2.3

Allergy test–guided elimination diets are not recommended as first-line dietary therapy because their effectiveness is lower than that of empiric and elemental diets[5,12,20,21].

Level of evidence: I
Grade of recommendation: C
Agreement: 100%

Good Practice Points

A systematic review and meta-analysis[21] reported overall effectiveness ranging from 39.5% to 45.7% for allergy test–guided elimination diets, with better outcomes observed in children than in adults (45.7% vs 26.4%). Variability was observed in allergy testing methods, types of allergens assessed, confirmation procedures, duration of food challenges, and criteria for treatment success, resulting in significant heterogeneity[5].

A systematic review[20] of 16 studies in children and adults demonstrated that elimination diets based on allergy testing achieved effectiveness of 66.7% when results from serum-specific IgE (sIgE), skin prick testing, and patch testing were combined; however, these approaches do not appear to be superior to empiric elimination diets[20].

What is the role of the elemental diet in the treatment of eosinophilic esophagitis?

Statement 2.4

Amino acid–based formulas are highly effective (>90%) in achieving histologic remission; however, they are costly and associated with low adherence. Therefore, they are considered second-line therapy in complex cases[4,5,11,22].

Level of evidence: I
Grade of recommendation: A
Agreement: 100%

Good Practice Point

Amino acid–based formulas are highly effective and act rapidly, inducing histologic remission in 95% of children with EoE. They should be administered for at least four weeks prior to endoscopic reassessment[5]. Their disadvantages include high cost and poor palatability, which negatively affects adherence; consequently, they are considered a second-line option. Their use is indicated in infants who have not yet initiated solid food intake, in patients with multiple food allergies, in those with growth failure, and in individuals with severe disease unresponsive to highly restrictive diets or pharmacologic therapy[22]. Swallowing therapy with puréed foods based on amino acid–based formulas should be continued to facilitate subsequent reintroduction of other foods[4,5,11].

WHAT IS THE ROLE OF PROTON PUMP INHIBITORS IN INDUCING AND MAINTAINING REMISSION OF EOSINOPHILIC ESOPHAGITIS?

Statement 3

Proton pump inhibitors (PPIs) are a treatment of choice in the management of EoE and have been described as the most cost-effective pharmacologic strategy, with an efficacy of approximately 50% in the pediatric population that is maintained over the long term (**Table 3**)[23-32].
Level of evidence: I-II
Grade of recommendation: A
Agreement: 100%

Good Practice Points

PPIs improve EoE by blocking eotaxin-3, ICAM-1, and VCAM-1. Their role in eosinophil migration has been demonstrated through attenuation of IL-13–induced chemokine secretion and adhesion molecules, as well as improvement of esophageal barrier function[26]. They represent the most frequently used first-line option, with reported histologic response rates ranging from 23% to 83%[27]. In a retrospective Colombian study, histologic remission was achieved in 47% of patients[28].

A meta-analysis including 619 patients treated with PPIs (188 children), across 33 studies (11 prospective), reported histologic remission in 50.5% of cases, with no difference between children and adults, and maintenance of remission in up to 73% with a low-dose regimen[29]. The European multicenter EoE CONNECT study, including 630 patients (76 children), reported clinicopathologic remission in 48.9%[27]. PPIs irreversibly inhibit the H^+/K^+ ATPase pump and may be particularly beneficial in patients with concomitant gastroesophageal reflux disease (GERD). EoE may coexist with GERD due to impaired esophageal clearance; therefore, PPI therapy may provide clinical benefit by reducing gastric acid production[30].

Greater efficacy during the induction phase has been observed in the inflammatory phenotype and with higher doses (2 mg/kg/day; maximum 80 mg/day). Conversely, common CYP2C19*17 and STAT6 variants have been associated with reduced therapeutic response, suggesting a potential genotype-guided approach[24,31,32]. The long-term safety profile remains controversial. In a randomized controlled trial including 17,598 adult patients followed for a median of 3.01 years, pantoprazole was not associated with adverse effects, except for a slightly increased risk of gastrointestinal infections[23].

WHAT IS THE ROLE OF TOPICAL CORTICOSTEROIDS IN INDUCING AND MAINTAINING REMISSION OF EOSINOPHILIC ESOPHAGITIS?

Statement 4

Swallowed topical corticosteroids are safe and effective, with good adherence and a favorable safety profile for

Table 3. Induction and maintenance regimens with proton pump inhibitors: recommended doses, formulations, and administration

Medication	Induction dose	Maintenance dose*	Formulations	Administration
Omeprazole / Esomeprazole	1 mg/kg per dose, twice daily (max. 40 mg every 12 h)	1 mg/kg/day (max. 40 mg/day)	Tablets, capsules** 20–40 mg, 10 mg sachets	15–20 minutes before breakfast or dinner
Lansoprazole	0.75 mg/kg per dose, twice daily (max. 30 mg every 12 h)	0.75 mg/kg/day (max. 30 mg/day)	Tablets*** 15–30 mg	

*Maintenance dose should subsequently be reduced to the lowest effective dose. **A formulation of esomeprazole designed for dissolution in water is available. ***An orally disintegrating formulation is available. Adapted from: Gutiérrez Junquera C, et al. *An Pediatr.* 2020;92(6):376.e1-376.e10[25].

both induction and maintenance of remission, with rare complications. No evidence demonstrates superiority between viscous budesonide and swallowed fluticasone. Dose reduction or alternate-day dosing may result in relapse; therefore, endoscopic reassessment is recommended. Food intake should be avoided for one hour after administration of the topical corticosteroid (**Table 4**)[2,6,33-36].

Level of evidence: I
Grade of recommendation: A
Agreement: 100%

Good Practice Points

In March 2024, swallowed topical corticosteroids were approved by the U.S. Food and Drug Administration (FDA) for the management of EoE. A systematic review and meta-analysis demonstrated histologic improvement in more than 63% of patients compared with placebo (relative risk [RR]: 11.94; 95% confidence interval [CI]: 6.56–21.75; number needed to treat [NNT] = 3), although little to no endoscopic improvement was observed (RR: 2.60; 95% CI: 0.82–8.19). No significant differences were observed in total adverse events (RR: 1.14; 95% CI: 0.94–1.40) or serious adverse events (RR: 0.35; 95% CI: 0.17–0.73) compared with placebo[6].

Comparison between viscous budesonide and swallowed fluticasone demonstrated no significant differences in clinical outcomes (mean difference [MD]: −0.60; CI: −3.78–2.58), histologic outcomes (RR: 1.13; CI: 0.84–1.51), endoscopic outcomes (MD: 0.70; CI: −0.03–1.43)[6], or total adverse events (RR: 0.92; CI: 0.15–5.56). Induction therapy should be administered for a minimum of 3 months at age-appropriate doses. Maintenance therapy should be continued at half the induction dose for at least 1–2 years to prevent relapse (**Table 4**), with dose reduction by half every 6–12 months under endoscopic monitoring[2]. Long-term adverse effects are uncommon; however, concomitant corticosteroid exposure for other conditions (oral, topical, inhaled, or intranasal) should be considered. A recent study evaluating the effectiveness and safety of swallowed topical corticosteroids in children and adults demonstrated sustained long-term efficacy (mean follow-up: 6.5 years), with improved adherence and rare complications: adrenal insufficiency (1%), osteopenia (1%), and esophageal candidiasis (4%)[35].

Dose reduction of topical corticosteroids may lead to recurrence of EoE. A pediatric study demonstrated a 100% relapse rate with alternate-day dosing. Given the favorable long-term safety profile of topical corticosteroids, continuation of the standard dose without reduction may be more effective and safer. If dose reduction is implemented, endoscopic reassessment should be performed[36].

WHAT IS THE ROLE OF BIOLOGIC THERAPY IN INDUCING AND MAINTAINING REMISSION OF EOSINOPHILIC ESOPHAGITIS?

Statement 5

Dupilumab may be used as a second-line therapy in patients with EoE refractory to conventional treatment or in those experiencing adverse events that limit its use. Patients with EoE and concomitant atopic comorbidities (dermatitis, asthma, or chronic rhinosinusitis) who meet clinical criteria for biologic therapy based on the underlying comorbid condition may receive dupilumab regardless of EoE severity. Its use as first-line therapy may be limited by cost when compared with topical corticosteroids[24,37-42].

Level of evidence: I
Grade of recommendation: A
Agreement: 100%

Good Practice Points

Dupilumab is a monoclonal antibody that inhibits the alpha subunit of the interleukin-4 and interleukin-13 receptor. It

Table 4. Topical corticosteroids for EoE: recommended induction and maintenance doses, clinical response, and adverse effects

Topical corticosteroid	Age	Induction dose	Maintenance dose	Adverse effects	Response
Viscous budesonide*	<10 years	0.5 mg per dose (twice daily)	0.5 mg per dose (once daily)	Adrenal insufficiency 1% Osteopenia 1% Esophageal candidiasis 4%	64.9% in 8 RCTs (n = 437) vs 13.3% with placebo
	>10 years	1 mg per dose (twice daily)	1 mg per dose (once daily)		
Liquid fluticasone**	<10 years	400 µg per dose (twice daily)	400 µg per dose (once daily)		
	>10 years	800 µg per dose (twice daily)	800 µg per dose (once daily)		

*Avoid grapefruit intake: inhibits CYP3A. **Release contents onto the base of the tongue. RCTs: randomized controlled trials. Adapted from: Harris PR, et al. *Rev Chil Pediatr.* 2020;91(5):809-27[9]; Gutiérrez Junquera C, et al. *An Pediatr.* 2020;92(6):376.e1-376.e10[25]; McCallen JD, et al. *J Clin Gastroenterol.* 2025;59(8):737-743[35].

has been approved by the FDA for patients with EoE aged ≥12 years and weighing ≥40 kg since 2022, and for children aged ≥1 year and weighing ≥15 kg since 2024. Real-world studies have demonstrated effectiveness exceeding 90% in achieving histologic remission[37-39].

Evaluation of treatment response to dupilumab should include esophagogastroduodenoscopy with biopsies 5–6 months after treatment initiation, following dose adjustment, or in the presence of symptom worsening. Recommended weight-based dosing is as follows: 200 mg every two weeks for children weighing 15–30 kg; 300 mg every two weeks for those weighing 30–40 kg; and 300 mg weekly for patients weighing more than 40 kg[41]. Adverse effects have been reported in approximately 2% of patients and include injection-site reactions, upper respiratory tract infections, arthralgia, and headache[40,41].

Most patients receiving dupilumab achieve significant clinical and histologic improvement 12–24 weeks after initiation of standard weight-based dosing. Currently, no evidence supports dose reduction or treatment discontinuation after this period. Continuation of therapy is recommended to achieve and maintain disease remission[42]. Topical corticosteroids may be gradually discontinued once dupilumab induces histologic remission. PPIs may be continued in the presence of concomitant GERD. Elimination diets should be individualized. Although no significant pharmacologic interactions between dupilumab and these therapies have been established, decisions regarding continuation or discontinuation of concomitant treatments should be individualized[42].

HOW SHOULD PATIENTS WITH EOSINOPHILIC ESOPHAGITIS BE FOLLOWED?

Statement 6

Clinical follow-up should be conducted periodically using the PEESS v2 questionnaire. Treatment modifications should be evaluated endoscopically after 8–12 weeks for elimination diets, topical corticosteroids, or proton pump inhibitors (PPIs), and no less than 4 weeks for exclusive elemental diets. In cases of relapse or non-response, endoscopic and histologic reassessment is required during maintenance therapy, and the timing should be individualized. Clinical, endoscopic, and histologic remission should be clearly defined. In asymptomatic patients, endoscopic reassessment should be considered 1–3 years after sustained remission due to the risk of fibrotic progression[4,7,43-45].
Level of evidence: III
Grade of recommendation: B
Agreement: 100%

Good Practice Points

The PEESS v2 is a validated instrument for assessing symptoms during maintenance therapy. Clinical remission should be evaluated regularly during follow-up[43], given the correlation between reported symptoms and eosinophil counts in the distal esophagus ($p < 0.05$)[44]. Twenty-four-hour pH-impedance monitoring has been evaluated as a diagnostic tool for gastroesophageal reflux disease (GERD) or non-response to PPIs in relation to alterations in baseline nocturnal impedance and its association with eosinophil counts in biopsy samples. Additional studies are required[7,45].

Treatment adherence is a key component of patient follow-up, as multiple barriers extend beyond clinical factors. First, the presence of adverse effects that may reduce adherence should be considered (**Table 5**). Second, additional factors such as barriers to accessing recommended therapies should be evaluated. A recent study identified limited food options, food insecurity, and difficulty maintaining dietary restrictions outside the home as significant challenges for families implementing elimination diets[46]. Similarly, an earlier study demonstrated that the cost of acquiring foods meeting dietary requirements constitutes a major source of caregiver stress, together with the need to prepare specialized meals[47]. These findings confirm that adherence depends not only on patient engagement but also on family support and on the availability and affordability of appropriate foods. These factors should be considered when designing sustainable therapeutic strategies.

WHAT ARE THE PREDICTORS OF TREATMENT RESPONSE AND RISK FACTORS FOR ESOPHAGEAL TISSUE REMODELING OR STRICTURE FORMATION IN PATIENTS WITH EOSINOPHILIC ESOPHAGITIS?

Statement 7

Delayed diagnosis of EoE is the most important risk factor for the development of esophageal strictures. Early initiation of treatment during the course of the disease may prevent esophageal tissue remodeling or stricture formation[49-52].
Level of evidence: II-2
Grade of recommendation: B
Agreement: 100%

Good Practice Points

The prevalence of esophageal strictures and their occurrence over time has been demonstrated during longitudinal follow-up of patients with EoE and is proportional to the interval between symptom onset and diagnosis: 0–2 years: 17.2%; >2–5 years: 30.8%; >5–8 years: 38.9%;

Table 5. Most frequent adverse effects of pharmacologic treatments for eosinophilic esophagitis

Treatment	Common adverse effects	Clinical considerations	References
Proton pump inhibitors	Increased risk of gastrointestinal and respiratory infections	Generally well tolerated; long-term use has been associated with hypomagnesemia and vitamin B_{12} deficiency	4,6,7,23,27,31,32
Topical corticosteroids (viscous budesonide, liquid fluticasone)	Adrenal insufficiency 1%, osteopenia 1%, esophageal candidiasis 4%	Low risk of systemic effects; isolated cases of adrenal insufficiency and bone alterations with prolonged use	2,4,6,7,33-35
Systemic corticosteroids (prednisone, prednisolone)	Weight gain, hypertension, hyperglycemia, osteoporosis, adrenal suppression	Not recommended for chronic therapy; reserved for severe and refractory cases	4,6,7,48
Biologics (dupilumab)	Injection-site reactions, headache, conjunctivitis, arthralgia	Favorable safety profile in clinical trials; additional data are needed for long-term pediatric use	37,38,40

Adapted from: Chan J, Flynn DM, Gordon M, Parmar R, Moolenschot K, Jackman L, et al. Swallowed topical steroid therapy for eosinophilic oesophagitis in children: practical, evidence-based guidance by the BSPGHAN Eosinophilic Oesophagitis Working Group. *BMJ Paediatr Open.* 2024;8(1):e002467-e002467[2]; Amil-Dias J, et al. *J Pediatr Gastroenterol Nutr.* 2024;79(2):394-437[4]; Franciosi JP, et al. *Cochrane Database Syst Rev.* 2023;2023(7):CD004065[6]; Dhar A, et al. *Gut.* 2022;71(8):1459-87[7]; Shah SC, et al. *Clin Gastroenterol Hepatol.* 2019;17(11):2185-2198.e3[23]; Laserna-Mendieta EJ, et al. *Aliment Pharmacol Ther.* 2020;52(5):798-807[27]; Mougey EB, et al. *J Pediatr Gastroenterol Nutr.* 2019;69(5):581-7[31]; Chevalier R, et al. *Expert Opin Drug Metab Toxicol.* 2023;19(2):53-6[32]; Bose P, et al. *J Pediatr Gastroenterol Nutr.* 2020;70(3):324-9[33]; Philpott H, et al. *Aliment Pharmacol Ther.* 2018;47(8):1071-8[34]; McCallen JD, et al. *J Clin Gastroenterol. 2025;59(8):737-743[35]; Russin M, et al. Am J Gastroenterol.* 2025;120(3):663-666[37]; Chehade M, et al. N Engl J Med. 2024;390(24):2239-51[38]; Aceves SS, et al. *Ann Allergy Asthma Immunol.* 2023;130(3):371-8[40]; Al-Hussaini A. *J Pediatr Gastroenterol Nutr.* 2016;63(5):474-80[48].

>8–11 years: 37.9%; >11–14 years: 41.7%; >14–17 years: 64.3%; >17–20 years: 66.7%; and >20 years: 70.8% ($p < 0.001$). Diagnostic delay was identified as a risk factor for stricture formation (odds ratio [OR]: 1.08 per year; 95% confidence interval [CI]: 1.04–1.12; $p < 0.001$)[49]. Patients with delayed diagnosis and late initiation of treatment more frequently presented with dysphagia and food impaction[50]. Poor response to topical corticosteroids has been observed more frequently in patients with strictures (28% vs 12%, $p = 0.005$) or in those requiring dilation (37% vs 19%, $p = 0.006$)[51].

IN WHICH PATIENTS IS ESOPHAGEAL DILATION INDICATED SECONDARY TO EOSINOPHILIC ESOPHAGITIS, AND HOW SHOULD IT BE PERFORMED?

Statement 8

Endoscopic dilation should be considered in patients with moderate or severe strictures who continue to experience dysphagia despite adequate treatment with proton pump inhibitors (PPIs), topical corticosteroids, elimination diets, or dupilumab. A four-week course of systemic corticosteroids is recommended in cases of severe acute stricture with dysphagia or food impaction requiring rapid symptomatic improvement, particularly when adequate nutritional intake cannot be ensured. Both hydrostatic balloon dilation and Savary-Gilliard bougie dilation are effective and safe in pediatric patients, with low complication rates. These approaches should be considered in patients who do not respond to systemic corticosteroids or who present with severe strictures at diagnosis, combined with corticosteroid therapy. The dilation method should be selected according to the endoscopist's expertise[4,7,48-51,53-59].

Level of evidence: II
Grade of recommendation: B
Agreement: 100%

Good Practice Points

Strictures can be classified into three severity grades: mild, when a standard 9 mm endoscope can pass; moderate, when a 6 mm pediatric endoscope can pass; and severe, when a 6 mm pediatric endoscope cannot pass[4]. In a study including 20 patients (mean age: 10.6 ± 4.2 years), 16 had moderate strictures and four had severe strictures. Eighteen patients received oral systemic corticosteroids (prednisone 1–2 mg/kg/day in one or two daily doses) for four weeks, and two initially received intravenous corticosteroids (methylprednisolone). Seventeen patients (85%) received PPIs and nine (45%) initiated elimination diets. All patients demonstrated clinical improvement, and 15 of 20 became asymptomatic. Resolution of the stricture was observed endoscopically in 19 of 20 patients, and histologic remission was achieved in 13 of 20. Minor adverse

effects were reported: hyperphagia (10/20), weight gain (5/20), hyperactivity (2/20), and acne (1/20). Ultimately, esophageal dilation was required in 3 of 20 patients during a follow-up period of 48.5 months[54]. Mild inflammatory strictures may resolve with standard treatment using PPIs, dietary restriction, or topical corticosteroids[55]. Dilation does not control underlying inflammation; therefore, it should be combined with standard induction and maintenance therapies[4], particularly topical corticosteroids, which demonstrate greater effectiveness[7,48-56].

A meta-analysis including 1,890 dilations in children and adults reported a very low perforation rate of 0.38%, confirming that dilation is safe and effective, with no differences between Savary bougies and balloon dilation[57]. Hydrostatic balloons allow direct visual inspection during and after dilation; however, their main limitation is the presence of multiple or long strictures, which may be more easily treated using Savary-Gilliard bougies. Both techniques should begin with a small dilation diameter and increase progressively in 1 mm increments (not exceeding 3 mm per session) until symptom resolution is achieved[4,58]. A satisfactory dilation target should consider the esophageal diameter according to patient age: <9 months: 8 mm; 9–23 months: 10 mm; 24 months to 5 years: 12 mm; and >6 years: 14 mm[7,53]. Intralesional corticosteroid administration, such as triamcinolone, may be beneficial and has demonstrated potential to increase the final achieved diameter, although it does not appear to reduce the number of required dilations[59]. Another alternative is EsoFLIP, a method shown to be faster than balloon dilation and associated with reduced fluoroscopy requirements[60]. Expert consensus guidelines on dilation techniques have been published internationally[53,61].

QUALITY OF LIFE IN PATIENTS WITH EOSINOPHILIC ESOPHAGITIS

How should quality of life be assessed in patients with eosinophilic esophagitis?

Statement 9

The Pediatric Quality of Life Inventory (PedsQL) Eosinophilic Esophagitis Module is an appropriate instrument for assessing health-related quality of life across different pediatric age groups, together with parental input, and has undergone cross-cultural adaptation into Spanish. This assessment provides a comprehensive evaluation of physical, emotional, and social impact and allows assessment of outcomes from individualized therapeutic interventions[62-65].

Level of evidence: II-2
Grade of recommendation: B
Agreement: 100%

Good Practice Points

In pediatric patients, the PedsQL scale has been translated, cross-culturally adapted, and validated in Spanish in Spain[63]. High reliability and validity have been demonstrated in multiple studies[64]. This instrument enables monitoring of treatment impact and shows that more restrictive elimination diets are associated with poorer quality-of-life scores ($p < 0.001$)[65].

RECOMMENDATIONS FOR TRANSITION TO ADULT CARE

How should transition of care be approached in pediatric patients with eosinophilic esophagitis?

Statement 10

Transition should be individualized for each patient and family, involving a multidisciplinary team including pediatric and adult gastroenterologists, nutritionists, nurses, and psychologists, to ensure adequate preparation of adolescent patients and their families for an appropriate transfer of care. The involvement of a transition coordinator is recommended[4,66-68].

Level of evidence: II-2
Grade of recommendation: B
Agreement: 100%

Good Practice Points

This process should ideally be led by a transition coordinator[4]. Instruments such as the STARx (Self-Management and Transition to Adulthood with Rx) questionnaire may be used to assess disease-related knowledge and readiness for successful transition. The questionnaire includes 18 items on a 5-point scale and evaluates six domains, with scores ranging from 0 to 90. Higher scores indicate greater readiness for transition[66]. The instrument has been translated into Spanish but has not undergone cultural validation in the Colombian context[67]. Studies indicate that 78% of patients and 76% of family members lacked knowledge regarding the transition process and demonstrated low levels of readiness according to the STARx questionnaire[66]. Barriers to transition include adolescent resistance and reduced adherence to treatment, highlighting the need for stronger parental involvement; limited physician training and experience in transitional care; and healthcare system limitations, including a scarcity of multidisciplinary teams and lack of insurance coverage for transition programs. Multidisciplinary participation should be ensured during the transition process, and continued development of national and international guidelines is recommended[68].

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Review article

Tumor Necrosis Factor Inhibitors and the Risk of Anorectal Cancer in Patients with Inflammatory Bowel Disease: Is This a Consistent and Clinically Concerning Association?

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Abstract

Introduction: The association between the use of tumor necrosis factor inhibitors (anti-TNF agents) and malignancy in patients with inflammatory bowel disease (IBD) has been increasingly explored. The objective of this study was to review the current state of the art regarding this relationship from multiple perspectives, based on the evidence available to date. **Methodology:** A comprehensive literature review was conducted using the metasearch engines PubMed, ScienceDirect, Embase, SciELO, Cochrane, and Medline, without restrictions on publication period. Bibliographic sources consistent with the stated objective were systematically selected. **Results:** A clear and unified definition of this association remains elusive. Human papillomavirus (HPV) infection and long-standing perianal fistulizing disease represent the primary risk factors. The main pathophysiological mechanism involved is the induction of T-cell apoptosis. Clinical presentation may overlap with IBD activity. Diagnostic evaluation should be supported by advanced imaging techniques, high-resolution anoscopy (HRA), and histopathological studies. Regarding management, a careful risk–benefit assessment of continued anti-TNF therapy is required. Localized disease presentation is associated with recurrence and a low risk of complications. **Conclusions:** Evidence exists supporting an association between TNF inhibitors and malignancy in patients with IBD, which may be extrapolated to a limited extent. The majority of available data supports a protective role. However, when squamous cell carcinoma of the anal canal and anal margin is evaluated independently, recommendations favor considering these patients as a high-risk group, warranting inclusion in structured surveillance programs.

Keywords (DeCS)

Tumor necrosis factor inhibitors, inflammatory bowel diseases, rectal diseases, neoplasms, diagnosis, therapy.

INTRODUCTION

Inflammatory bowel disease (IBD) is a chronic inflammatory condition characterized by a relapsing–remitting course and the absence of curative treatment. It encompasses Crohn's disease (CD) and ulcerative colitis (UC). IBD affects millions of individuals worldwide and imposes a substantial burden on both patients and healthcare systems[1,2]. The introduction of monoclonal antibodies targeting tumor necrosis factor alpha (anti-TNF-α) in the late twentieth century represented a major therapeutic advance in the management of IBD. These agents led to significant improvements in clinical outcomes, including sustained clinical remission, prevention of complications, and improved

quality of life[3,4]. The first anti-TNF agent developed was infliximab[4]. Subsequently, other anti-TNF agents emerged, including adalimumab, golimumab, and certolizumab, all of which received approval for the treatment of UC or CD[5]. Since 2013, biosimilars of infliximab and adalimumab have also been approved for the treatment of IBD[2].

Anti-TNF agents appear to exert a protective effect against the development of colorectal cancer in patients with both UC and CD, likely as a result of effective control of inflammation rather than an intrinsic antitumor mechanism[6]. In contrast, uncertainty persists regarding the association between anti-TNF therapy and the risk of anorectal cancer (ARC). Nevertheless, the broader relationship between anti-TNF agents and malignancy, particularly in patients with IBD, has been extensively explored. Several systematic reviews and meta-analyses have evaluated the risk of malignancy associated with anti-TNF therapy in patients with IBD. A systematic review conducted by Müller et al. found no significant association between anti-TNF use and an increased overall risk of malignancy, although one study reported an increased risk of lymphoma[7]. Similarly, Williams et al. conducted a meta-analysis in which no increased risk of malignancy was observed with anti-TNF therapy compared with placebo, although the available data were limited to short-term follow-up[8]. In a cohort study by Andersen et al., no significant increase in overall cancer risk associated with anti-TNF therapy was reported among patients with IBD, with a median follow-up of 3.7 years[9]. Furthermore, Targownik and Bernstein emphasized that although anti-TNF agents may increase the risk of nonmelanoma skin cancer, limited evidence suggests a meaningful increase in the risk of other malignancies, including ARC, beyond risks attributable to the underlying disease and concomitant therapies[10].

Overall, some concern persists regarding specific malignancies such as lymphoma; however, current evidence does not suggest a significant association between TNF inhibitors and an increased risk of ARC. Nevertheless, long-term data remain limited, and further research is required to fully characterize the long-term cancer risks associated with anti-TNF therapy. In the current context of colorectal cancer (CRC) and anal squamous cell carcinoma in patients with IBD receiving anti-TNF therapy, attention has focused on the potential impact of these agents on neoplasia risk. Available evidence suggests that patients with IBD treated with anti-TNF agents may have a reduced risk of CRC due to effective control of chronic inflammation. In contrast, the risk of anal squamous cell carcinoma remains less clearly defined. Evidence indicates that the benefits of TNF inhibitors in controlling inflammation outweigh potential cancer risks[6,11]. Consequently, an important knowledge gap persists regarding the relationship between anti-TNF use and the risk of CRC and anal squamous cell carcinoma in patients with IBD. The objective of this review is to evaluate the current state of knowledge regarding this association from multiple perspectives, based on the evidence available to date.

METHODS

This study constitutes a narrative literature review examining the relationship between anti-TNF therapy and the risk of ARC in patients with inflammatory bowel disease. The stages of the literature review included literature search, article selection, and reference screening of selected studies. Additionally, some articles cited in the reference lists of selected publications were incorporated into the final selection when they met predefined criteria (described below). During the first phase of the review, an initial search was conducted between February 2024 and November 2024 using the following parameters: databases and metasearch engines included PubMed, ScienceDirect, Embase, SciELO, Cochrane, and MEDLINE. Search terms included: "Tumor Necrosis Factor Inhibitors," "Rectal Diseases," "Anorectal," "Neoplasms," "Neoplasms by Site," "Inflammatory Bowel Diseases," "Ulcerative Colitis," and "Crohn's Disease." Timeframe: no restrictions. Languages: English and Spanish. Study types included clinical practice guidelines, observational studies, randomized controlled trials, systematic reviews and meta-analyses, case series, and case reports. Eligibility criteria included use of evidence grading systems and recommendation strength classifications, as well as publication by authors affiliated with internationally recognized institutions. Following the initial search, titles and abstracts were independently reviewed according to the eligibility criteria described above and assessed for consistency with the objective of the literature review.

RESULTS

Defining criteria

In clinical practice, attributing ARC to anti-TNF therapy first requires a comprehensive evaluation of the patient's clinical history[8,12], including assessment of other cancer risk factors, as well as careful review of evidence supporting an association between these agents and cancer risk (**Figure 1**):

- Temporal association: development of anorectal cancer after initiation of anti-TNF therapy.
- Exclusion of alternative risk factors: consideration of other potential risk factors for ARC.
- Biological plausibility: understanding potential mechanisms by which anti-TNF therapy could contribute to carcinogenesis.

- Epidemiological evidence: data from studies suggesting increased incidence of ARC among patients receiving anti-TNF therapy.

Epidemiology

Recent data indicate an increased risk of anal cancer among patients with IBD who present specific risk factors. However, according to current evidence, the use of TNF inhibitors does not appear to significantly modify the risk of anorectal tumors[7,8,13]. Individuals with CD have a higher risk of developing anal cancer, particularly anal squamous cell carcinoma, especially in the presence of anal or perianal lesions. The CESAME study demonstrated that patients with IBD and anal or perianal lesions had a higher incidence rate of anal squamous cell carcinoma (2.6 per 10,000 person-years) compared with those without such lesions (0.8 per 10,000 person-years)[13]. Risk factors for anal cancer in this population include human papillomavirus (HPV) infection[13]. Among patients with IBD, a higher risk of ARC has been observed in those with anal or perianal CD[13,16].

Systematic reviews and meta-analyses suggest that anti-TNF agents do not significantly increase the risk of cancer in patients with IBD, including anorectal tumors. The principal malignancy-related concerns associated with anti-TNF therapy are lymphoma and nonmelanoma skin cancer rather than anorectal cancer[7,8].

Risk factors

The main risk factors for ARC in patients with IBD receiving anti-TNF agents are not specifically detailed in the medical literature. However, several general risk factors for anorectal cancer in patients with IBD can be identified (**Figure 1**):

- Perianal disease: patients with CD and long-standing perianal fistulas have an increased risk of anal cancer. The CESAME study demonstrated this elevated risk, particularly in individuals with anal or perianal lesions[13].
- HPV infection: a well-established risk factor for anal squamous cell carcinoma. Its presence may increase risk in patients with IBD[13].
- Chronic inflammation: persistent inflammation in the anorectal region, commonly observed in IBD, may contribute to carcinogenesis[13,14].

TNF inhibitors do not appear to be associated with an increased risk of ARC. However, combination therapy with thiopurines may increase the risk of certain malignancies, including lymphoma and nonmelanoma skin cancer[7,10,14].

Regarding disease duration, longer duration of IBD has been associated with an increased overall risk of malignancy, although data specifically addressing ARC remain limited[17].

Pathophysiology

The pathophysiology of ARC in patients with IBD treated with anti-TNF agents is not well characterized. Its relationship with CRC in patients with IBD continues to be investigated. TNF-α is a key proinflammatory cytokine involved in the pathogenesis of IBD, and its inhibition constitutes a cornerstone of biological therapy. The principal mechanism of action involves reduction of inflammation, a well-established risk factor for CRC in patients with IBD[6,18]. By controlling inflammation, anti-TNF agents may reduce the risk of CRC[6]. The role of TNF-α in immune surveillance and tumor suppression is complex. TNF-α contributes to immune recognition and elimination of malignant cells; therefore, its inhibition could theoretically interfere with this process and increase malignancy risk[10,19]. Nevertheless, current evidence does not support an increased risk of neoplasia, including CRC, despite this theoretical concern[8,10]. In animal models, TNF-α appears to be redundant in colitis-associated carcinogenesis, as other proinflammatory cytokines compensate for its absence[19]. This finding may explain why TNF inhibition does not significantly increase cancer risk in clinical settings.

Anti-TNF agents have been shown to induce apoptosis of T cells in patients with IBD through tumor necrosis factor receptor 2 (TNFR2) and membrane-bound TNF (mTNF) expressed on CD14+ macrophages, which may explain their anti-inflammatory effects[20]. This mechanism may also play a role in modulation of the intestinal immune environment, potentially influencing cancer risk.

In summary, TNF inhibitors are effective in controlling inflammation associated with IBD. Further studies are required to fully elucidate the underlying mechanisms and their clinical implications.

Clinical presentation

ARC in patients with IBD, irrespective of TNF inhibitor use, typically presents with symptoms such as rectal bleeding, changes in bowel habits, and proctalgia. These symptoms may overlap with those of IBD, which can delay early diagnosis. Regular surveillance and a high index of suspicion are essential for early detection[7].

Ogawa et al. investigated the relationship between infliximab therapy and anorectal cancer in patients with perianal CD. A small subgroup of patients undergoing surgery for perianal CD developed ARC associated with perianal fistulas. These patients presented with advanced-stage cancer and had received infliximab prior to cancer diagnosis, often due

to progression of anal lesions[21]. These findings suggest that patients with long-standing anal fistulas, particularly those receiving anti-TNF agents such as infliximab, may be at increased risk of developing ARC. The results also highlight the importance of careful inspection and biopsy of anal lesions before initiating infliximab therapy in such cases.

Diagnosis

Diagnosis of ARC in patients with IBD receiving TNF antagonists requires integration of comprehensive clinical history assessment with complementary diagnostic tests (**Figure 1**), including endoscopic biopsy, core needle biopsy, and excisional biopsy, frequently complemented by advanced imaging techniques[15,22-24]. Particularly in patients with long-standing perianal disease, regular surveillance and a high index of suspicion are essential for early detection[15,22]. Endoscopic biopsy constitutes the cornerstone of ARC diagnosis. It allows direct visualization and tissue sampling of suspicious lesions. In the study conducted by Matsuno et al.[15], various biopsy methods were evaluated for cancer detection in patients with CD, and endoscopic biopsy demonstrated a detection rate of 5.56%. This method is essential for obtaining tissue samples for histopathological examination[15].

Core needle biopsy is most commonly used in the perianal region when endoscopy is impracticable due to stenosis or severe inflammation. One study reported a detection rate of 1.85% for CRC using core needle biopsy. This technique may be useful when endoscopic evaluation cannot be performed[15]. Excisional biopsy involves surgical removal of part of the lesion. In the study by Matsuno et al., this method demonstrated a detection rate of 5.88%. It is useful for larger or more accessible lesions and provides sufficient tissue for histopathological evaluation[15]. Endoscopic surveillance under anesthesia may be considered in patients with perianal pain or stenosis. This approach allows more thorough and less painful examination and biopsy[15].

Molecular imaging techniques represent valuable tools in the evaluation of IBD and associated neoplasia. Intracolonic ultrasound targeting membrane-bound TNF--α (mTNF-α) enables quantitative detection of TNF-α expression in the intestinal mucosa. Furthermore, the use of fluorescent anti-TNF antibodies during confocal laser endomicroscopy has shown promise for predicting therapeutic response and could potentially be adapted for surveillance purposes[22,23].

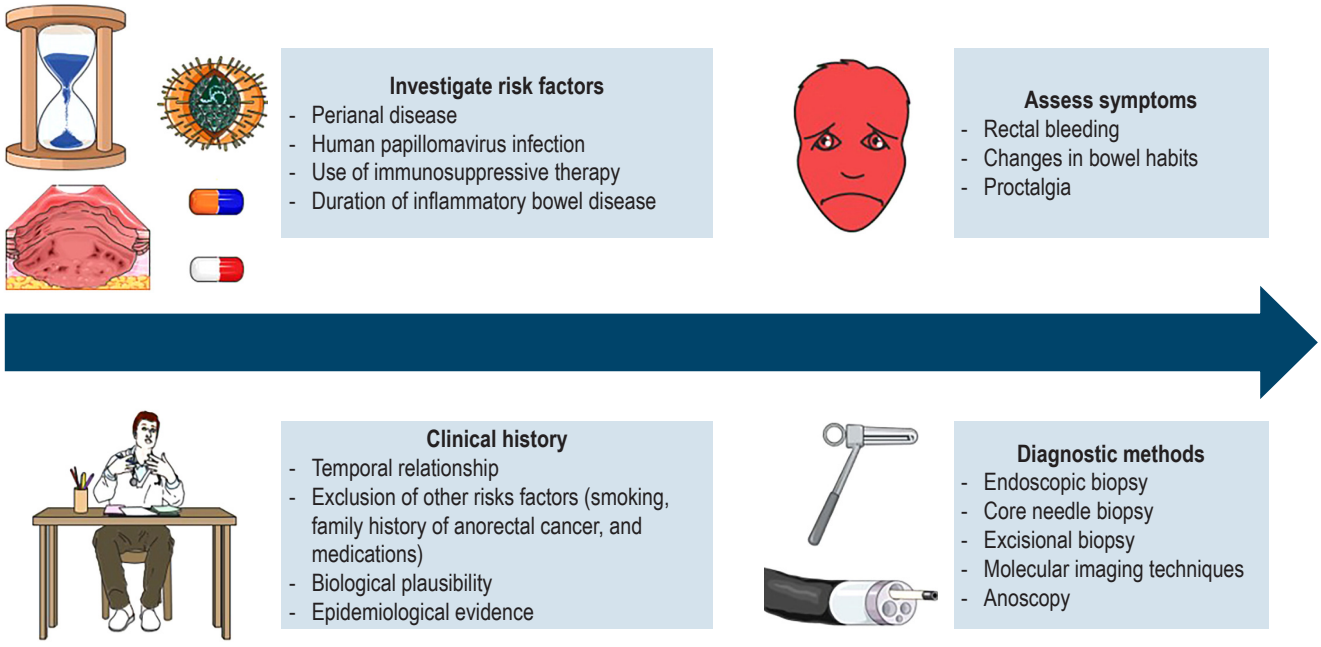


Figure 1. Considerations in the diagnostic approach to anorectal cancer in relation to the use of tumor necrosis factor inhibitors in patients with inflammatory bowel disease. Image created using Servier Medical Art figures under their terms of use, based on: Muller M, et al. *J Crohn's Colitis.* 2021;15(5):840-59[7]; Williams CJM, et al. *Aliment Pharmacol Ther.* 2014;39(5):447-58[8]; Andersen NN, et al. *JAMA.* 2014;311(23):2406-13[9]; Targownik LE, et al. *Am J Gastroenterol.* 2013;108(12):1835-42[10]; Townsend CM, et al. *Dig Dis Sci.* 2021;66(12):4436-40[12]; Axelrad JE, et al. *Clin Gastroenterol Hepatol.* 2024;22(7):1365-72[13]; Laredo V, et al. *Cancers (Basel).* 2023;15(3):871[14]; Matsuno H, et al. *Digestion.* 2016;94(1):24-9[15].

These approaches are not yet standardized, and their clinical applicability remains uncertain. Random biopsies may identify "invisible" neoplastic lesions; however, their utility in detecting colorectal neoplasia in IBD is controversial. Detection rates are generally low, and the approach increases procedural time and cost[24].

High-resolution anoscopy and inflammatory bowel disease

High-resolution anoscopy (HRA) is used to identify precancerous squamous cell lesions[25]. Squamous cell carcinoma of the anal canal and anal margin occurs approximately three times more frequently in immunocompromised individuals than in the general population. Incidence rates may reach 5.5 per 100,000 persons in the general population[25,26].

Use of the therapies described in patients with IBD has been associated with persistence of high-risk HPV infection through alteration of viral oncoproteins E6 and E7, which promote viral overexpression[27]. The most commonly implicated and best-documented HPV genotypes are HPV 16 and HPV 18[27]. In most cases, HPV infection in sexually active adults tends to resolve spontaneously (viral clearance)[25,27]. When infection persists, cytopathological changes may occur, ranging from viral warts to anal intraepithelial neoplasia, classified as low-grade squamous intraepithelial lesions (LSIL) or high-grade squamous intraepithelial lesions (HSIL)[28]. Low-grade dysplastic changes may regress or progress to high-grade dysplasia[25-27]. This process may ultimately lead to superficially invasive squamous cell carcinoma of the anal canal (SISCCA), which is initially superficial and asymptomatic but subsequently progresses to deeper tissue infiltration accompanied by symptoms[29,30]. Specific risk groups have been identified as having a higher incidence of anal squamous cell carcinoma. These groups have been classified as follows[29-31]:

- Individuals living with HIV older than 35 years, with incidence rates up to 90 per 100,000.
- Women older than 45 years with documented HPV 16 infection.
- Individuals older than 45 years with receptive anal intercourse (unknown serological status).
- Immunocompromised patients, including transplant recipients and those receiving corticosteroids or anti-TNF therapy, representing approximately 5.5% of the population[31].

Hypotheses and underlying mechanisms

Persistence of high-risk HPV infection is a key factor in the development of anal cancer[31]. Immunocompromised patients are more susceptible to infections, and the use of anti-TNF agents has been associated with an increased risk of HPV infection[30]. Alterations in the viral oncoproteins E6 and E7 may also affect human defensins, which function as a protective system against HPV in perianal skin through surface proteins[30,31]. Development of dysplasia as a precursor lesion may be promoted by chronic inflammation attributable to IBD itself[30].

Surveillance and prevention

The meta-analysis published by Clifford et al., together with the guidelines of the International Anal Neoplasia Society, suggests that patients with IBD, particularly those with CD[26], should be included in screening programs in order to reduce the incidence of anal cancer. Primary prevention through HPV vaccination could mitigate this risk over several decades. However, ongoing screening and surveillance strategies remain necessary because most of the population was not vaccinated at an early age[26,31].

Complementary surveillance strategies include the following[26-31]:

- Liquid-based anal cytology: enables early detection of abnormal cells, analogous to cervical cytology.
- Advanced genotyping: identifies high-risk HPV types, particularly types 16 and 18.
- High-resolution anoscopy (HRA): enables rapid and safe identification and treatment of dysplastic lesions. This approach has reduced the incidence of anal cancer by approximately half in other high-risk populations, comparable to the reductions in cervical cancer incidence achieved through colposcopy.

High-resolution anoscopy technique

HRA is performed using a colposcope rather than a colonoscope in order to allow a detailed 360-degree examination of the anal transformation zone[30]. This area is located between the visible squamocolumnar junction and the dentate line. Topical agents such as 5% acetic acid and 5% Lugol's solution are used to identify lesions. The specialist identifies low- and high-risk lesions, superficially invasive squamous cell carcinoma of the anal canal (SISCCA), or deeply infiltrative carcinoma[32].

Lesion identification is based on several characteristic patterns:

- Acetic acid uptake (flat or raised).
- Surface pattern (granular or micropapillary).
- Vascular patterns (mosaic and punctation).
- Areas of abnormal metaplasia (lace-like or honeycomb pattern).
- Lugol uptake (partial or negative in high-grade dysplasia).

These findings guide diagnosis and therapeutic decision-making[32]. **Figure 2** illustrates representative findings observed in dysplastic changes associated with HPV infec-

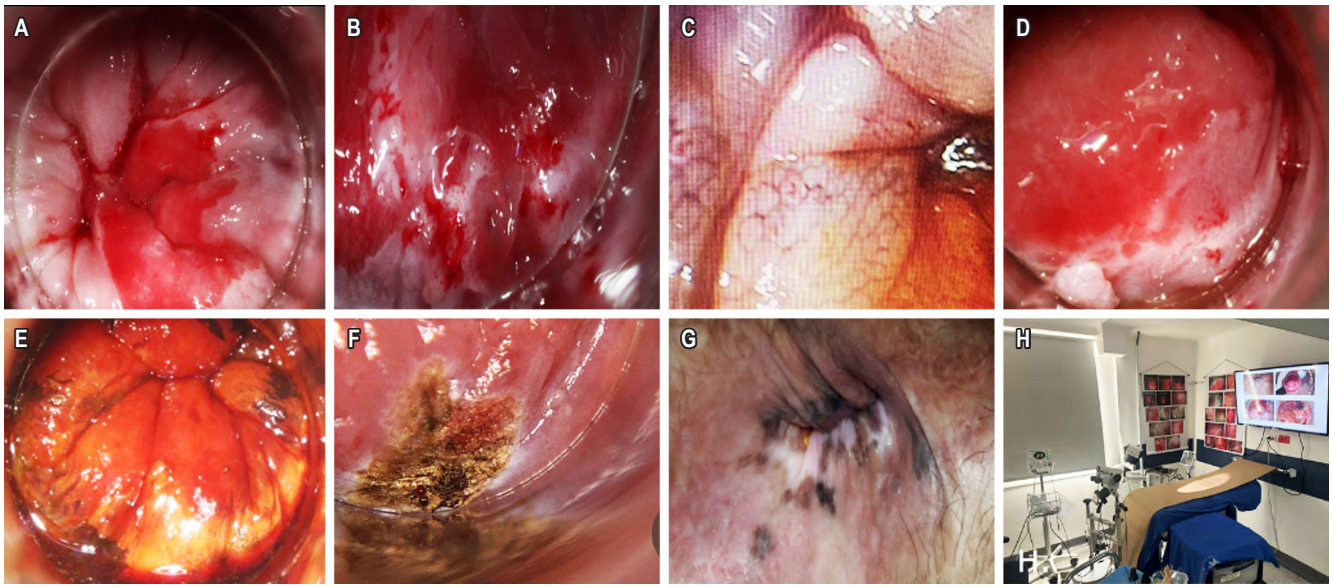


Figure 2. A. Dense acetowhite area: transformation zone with a clearly visible 360-degree squamocolumnar junction. **B.** High-grade dysplasia with lace-like metaplasia and coarse punctation observed at 15× magnification using microscopy. **C.** Coarse mosaic pattern at 15× magnification, consistent with high-grade dysplasia. **D.** LSIL-condyloma lesion and lace-like metaplastic area of anal intraepithelial neoplasia. **E.** Lugol-negative area corresponding to high-grade dysplasia requiring treatment. **F.** Electrocautery treatment of a high-grade dysplastic area in the HRA setting. **G.** Anoscopy includes assessment and magnification of the perianal region. In this case, pigmented lesions correspond to perianal HSIL (bowenoid papulosis). **H.** HRA examination setting. Images property of the authors.

tion, as well as elements commonly used in an HRA examination setting.

Surveillance strategies such as liquid-based cytology, genotyping, and HRA are essential for prevention and early detection of precursor lesions and early-stage anal cancer, particularly in high-risk populations. These strategies may significantly reduce disease incidence, as demonstrated in other high-risk groups[33].

Differential diagnoses

Diagnosis of ARC in patients with IBD receiving anti-TNF therapy requires careful assessment of the impact of chronic inflammation associated with IBD and the potential effects of anti-TNF therapy on both malignant and nonmalignant cells. Management of these patients typically requires a multidisciplinary team involving gastroenterologists, oncologists, and coloproctologists. Regular surveillance and a high index of suspicion are essential to detect and manage malignancies in this high-risk population in the following clinical scenarios:

- Perianal abscess and fistula: common in IBD and may mimic CRC. Chronic perianal fistulas, particularly in patients with long-standing disease, should raise suspicion for malignancy[34].
- Infectious processes: opportunistic infections, including reactivation of latent infections such as tuberculosis and hepatitis B, may mimic malignancy, particularly in immunocompromised patients[35].
- CRC: chronic inflammation in IBD increases CRC risk, which may be further influenced by immunosuppressive therapies, although data regarding TNF antagonists remain inconclusive[7,14,16].
- Lymphoma: anti-TNF therapy has been associated with an increased risk of lymphoproliferative disorders, including lymphoma, particularly in patients receiving concomitant thiopurines[14,16,35].
- Nonmelanoma skin cancer: anti-TNF therapy is associated with an increased risk of nonmelanoma skin cancer. This possibility should be considered when evaluating unusual cutaneous lesions in the anorectal region[7,8].
- Anal squamous cell carcinoma: this malignancy may present as anorectal abscesses or fistulas and occurs more frequently in individuals with Crohn's disease or chronic perianal disease[34].

Management

Management of ARC in patients with IBD receiving anti-TNF therapy is complex, primarily due to the interaction

between cancer risk and the immunosuppressive effects of these biological agents[36,37]. Anti-TNF therapy plays a fundamental role in the management of IBD because of its anti-inflammatory properties and its capacity to promote mucosal healing. However, its use in patients with a history of malignancy, including colorectal cancer, requires careful consideration. A study comparing the safety of anti-TNF agents with that of non–anti-TNF biologic therapies found no significant differences in cancer progression or recurrence. These findings suggest that anti-TNF therapy may be safely used in this context[36-38]. Recent data suggest that anti-TNF therapy may reduce the risk of CRC in patients with IBD, possibly due to its anti-inflammatory effects. In the study conducted by Alkhayyat et al.[6], patients with IBD treated with anti-TNF agents were less likely to develop CRC compared with those not receiving these therapies (odds ratio [OR]: 0.69; 95% confidence interval [CI]: 0.66–0.73; $p < 0.0001$ for CD, and OR: 0.78; 95% CI: 0.73–0.83; $p < 0.0001$ for UC) Although this finding is specific to CRC, it underscores the importance of inflammation control in cancer risk management, which may also be relevant to ARC[6].

The decision to use anti-TNF therapy should be made by a multidisciplinary team, taking into account disease severity and oncological status (**Figure 3**). Potential benefits and risks must be carefully weighed. Therapeutic drug monitoring and combined strategies (e.g., antibiotics or surgery) have also been shown to improve outcomes in fistulizing CD[39,40].

Evidence regarding anti-TNF therapy in patients with IBD remains limited. Achieving an appropriate balance between optimal IBD control, cancer risk, and the safety of anti-TNF therapy in patients with prior malignancy remains essential. Further research is required.

Recurrence

Research on recurrence of neoplastic disease in patients with IBD treated with anti-TNF therapy is clinically relevant, as it may inform therapeutic decision-making according to the current literature. A multicenter study conducted by Holmer et al. compared the safety of anti-TNF biologic agents with non–TNF inhibitor biologics in patients with IBD and active or recent malignancy. No differences in cancer recurrence were observed between the two groups, suggesting that anti-TNF therapy does not increase recurrence risk in this population[37]. Another study supports this finding. It evaluated the risk of new or

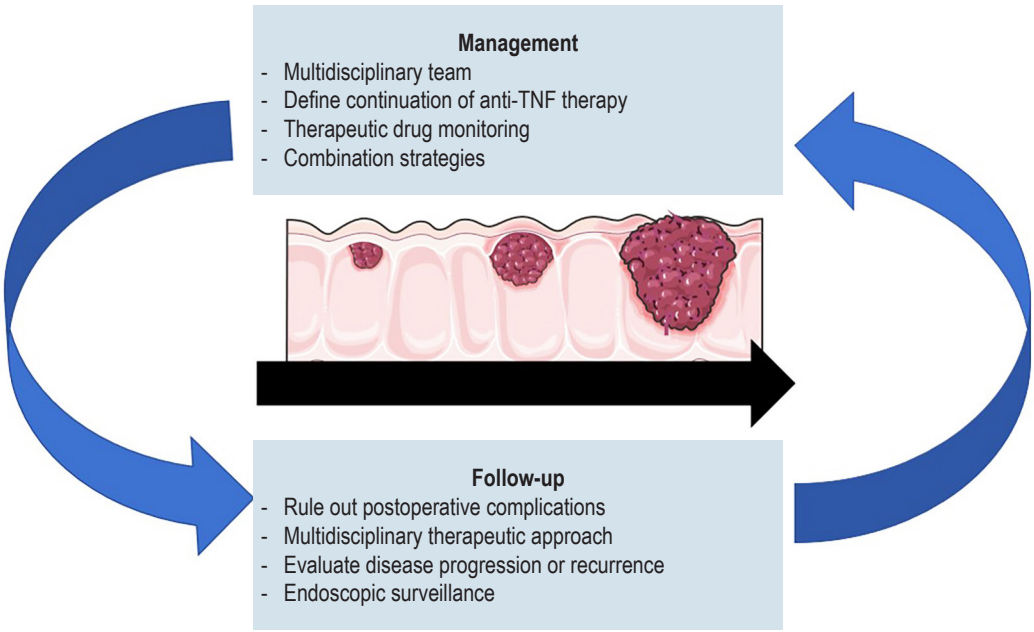


Figure 3. Considerations in the therapeutic approach and follow-up of anorectal cancer in relation to the use of tumor necrosis factor inhibitors in patients with inflammatory bowel disease. Image created using Servier Medical Art figures under their terms of use, based on: Boaz E, et al. *Am Surg.* 2023;89(6):2572-6[34]; Billiet T, et al. *Expert Opin Biol Ther.* 2014;14(1):75-101[36]; Holmer AK, et al. *Clin Gastroenterol Hepatol.* 2023;21(6):1598-1606.e5[37]; Waljee AK, et al. *Lancet Gastroenterol Hepatol.* 2020;5(3):276-84[41]; Lee KE, et al. *Dis Colon Rectum.* 2024;67(S1):S11-25[42]; Hammoudi N, et al. *Dig Liver Dis.* 2023;55(9):1280-7[43].

recurrent cancer in patients with IBD and a prior history of malignancy treated with anti-TNF agents. The study concluded that anti-TNF therapy was not associated with an increased risk of cancer compared with other immunosuppressive treatments or absence of therapy[44].

A review of available studies found no significant differences in cancer risk among patients with a prior history of malignancy who received anti-TNF therapy compared with those treated with nonbiologic disease-modifying therapies[45]. This meta-analysis further supports the conclusion that anti-TNF therapy is not associated with an increased risk of cancer recurrence.

A Danish cohort study similarly reported that anti-TNF therapy did not increase the risk of cancer recurrence or development of a new malignancy. No significant increase in risk was observed, with an adjusted hazard ratio (HR) of 0.82 (95% confidence interval [CI]: 0.61–1.11) for cancer recurrence or development of a new malignancy among patients receiving anti-TNF therapy[41].

Overall, the medical literature suggests that use of anti-TNF therapy in patients with IBD and a history of malignancy does not substantially increase recurrence risk. These findings are consistent across multiple studies and meta-analyses, supporting the relative safety of TNF inhibitors in this context. Nevertheless, individualized clinical assessment remains essential, and therapeutic decisions should involve close collaboration with oncology specialists.

Complications

Concern persists regarding lymphoma risk, particularly when anti-TNF therapy is used in combination with thiopurines, which are a recognized risk factor for hepatosplenic T-cell lymphoma[13]. A systematic review found that anti-TNF therapy does not significantly increase the risk of postoperative complications in patients with IBD undergoing surgery[42]. This finding is particularly relevant for patients with ARC who may require surgical intervention. A multicenter study reported that anti-TNF therapy in patients with active or recently diagnosed cancer does not appear to increase the risk of cancer progression or recurrence[37]. This observation is clinically important for management of IBD in patients with a history of CRC, as it suggests that anti-TNF therapy may be used without significantly increasing the risk of cancer-related complications.

Overall, TNF inhibitors do not appear to significantly increase the risk of malignancy or postoperative complications, although variability may exist. Close monitoring and multidisciplinary management are recommended (**Figure 3**).

Prognosis

Prognosis represents a nuanced issue with several important considerations based on current clinical evidence. A study conducted at a French tertiary care center provides relevant data regarding the prognosis of IBD-associated CRC[43]. The study reported a median overall survival of 45 months for the entire cohort. Patients with metastatic disease had a poorer prognosis, with a median overall survival of 20.4 months, compared with patients presenting with localized tumors, who demonstrated a median overall survival of 74 months among those previously exposed to immunosuppressive therapy[43]. These findings suggest that prior exposure to immunosuppressive agents, including anti-TNF therapy, may be associated with improved prognosis in localized IBD-associated CRC.

A multicenter study found no significant differences in cancer progression or recurrence rates between anti-TNF and non–TNF biologic therapies in patients with IBD and active or recent malignancy[37], indicating that anti-TNF therapy does not adversely affect cancer prognosis in this population[37]. A review evaluating patients with IBD treated with anti-TNF agents found no increased risk of malignancy, including CRC[7]. These findings support the conclusion that anti-TNF therapy does not negatively influence CRC prognosis in patients with IBD[7]. A study evaluating the risk of new or recurrent cancer in patients with IBD and prior malignancy found no significant differences in cancer risk between patients treated with anti-TNF agents and those not receiving anti-TNF therapy[44]. This observation suggests that anti-TNF therapy does not increase cancer recurrence risk, which represents a key determinant of prognosis in ARC[44].

CONCLUSIONS

Evidence regarding TNF inhibitors and malignancy risk in patients with IBD may be extrapolated. Available evidence largely supports a protective effect for colorectal cancer. Diagnosis of ARC in patients with IBD potentially associated with anti-TNF therapy should rely on careful clinical judgment. Suspicion should be heightened in patients with long-standing anal or perianal lesions, HPV infection, concomitant immunomodulator therapy, chronic inflammation, and long disease duration. Pathophysiological mechanisms may involve alterations in T-cell function. Diagnosis relies primarily on HRA and histopathological evaluation due to the broad differential diagnosis and nonspecific clinical presentation. Management requires a multidisciplinary approach. Risk of complications and prognosis vary, with poorer outcomes observed in patients

with disseminated disease. Although specific data regarding ARC remain limited, evidence from CRC and other malignancies suggests that anti-TNF therapy does not substantially modify cancer risk in patients with IBD. More robust studies are required to establish definitive conclusions. Evidence regarding the impact of anti-TNF therapy on anorectal cancer remains scarce, and no study has demonstrated either an increased or decreased risk of anorectal cancer attributable to anti-TNF therapy. Although anti-TNF therapy may influence CRC risk, data regarding its specific effect on anorectal cancer are lacking.

Availability of data and materials

Data sharing is not applicable to this article because no datasets were generated or analyzed during the current study.

Conflicts of interest

The authors declare no conflicts of interest.

Funding source

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Authors' contributions

All authors analyzed and interpreted the results of the literature search, contributed to manuscript drafting, analyzed and interpreted the images, and participated in manuscript preparation. All authors read and approved the final manuscript.

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Review article

Clinical Efficacy and Implementation of the Low-FODMAP Diet in Irritable Bowel Syndrome: A Systematic Review

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Abstract

Introduction: Functional gastrointestinal disorders, such as irritable bowel syndrome (IBS), significantly impair quality of life. The low–fermentable oligosaccharides, disaccharides, monosaccharides, and polyols (FODMAP) diet has emerged as an effective dietary intervention. This systematic review evaluates the evidence regarding its efficacy and clinical applicability in adults with functional gastrointestinal disorders. **Methodology:** A systematic review was conducted in accordance with the PRISMA 2020 guidelines and registered in PROSPERO (CRD1005339). Studies published between 2015 and 2025 were included if they evaluated the clinical effectiveness of the low-FODMAP diet compared with a standard diet or control group in adults with functional gastrointestinal disorders. Randomized controlled trials, cohort studies, and systematic reviews with meta-analyses were considered. Study selection, data extraction, and risk-of-bias assessment were independently performed by two reviewers using the Cochrane RoB 2.0 tool. **Results:** Of 1,750 records identified, 37 full-text articles were reviewed, and 22 studies were included in the final analysis. Findings demonstrated a significant reduction in gastrointestinal symptoms, improvements in quality of life, and adequate dietary adherence. **Conclusions:** The low-FODMAP diet is effective for symptom management in adults with irritable bowel syndrome. Its clinical implementation should be individualized and accompanied by professional supervision in order to optimize therapeutic outcomes.

Keywords

Irritable bowel syndrome, FODMAP diet, digestive signs and symptoms, quality of life, treatment adherence.

INTRODUCTION

Functional gastrointestinal disorders (FGIDs), including irritable bowel syndrome (IBS), affect a substantial proportion of the population and are associated with significant impairment in quality of life. These disorders are characterized by symptoms such as abdominal pain, bloating, flatulence, diarrhea, or constipation in the absence of demonstrable structural abnormalities. Globally, it is estimated that up to 40% of the population presents some form of FGID, whereas the prevalence of IBS, according to the Rome IV criteria, is 3.8%[1,2].

According to the global study conducted by the Rome Foundation across 33 countries and including more than 73,000 participants, 40.3% of individuals surveyed online and 20.7% of those surveyed through household interviews met criteria for at least one FGID, based on the Rome IV criteria. Regarding irritable bowel syndrome, prevalence was 4.1% in internet-based surveys and 1.5% in household surveys, with higher frequency observed in women[3].

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In Latin America, the prevalence of irritable bowel syndrome reaches 6.98%[4]. In Colombia, studies conducted in adult populations have reported figures as high as 24.0%[5], suggesting a substantial national disease burden and potential regional variation associated with dietary, cultural, and diagnostic factors. The low-FODMAP diet (LFD) represents a non-pharmacological therapeutic strategy with demonstrated efficacy in reducing gastrointestinal symptoms. Its implementation consists of three phases: elimination, gradual reintroduction, and individualized adaptation, with the aim of achieving sustained symptom control[6]. FODMAPs are poorly absorbed carbohydrates that increase intestinal osmolarity and undergo colonic fermentation, leading to the production of gas and short-chain fatty acids. These pathophysiological mechanisms contribute to symptoms such as bloating, abdominal pain, and altered gastrointestinal motility. These effects support the use of the LFD as a therapeutic strategy for functional gastrointestinal disorders[7,8].

Although the efficacy of the LFD is supported by scientific evidence, its clinical implementation continues to face challenges related to professional knowledge, food availability, and sociocultural factors. This underscores the need to address existing gaps and to develop evidence-based recommendations to optimize its application in the management of functional gastrointestinal disorders[9].

In this context, the objective of the present systematic review is to synthesize the available scientific evidence on the efficacy and clinical applicability of the LFD in adult patients, with emphasis on symptom reduction, improvement in quality of life, and adherence to nutritional treatment.

MATERIALS AND METHODS

This systematic review was conducted in accordance with the PRISMA 2020 methodology (Preferred Reporting Items for Systematic Reviews and Meta-Analyses)[10]. The protocol was registered in the International Prospective Register of Systematic Reviews (PROSPERO) under ID 1005339. The review received approval from the Research Ethics Committee of the School of Medicine at Universidad Nacional de Colombia (B.FM.1.002–CE–042–25).

The search strategy was carried out on March 6, 2025, across the bibliographic databases PubMed, ScienceDirect, Scopus, SciELO, Embase (Elsevier), Latin American and Caribbean Health Sciences Literature (LILACS), and The Cochrane Library (CLIB), which includes the Cochrane Central Register of Controlled Trials (CENTRAL).

From an epidemiological perspective, studies meeting predefined eligibility criteria based on the PICO framework were included. The target population consisted of adults (≥18 years) diagnosed with functional gastrointestinal disorders, primarily irritable bowel syndrome or functional dyspepsia, according to the Rome III or Rome IV criteria. The intervention evaluated was the LFD, applied in any of its phases, and compared with conventional diets, unstructured diets, or usual care without a specific dietary intervention. Outcomes included symptom reduction, improvement in quality of life, and treatment adherence. Both observational and experimental study designs were considered, including randomized controlled trials, cohort studies, case-control studies, and systematic reviews with meta-analysis. The search was limited to publications between 2015 and 2025 in English, Spanish, Portuguese, or French.

From a methodological perspective, studies involving populations not representative of the target clinical population were excluded. These included individuals younger than 18 years, frail older adults (≥70 years), and patients with organic gastrointestinal diseases such as inflammatory bowel disease, celiac disease, or cancer. Animal studies, in vitro research, and non-primary publications (narrative reviews, editorials, letters, case reports, and abstracts without complete data) were also excluded.

Studies that did not clearly describe the LFD implementation protocol, had follow-up periods shorter than four weeks, or failed to assess relevant clinical outcomes were excluded. Studies without defined comparator groups or those evaluating experimental diets different from conventional dietary approaches were also excluded. Only studies reporting clinically relevant outcomes, such as reduction in digestive symptoms, improvement in quality of life, or dietary adherence, were considered eligible.

The study screening process followed the methodological classification established by PROSPERO as "studies screened by one person (or machine) and verified by at least one other person (or machine)," ensuring independent double review to minimize selection bias. Reference management, duplicate detection, and streamlining of title, abstract, and full-text screening were conducted using the online platform Rayyan[11], a tool specifically designed for systematic reviews. Disagreements between reviewers were resolved by consensus or through consultation with a third evaluator.

Additionally, a complementary search approach known as the snowball method was applied. This strategy involved reviewing the reference lists of included studies as well as articles citing them in order to identify potentially relevant additional research. This approach increased the sensitivity of the search process and optimized the identification of pertinent studies, particularly those related to clinical efficacy and contextual implementation of the LFD in Latin American countries, where the literature may be dispersed or less extensively indexed in major databases.

Data extraction was conducted independently by two researchers, and discrepancies were resolved through con-

sensus. Key methodological and clinical characteristics of clinical trials and systematic reviews with meta-analysis were collected, including information on study design, population, intervention, and outcomes. Authors were contacted when necessary to clarify or complete missing information.

Risk of bias was independently assessed by two reviewers using the Cochrane Risk of Bias 2.0 (RoB 2.0) tool in its Excel version (version 7). This instrument evaluates the methodological quality of randomized controlled trials across five key domains and provides an overall judgment regarding risk of bias. Discrepancies between reviewers were resolved through discussion and, when necessary, with the involvement of a third evaluator[12].

RESULTS

A total of 1,750 records were identified through searches across multiple databases. Of these, 947 were removed as duplicates, and 592 were excluded after initial screening because they did not align with the objective of the review. During title and abstract screening, an additional 174 articles were excluded. Fifteen more were excluded after full-text assessment because they did not meet the established methodological criteria (**Figure 1**). Ultimately, 22 studies were included in the systematic review: 15 randomized controlled trials (**Tables 1** and **2**) and 7 systematic reviews with meta-analysis (**Table 3**).

The findings of this review are organized into primary and additional outcomes. Primary outcomes include reduction of gastrointestinal symptoms, comparison with other dietary interventions, effectiveness according to IBS subtype, and the role of dietary education. The reintroduction phase, impact on quality of life, treatment adherence, changes in intestinal microbiota, and nutritional safety were also evaluated. Additional outcomes included effects on body weight and BMI, mental health, functional well-being, sleep quality, and changes in dietary composition (**Figure 2**).

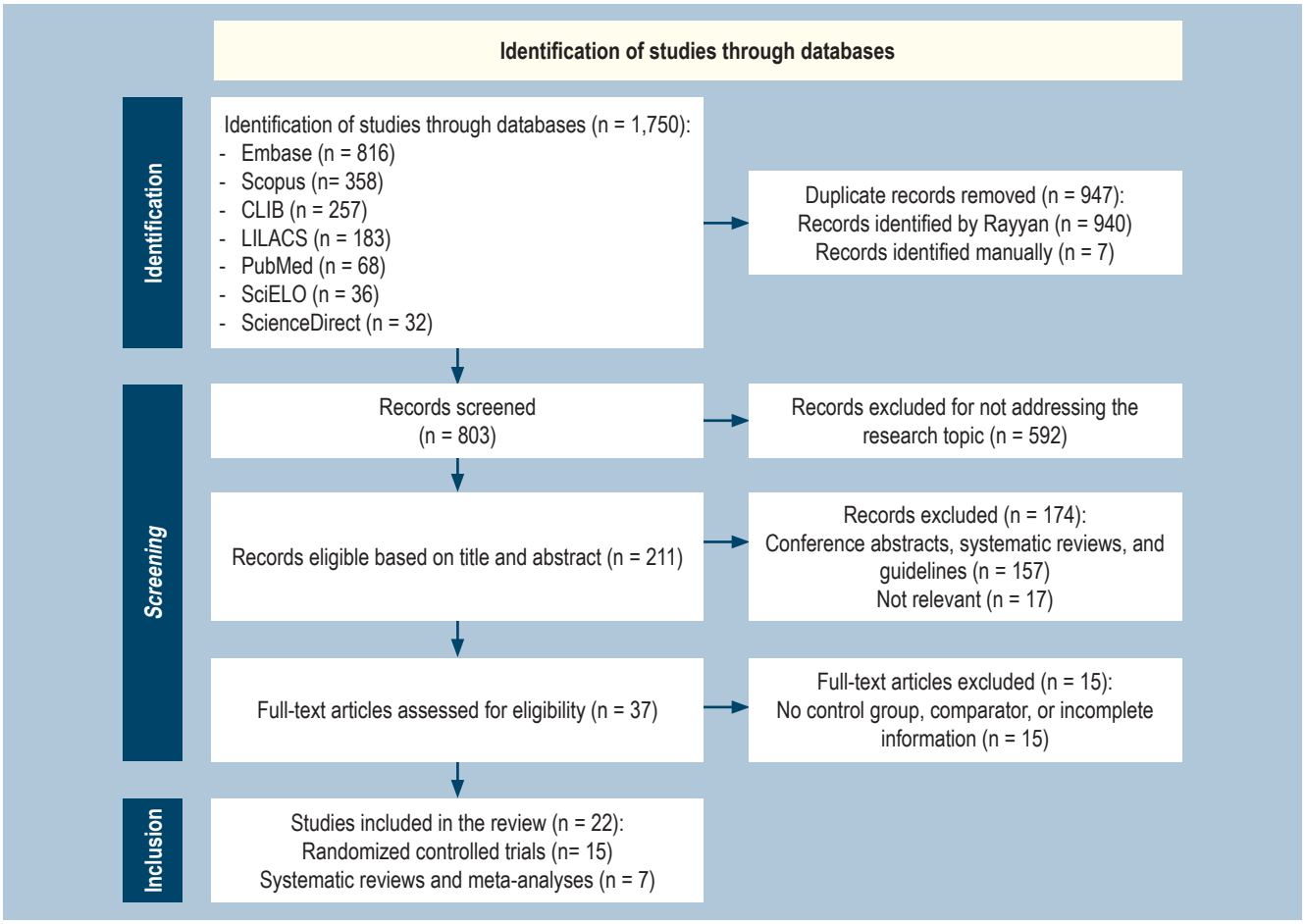


Figure 1. PRISMA flow diagram for study selection. Image property of the authors.

Table 1. Characteristics of randomized controlled trials included in the systematic review

Reference	Country	Study duration	Duration	Total, LFD	Total, comparator	Mean age	Diagnostic criteria	IBS subtype
Böhn et al. (2015)	Sweden	Multicenter, parallel, single-blind comparative RCT	4 weeks	33	34	LFD group: 44 NICE group: 41	Rome III	IBS-D IBS-C IBS-M IBS-U
Eswaran et al. (2016)	United States	Single-center, parallel superiority RCT	4 weeks	45	39	LFD group: 41.6 mNICE group: 43.8	Rome III	IBS-D
Eswaran et al. (2017)	United States	Post hoc analysis of RCT [Eswaran et al., 2016]	4 weeks	47	41	LFD group: 41.6 mNICE group: 43.8	Rome III	IBS-D
Harvie et al. (2017)	New Zealand	Parallel-design RCT	6 months	23	27	Group I: 43.3 Group II: 40.6	Rome III	IBS-D IBS-C IBS-M
Zahedi et al. (2018)	Iran	Single-blind RCT	6 weeks	50	51	Group I: 37.60 Group II: 37.43	Rome III	IBS-D
Patcharatrakul et al. (2019)	Thailand	Crossover RCT	4 weeks	30	32	Group I: 50 Group II: 52	Rome III	IBS-D IBS-C
Staudacher et al. (2020)	United Kingdom	Secondary analysis of RCT	4 weeks	63	Group II: 48 Group III: 19	Group I: 37 Group II: 34 Group III: 35	Rome III	IBS-D IBS-M IBS-U
Clevers et al. (2020)	Sweden	Post hoc analysis of RCT (Böhn et al., 2015)	4 weeks	33	33	Group I: 45 Group II: 41	Rome III	IBS-D IBS-C IBS-M
Guerreiro et al. (2020)	Portugal	Multicenter open-label RCT	4 weeks	39	18	Group I: 49.5 Group II: 52.3	Rome IV	IBS-D IBS-C IBS-M
Rej et al. (2022)	United Kingdom	RCT	4 weeks	33	Group II: 33 Group III: 33	37	Rome IV	IBS-D IBS-M
Mohseni et al. (2022)	Iran	Double-blind placebo-controlled RCT	6 weeks	26	23	38.09	Rome IV	IBS-D IBS-C IBS-M IBS-U
Chojnacki et al. (2023)	Poland	Open-label RCT	8 weeks	80	40	Group I: 46.5 Group II: 44.3	Rome IV	IBS-D
Roth et al. (2024)	Sweden	Open-label, parallel, non-inferiority RCT	4 weeks	72	72	Group I: 43 Group II: 41	Rome IV	IBS-D IBS-C IBS-M IBS-U
Tunali et al. (2024)	Turkey	Multicenter, parallel, double-blind RCT	6 weeks	51	70	18 – 65	Rome IV	IBS-D IBS-C IBS-M
Van den Houte et al. (2024)	Belgium	Double-blind crossover RCT	17 weeks (2 phases)	77	Each participant served as their own control	36.4	Rome IV	IBS-D IBS-C IBS-M IBS-U

*The traditional IBS diet consisted of general dietary advice based on the National Institute for Health and Care Excellence (NICE) and the British Dietetic Association (BDA). BSFS: Bristol Stool Form Scale; LFD: low-FODMAP diet; RCT: randomized controlled trial; GFD: gluten-free diet; GI: gastrointestinal; HADS: Hospital Anxiety and Depression Scale; IBS-QOL: Irritable Bowel Syndrome Quality of Life Questionnaire; IBS-SSS: Irritable Bowel Syndrome Severity Scoring System; mNICE: modified NICE diet; IBS-C: irritable bowel syndrome with constipation predominance; IBS-D: irritable bowel syndrome with diarrhea predominance; IBS-M: irritable bowel syndrome with mixed bowel habits; IBS-U: unsubtyped or unclassified irritable bowel syndrome; SSRD: SSRD: starch- and sucrose-reduced diet; TDA: traditional dietary advice. Table prepared by the authors.

Table 2. Characteristics of interventions in randomized controlled trials included in the systematic review

Reference	Intervention vs comparison	Assessment method	Primary outcomes	Additional outcomes	Risk of bias
Böhn et al. (2015)	LFD vs traditional IBS diet*	IBS-SSS Stool diary BSFS Food diary	No significant differences were observed between IBS subgroups in symptom severity reduction with the LFD compared with the traditional IBS diet (p = 0.62).	Dietary intake assessment showed reduced total carbohydrate and fiber intake in the LFD group; therefore, lower energy intake.	Low
Eswaran et al. (2016)	LFD vs mNICE diet	BSFS Stool frequency Individual symptom rating scale Food diary	Overall symptom relief did not differ significantly between diets (p = 0.31). Abdominal pain (p = 0.002), bloating (p = 0.0008), stool consistency (p = 0.02), stool frequency (p = 0.0003), and urgency (p = 0.0018) improved significantly.	Lower carbohydrate intake in the LFD group; therefore, reduced caloric intake. Fewer daily meals were also reported.	Some concerns
Eswaran et al. (2017)	LFD vs mNICE diet	IBS-QOL HADS Work productivity and activity impairment questionnaire Numeric rating scale for sleep quality and fatigue	The LFD significantly improved quality of life compared with the mNICE diet (15.9 vs 5.0 points; 95% CI: –17.4 to –4.3).	Anxiety and depression decreased significantly in the low-FODMAP group. No improvements were observed in work productivity; however, activity impairment decreased significantly. Sleep and fatigue also improved.	Some concerns
Harvie et al. (2017)	LFD with immediate dietary education vs delayed education	IBS-SSS IBS-QOL Comprehensive Nutrition Assessment Questionnaire (CNAQ)	The intervention significantly reduced IBS symptoms (p <0.01). Quality of life improved (p <0.05).	A significant reduction in total reported energy intake (p <0.01) and fiber intake was observed.	Low
Zahedi et al. (2018)	LFD vs traditional IBS diet*	IBS-SSS BSFS IBS-QOL HADS	The LFD showed significant improvement in most IBS-SSS symptoms, including abdominal pain, bloating, and bowel habits, compared with the comparator group (p <0.001).	Carbohydrate reduction was significantly greater in the LFD group (p <0.05).	High
Patcharatrakul et al. (2019)	Structured individual low-FODMAP dietary counseling (SILFD) vs brief advice on a commonly recommended diet (BRD)	GI symptom questionnaire HADS	SILFD was more effective than BRD in reducing overall symptom severity, with a higher proportion of responders (p = 0.001) and a significant decrease in symptom severity. However, differences between diets were not significant at the end of the intention-to-treat analysis.	No additional outcomes of interest were measured.	Some concerns
Staudacher et al. (2020)	LFD vs sham diet vs habitual diet	7-day food record Healthy Diet Indicator Healthy Diet Score Diet Quality Index-Revised Dietary Diversity Score Dietary Diversity Score	The LFD effectively reduced FODMAP intake (p <0.001) but decreased overall diet quality (p = 0.006–0.018).	Reduced starch intake (p = 0.030) and fat intake (p = 0.007). Intake of vitamin B12 and selenium improved (p <0.01–0.001).	Some concerns
Clevers et al. (2020)	LFD vs traditional IBS diet*	IBS-SSS Food diary	Adherence to the LFD tended to be associated with symptom improvement (p = 0.05).	A 25% reduction in energy intake was observed in group I, whereas the other group showed an 11% reduction.	High

Table 2. Characteristics of interventions in randomized controlled trials included in the systematic review (*continued*)

Reference	Intervention vs comparison	Assessment method	Primary outcomes	Additional outcomes	Risk of bias
Guerreiro et al. (2020)	LFD vs standard or NICE diet	Birmingham IBS Symptom Score Questionnaire (BISS) Visual Analog Scale (VAS) IBS-QOL	Both diets significantly reduced symptoms; however, the LFD was more effective for specific symptoms. IBS-QOL improved in both groups without significant differences, although the LFD showed greater benefit in domains such as dysphoria, health concern, body image, and social functioning. Adherence was slightly higher with the LFD. No significant differences were observed at medium-term follow-up (10 weeks).	Energy and carbohydrate intake decreased in both groups. Fiber and iron intake were significantly lower in the LFD group. Participants also showed significant reductions in body weight, BMI, waist circumference, and fat mass percentage.	Low
Rej et al. (2022)	LFD vs gluten-free diet (GFD) vs traditional dietary advice (TDA)	IBS-SSS HADS Patient Health Questionnaire-12 non-GI somatic symptoms scale IBS-QOL Acceptability of Dietary Restriction Questionnaire Food-related QOL Questionnaire Comprehensive Nutrition Assessment Questionnaire (CNAQ)	TDA, GFD, and LFD represent effective approaches for IBS without constipation predominance.	The LFD improved depression compared with TDA (p <0.05) and improved dysphoria more than TDA and GFD (p <0.05). TDA and LFD were easier to incorporate into daily life than GFD (p = 0.02). The LFD showed greater reduction in fiber intake compared with GFD and TDA (p = 0.06).	Low
Mohseni et al. (2022)	LFD with or without gluten	IBS-QOL IBS-SSS Dietary recalls	The gluten-free group showed greater improvements in symptoms such as abdominal pain, bloating, dissatisfaction with bowel habits, interference with daily life, quality of life, stool frequency, and stool consistency (p <0.05). No significant differences were observed in adherence to the LFD (p <0.05).	No additional outcomes of interest were measured.	Low
Chojnacki et al. (2023)	LFD vs LFD with reduced tryptophan (TRP) intake	TRP intake: nutritional calculator IBS-SSS Hamilton Anxiety Rating Scale (HAM-A) Hamilton Depression Rating Scale (HAM-D) TRP and metabolites: liquid chromatography–tandem mass spectrometry (LC-MS/MS)	A significant reduction in somatic and psychological symptoms was observed after both dietary interventions. The effect was more favorable in the subgroup with restricted TRP intake (p < 0.01).	Limitation of certain traditional dietary products was poorly accepted by patients.	High

Table 2. Characteristics of interventions in randomized controlled trials included in the systematic review (*continued*)

Reference	Intervention vs comparison	Assessment method	Primary outcomes	Additional outcomes	Risk of bias
Roth et al. (2024)	LFD vs starch- and sucrose-reduced diet (SSRD)	Study questionnaire Rome IV (40–48°) IBS-SSS Visual Analog Scale for Irritable Bowel Syndrome (VAS-IBS)	Both diets significantly reduced IBS severity after two weeks. At six months, nearly half of the participants experienced only occasional abdominal pain and no longer met IBS diagnostic criteria. No significant differences were observed between diets.	Both diets reduced carbohydrate and energy intake. The SSRD showed greater reductions in starch, disaccharides, and added sugars. In the LFD group, fiber intake decreased and alcohol consumption increased. Psychological well-being and fatigue improved.	High
Tunali et al. (2024)	LFD vs personalized diet (PD)	IBS-SSS BSFS HADS IBS-QOL	The PD showed significant improvement in IBS-SSS scores, symptom relief in IBS-D, and improved IBS-QOL across all subtypes. The LFD demonstrated significant improvement in IBS-SSS scores in IBS-C and IBS-M and improved quality of life in IBS-C and IBS-D.	The LFD did not demonstrate positive effects on the intestinal microbiota. In contrast, the PD showed increased abundance of beneficial bacterial species.	Low
Van den Houte et al. (2024)	FODMAP reintroduction vs glucose (control)	IBS-SSS BSFS VAS Dietary intake record using the "MyFitnessPal" application Monash FODMAP calculator Patient Health Questionnaire (PHQ) IBS-QOL Visceral Sensitivity Index (VSI)	IBS-SSS scores decreased significantly after 2, 4, and 6 weeks compared with baseline (p <0.001). Five percent of patients experienced symptom recurrence during reintroduction. Significant symptom exacerbation was observed with mannitol (p <0.001) and fructan reintroduction (p <0.001).	IBS subtype did not predict dietary response (p = 0.38). Significant reductions were observed in body weight (p <0.001), caloric intake (p <0.001), FODMAP intake (p <0.001), fructans (56%), and mannitol (54%), which triggered symptoms in most patients.	Low

*The traditional IBS diet consisted of general dietary advice based on the National Institute for Health and Care Excellence (NICE) and the British Dietetic Association (BDA). BSFS: Bristol Stool Form Scale; LFD: low-FODMAP diet; RCT: randomized controlled trial; GFD: gluten-free diet; GI: gastrointestinal; HADS: Hospital Anxiety and Depression Scale; IBS-QOL: Irritable Bowel Syndrome Quality of Life Questionnaire; IBS-SSS: Irritable Bowel Syndrome Severity Scoring System; mNICE: modified NICE diet; IBS-C: irritable bowel syndrome with constipation predominance; IBS-D: irritable bowel syndrome with diarrhea predominance; IBS-M: irritable bowel syndrome with mixed bowel habits; IBS-U: unsubtyped or unclassified irritable bowel syndrome; SSRD: SSRD: starch- and sucrose-reduced diet; TDA: traditional dietary advice. Table prepared by the authors.

The available evidence supports the role of the LFD in reducing gastrointestinal symptoms, modulating the intestinal microbiota, improving mental health, enhancing sleep quality, supporting body weight control, and improving quality of life. These findings reflect the multidimensional benefits of the diet across physical, psychological, and metabolic domains in the management of IBS.

Primary outcomes

Reduction of gastrointestinal symptoms

Multiple studies have demonstrated that the LFD is effective in reducing symptoms of irritable bowel syndrome, although results may vary according to the type of intervention, comparator group, and IBS subtype evaluated[6,13-17].

Table 3. Characteristics of systematic reviews and meta-analyses included in the systematic review

Reference	Number of studies/type	Total sample	Primary variable	Main conclusion	Key limitations
Varjú et al. (2017)	5 RCTs 2 NRCTs 3 uncontrolled prospective studies	1573	Overall symptoms Quality of life	The LFD significantly improves overall symptoms and quality of life in patients with IBS.	Heterogeneity in IBS symptom severity scales. Lack of data on IBS subtypes. Variability in control diets.
Hahn et al. (2021)	20 RCTs 2 NRCTs	1406	Overall symptoms Quality of life Bowel habits	The LFD reduced symptom severity and improved quality of life and bowel habits.	Lack of standardization across studies regarding diet implementation, sex distribution, and IBS subtype. Small subgroup samples.
Van Lanen et al. (2021)	12 RCTs	772	Gastrointestinal symptoms Quality of life Nutritional adequacy Intestinal microbiome	The LFD reduces gastrointestinal symptoms and improves quality of life.	Study heterogeneity. Lack of adherence assessment in several studies.
Wang et al. (2021)	10 RCTs	511	Overall symptom improvement Stool output Quality of life HADS BMI	The LFD significantly reduces overall IBS symptoms and improves stool output, particularly in IBS-D.	Small sample size. Lack of subgroup analysis by IBS subtype. Absence of unified measurement scale.
So et al. (2022)	9 RCTs	2748	Microbiome composition and function	Overall microbiome composition may not be substantially altered by the LFD.	Small sample size. High design heterogeneity. Difficulty synthesizing extensive data. Limited microbiome and virome evaluation.
Jent et al. (2024)	11 RCTs 19 observational studies	2748	Abdominal pain Stool consistency Stool frequency Overall symptoms and symptom relief Quality of life Adherence	The LFD improves IBS symptoms.	Wide variety of measurement instruments. Difficulty interpreting stool consistency outcomes. Complexity in differentiating study populations. Risk of bias and diversity of study designs. Use of per-protocol analyses in some RCTs.
Haghbin et al. (2024)	23 RCTs	1689	IBS QOL IBS-SSS	The LFD demonstrated superiority in managing IBS symptoms and improving quality of life. The Mediterranean diet also emerges as a promising alternative.	Study heterogeneity. Recall bias. Lack of participant blinding. Limited data on adherence to restrictive diets. Absence of direct comparisons with other dietary approaches. Inconsistent definition of the Mediterranean diet.

Non-randomized clinical trial (NRCT); PP: per-protocol population. Table prepared by the authors.

Most studies included in this review report a significant reduction in gastrointestinal symptom severity, primarily assessed using the IBS-SSS scale. A Swedish study comparing the LFD with a conventional diet based on NICE and BDA guidelines over four weeks observed improvements in stool frequency, although no substantial changes were detected in stool consistency[13].

Comparisons with other diets and interventions

Randomized controlled trials reported significant reductions in abdominal pain and bloating, as well as improvements in stool frequency and consistency. These effects were more pronounced in groups following the LFD compared with conventional dietary interventions[14,18], findings supported by two meta-analyses demonstrating the effectiveness of the

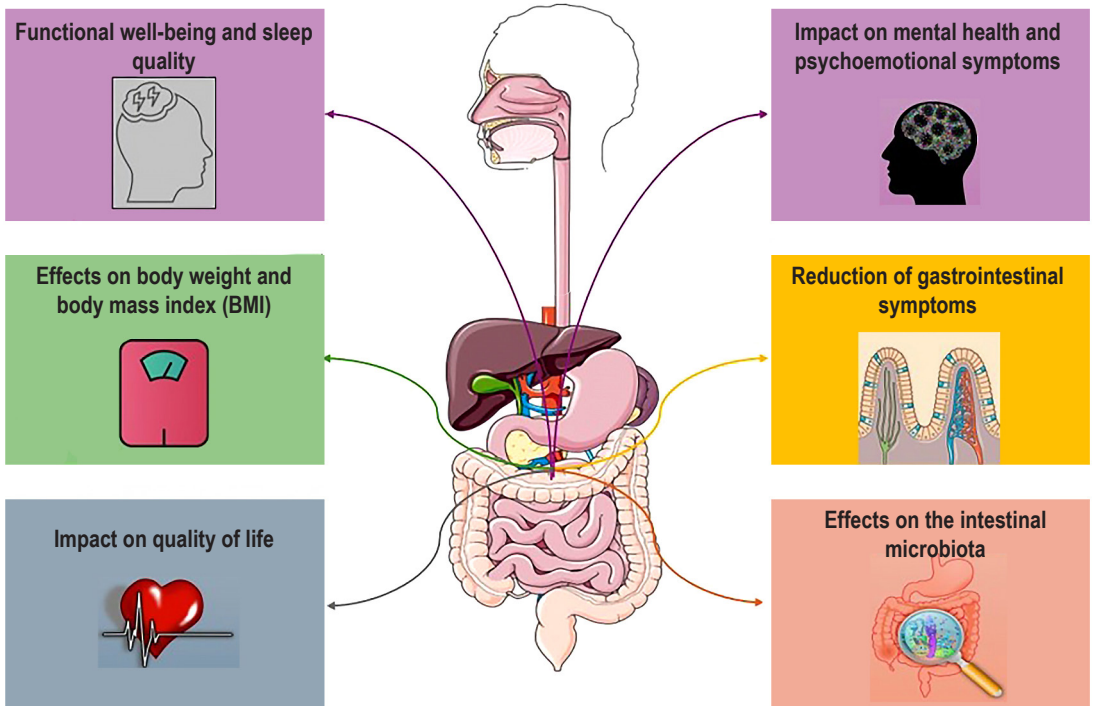


Figure 2. Clinical effects associated with the low-FODMAP diet in patients with IBS. Image property of the authors.

LFD[19,20]. However, another meta-analysis indicates that although symptom reduction is maintained over the long term, available data remain limited[21].

Although no statistically significant differences were observed between diets in terms of global symptom relief, the LFD group showed sustained improvements in individual symptoms from the first week of treatment[22,23]. Similarly, a significant reduction in symptom frequency, particularly pain and diarrhea, has been documented, with a success rate of 56.4% compared with 22.2% in the control group[15].

With respect to effectiveness across IBS subtypes, findings have been heterogeneous. Some studies reported no relevant differences between subgroups[13], whereas others identified greater effectiveness in patients with IBS-C[18]. Evidence also suggests a potential advantage of personalized diets over the LFD in IBS-D[16]. Therefore, although differences between diets were not always statistically significant, clinically meaningful benefits were observed, particularly in bloating and bowel dissatisfaction[17,24].

Dietary education represents another important factor, as one study demonstrated that participants who received education at the initiation of the LFD experienced early and sustained improvements in abdominal pain and stool frequency. In contrast, the group receiving delayed education showed improvement only after receiving dietary counseling[25]. Similar findings were reported in a meta-analysis demonstrating improvement in abdominal pain, bloating, and stool frequency[26].

Recent studies have also explored combined dietary approaches. For instance, a diet combining reduced tryptophan intake with the LFD showed greater effectiveness in IBS-D than the LFD alone[27]. Additionally, the LFD has been compared with a sucrose-reduced diet. Both groups showed high clinical response rates. However, the sucrose-reduced diet demonstrated greater improvement in most symptoms, except constipation[28].

Reintroduction phase and individual sensitivity

During the reintroduction phase, one study[5] demonstrated that after six weeks of restriction, the reintroduction of mannitol and fructans resulted in a significant increase in IBS-SSS scores, accompanied by symptoms such as abdominal pain, bloating, and flatulence. Reactions were also observed following consumption of galactooligosaccharides (GOS), sorbitol, and lactose, although with lower intensity[6].

Participants discontinued intake of mannitol earlier (day 2), followed by fructans (day 4) and GOS (day 5), suggesting greater sensitivity to these compounds. Consequently, the authors recommend prioritizing the reintroduction of FODMAPs with lower symptom-inducing potential before introducing fructans and mannitol[6].

Impact on quality of life

The LFD has demonstrated greater improvement in quality of life compared with other dietary interventions, particularly in domains related to anxiety, dysphoria, and psychosocial functioning, based on assessments using the IBS-QOL questionnaire[29]. Another clinical trial reported sustained increases in IBS-QOL scores following LFD intervention, with an average improvement of approximately 14 points between weeks two and six of follow-up[6]. Although domains such as food avoidance and dietary concern showed smaller changes, an overall positive effect was observed in perceived general and social well-being[25].

Similarly, additional studies reported improvements associated with the LFD compared with baseline and with traditional dietary approaches[17], with beneficial effects across multiple IBS-QOL domains[15]. However, mixed findings have also been documented. In some studies, both dietary interventions reduced the impact of symptoms on quality of life[13]. Other studies reported decreased quality of life at six weeks in both comparison groups[14] or improvements in both gluten and placebo groups without statistically significant differences[24].

Systematic reviews and meta-analyses largely support the positive impact of the LFD on quality of life. These analyses identified mild to moderate improvement compared with control groups(23), with higher IBS-QOL scores observed in favor of the LFD[30]. Although not all results reached statistical significance, the overall trend supported the effectiveness of this intervention[21]. Finally, one systematic review concluded that both the LFD and the Mediterranean diet significantly improved quality of life. However, the Mediterranean diet ranked as the most effective according to comparative classification analysis[26].

Dietary adherence and acceptability

Adherence represents a key determinant of LFD effectiveness. Dietary compliance was assessed using food frequency records. Participants with higher adherence to the LFD demonstrated greater reductions in FODMAP intake and greater clinical improvement in gastrointestinal symptoms[18]. Adherence rates of up to 83% during the restriction phase have been reported, along with high levels of satisfaction, particularly regarding integration of the diet into daily life. However, cost was identified as the domain with the lowest satisfaction rate[15,31].

Effects on the intestinal microbiota

The LFD intervention has shown a tendency to reduce the abundance of bifidobacteria, particularly *Bifidobacterium adolescentis*, as well as the broader phylum Actinobacteria[16,30,32]. In contrast, no significant differences were observed in other bacterial groups such as *Bacteroides* or *Firmicutes*[32]. Similarly, microbial composition changes have been documented after four weeks of LFD intervention, including a reduction in bifidobacteria abundance[17].

However, some studies did not identify significant changes in intestinal microbiota composition, particularly when samples were not affected by thawing. These findings suggest that, at least in the short term, the LFD may not substantially alter microbiota composition detectable through 16S ribosomal RNA analysis[25]. Conversely, when compared with a personalized diet, the latter produced greater changes in alpha diversity, increased abundance of *Faecalibacterium prausnitzii*, and a significant reduction in Ruminococcaceae, effects not observed with the LFD[16].

Nutritional safety and adverse effects

No serious adverse effects or unexpected symptoms associated with the LFD have been reported. However, one study indicated that this intervention resulted in lower diet quality scores compared with a habitual control diet, although no differences were observed when compared with a sham control diet, according to the Healthy Diet Indicator[33]. Another clinical trial identified mild alterations in micronutrient intake following LFD intervention, including vitamin A, riboflavin, calcium, thiamine, and iron[30].

Additional outcomes

Effects on body weight and body mass index

The impact of the LFD on body mass index (BMI) and body weight has been evaluated with heterogeneous findings. Some systematic reviews reported that only a limited number of studies assessed these outcomes, with no statistically significant differences observed[20,27]. However, other clinical trials demonstrated significant reductions in body weight and BMI in both intervention groups (LFD and SSRD) following a four-week intervention, with partial weight regain over time. Waist circumference remained reduced[28]. In addition, significant reductions in body weight, caloric intake, and FODMAP consumption have been documented[6].

Impact on mental health and psychoemotional symptoms

Beyond gastrointestinal benefits, the LFD has demonstrated positive effects on mental health, sleep quality, and overall well-being in patients with irritable bowel syndrome. Two studies reported significant improvement in anxiety levels, assessed using the HADS scale, after four weeks of LFD intervention compared with the comparator group, in which no meaningful changes were observed.

Although depression scores improved in both groups, only the LFD group showed statistically significant improvement relative to baseline values[16]. These findings were

supported by a study conducted in the United Kingdom, which also reported significant improvement in depressive symptoms and dysphoria among participants following the LFD[17]. Furthermore, reduced tryptophan intake combined with the LFD resulted in significant improvement in both somatic and psychological symptoms, suggesting a potential synergistic effect between specific dietary components and IBS management[27].

Functional well-being and sleep quality

Functional well-being outcomes, including work productivity and impairment in daily activities, have also been evaluated. No statistically significant differences were observed between groups in indicators such as absenteeism or presenteeism. However, both groups improved compared with baseline values, with greater improvement observed in the LFD group. Mean scores for sleep and fatigue also improved significantly following LFD intervention, particularly in sleep quality and sleep initiation, although differences between groups were not statistically significant[29].

Changes in dietary composition and diet quality

Finally, regarding dietary changes associated with LFD implementation, marked reductions in FODMAP intake, total caloric intake, carbohydrate intake, and fiber intake have been reported[13,14,18,22,25,28]. In some cases, a lower frequency of meals and reduced consumption of snacks, dairy products, and beverages were observed, although coffee and alcohol consumption remained partially unchanged[31]. Significant reductions in energy and carbohydrate intake were observed in both intervention groups. However, lower intake of fiber and iron was reported in the LFD group[15,17,24]. In one intervention, participants reduced total FODMAP intake to less than 2 g/day, with variable changes in macronutrient intake depending on the assigned group[24]. Following the reintroduction phase, some nutritional reductions, such as fiber intake, showed partial recovery[25].

DISCUSSION

This systematic review synthesizes recent evidence on the efficacy and clinical applicability of the low-FODMAP diet (LFD) in adults with irritable bowel syndrome. The findings consistently indicate a significant reduction in gastrointestinal symptoms, particularly among patients with diarrhea-predominant or mixed subtypes, as well as meaningful improvements in quality of life and psychological dimensions. Overall, the evidence supports the LFD as an effective dietary intervention for symptomatic management of irritable bowel syndrome and improvement of overall patient well-being[34], with high acceptability and a low risk of adverse effects when implemented with professional guidance[35]. Furthermore, clinical practice guidelines for IBS issued by the National Institute for Health and Care Excellence (NICE) and the World Gastroenterology Organisation (WGO) recognize the LFD as an effective therapeutic option[36,37].

Regarding gastrointestinal symptoms, findings were consistent across studies, demonstrating significant symptom reduction following adherence to the LFD compared with conventional diets or placebo interventions[34,35,38-44]. This pattern has been observed in both European and Latin American contexts, where improvements in abdominal pain, bloating, stool frequency, and quality of life have also been reported[45,46]. These outcomes were primarily evaluated using validated instruments such as the IBS-SSS, strengthening the reliability of the evidence, although the inherent limitations of self-reported scales are acknowledged.

The LFD was consistently associated with improvements in quality of life among patients with IBS, with benefits observed in psychosocial domains compared with sham dietary interventions[35] and sustained improvements over both short- and long-term follow-up in pain, vitality, and social functioning[40]. Quality of life increased significantly across all IBS-QOL domains, with an overall improvement of approximately 14 points[46]. No relevant differences were identified according to the level of dietary adherence or degree of professional support[47]. Improvements were more pronounced in patients with IBS-D and IBS-M, particularly in dysphoria, body image, and activity interference, whereas in IBS-C improvement was limited primarily to dysphoria[48]. Additionally, seven of the nine quality-of-life domains evaluated improved following dietary intervention[44].

Dietary adherence plays a crucial role in intervention success, long-term willingness to maintain the diet, and improvement across multiple health dimensions. Professional support has been consistently identified as a determining factor in adherence across several studies[49-51]. Evidence also indicates that the LFD may demonstrate enhanced effectiveness when combined with complementary therapies such as cognitive behavioral therapy, yoga, meditation, or hypnotherapy[38,52]. Similarly, the incorporation of functional food components, such as turmeric extracts, has demonstrated reductions in abdominal bloating and intestinal dysbiosis[53]. The most frequently reported reasons for discontinuation include limited time availability to follow the diet, occupational constraints related to cost, and motivational factors[47].

Recent findings have questioned the necessity of strict restriction of all FODMAP components in IBS management. Eswaran et al.[54] demonstrated that after completion

of the LFD phase, only fructans induced statistically significant worsening of abdominal pain during reintroduction, whereas galactooligosaccharides increased bloating without a clear effect on pain. Similarly, Singh et al.[55] compared a traditional low-FODMAP diet with a simplified version restricting only fructans and galactooligosaccharides. Both groups demonstrated similar clinical response rates; however, the traditional LFD showed higher discontinuation rates due to adherence difficulties and tolerability concerns. These findings underscore the importance of individualized dietary strategies and highlight that not all FODMAP components exert equivalent effects across patients. They also reinforce the need to incorporate key variables such as adherence and dietary sustainability into clinical evaluation, factors frequently underreported in systematic reviews but highly relevant in clinical practice.

Adverse effects were minimal and generally transient, with some studies reporting mild symptom worsening in a small proportion of participants[35]. The LFD appears safe in the short term; however, further evidence is required to establish long-term safety.

A relevant aspect identified was the impact on the intestinal microbiota. Most studies report a significant reduction in *Bifidobacterium*, which may compromise microbial diversity and contribute to dysbiosis due to restriction of prebiotic substrates, with potential long-term implications[35,56-58]. A general reduction in total microbiota abundance and butyrate production has also been described, although multistrain probiotic supplementation may mitigate these effects[56]. Regarding bacterial composition, the LFD has been associated with reduced *Lactobacillus*. In patients with pain-predominant IBS (IBS-P), increased abundance of *Bacteroides* and reduced pathogenic bacteria have been reported, effects not observed in unsubtyped IBS (IBS-S) or in healthy controls[59,60].

Regarding nutritional status, studies indicate that both the standard LFD and adapted versions do not produce significant changes in anthropometric parameters or hydration status in the short or long term[40,48]. Nevertheless, weight loss or gain has been observed in some patients, suggesting heterogeneous individual responses and highlighting the need for nutritional monitoring[39]. A significant reduction in body fat percentage has also been reported following intervention[61].

Beneficial psychological effects associated with the LFD have also been demonstrated. The findings of this review are supported by clinical trials that evaluated psychological outcomes, showing significant improvements in symptoms of anxiety and depression, sleep quality, and fatigue[40].

The LFD also modifies habitual dietary patterns through the exclusion of commonly consumed foods such as wheat, dairy products, and certain fruits and vegetables. Although intake of energy, protein, and fat generally remains stable, carbohydrate and fiber intake tends to decrease, which may represent a disadvantage for patients with IBS-C[62]. Despite concerns regarding potential nutritional deficiencies, these risks may be mitigated during the reintroduction phase, and overall nutritional adequacy does not appear compromised, particularly when individualized dietary approaches are applied[56,57]. Some studies report short-term reductions in caloric intake and micronutrients such as calcium and thiamine[39,63], whereas others demonstrate that adapted versions of the diet maintain adequate intake and improve overall dietary quality[49,64].

This review incorporated high-level evidence, including 15 randomized controlled trials and 7 systematic reviews with meta-analysis, all with control groups and a minimum duration of four weeks. Studies focused exclusively on adults diagnosed with irritable bowel syndrome and included a considerable total sample size of 1,315 participants across randomized controlled trials. Findings were consistent across studies and were evaluated using validated instruments for symptom severity, quality of life, and adherence, which contributed to a low risk of bias in most trials. The publication timeframe (2015–2024) further supports the relevance and contemporaneity of the evidence.

Nevertheless, several important limitations were identified. Variability in symptom measurement across studies was observed, along with limited information on adherence and lack of long-term outcome data due to the scarcity of prospective studies. In addition, limited cultural and geographic diversity, with predominance of European study populations, restricts generalizability of findings to other contexts, particularly Latin America. Although some studies describe dietary habits among patients with IBS in Latin America[45,65,66], further research is required to evaluate the effectiveness of the LFD in this geographic context and to identify dietary challenges specific to these populations. Furthermore, this systematic review was limited by heterogeneity in outcome definitions across included studies, which precluded quantitative synthesis through meta-analysis.

The LFD represents an effective strategy for IBS management, particularly when individualized according to patient subtype. Nutritional education and professional guidance are essential to ensure adherence. Although the diet improves quality of life and emotional symptoms, monitoring of nutritional intake remains necessary to prevent potential deficiencies. Effects on the intestinal microbiota appear mild and transient. Additionally, combination with complementary therapies such as cognitive behavioral therapy or yoga may enhance clinical benefits.

CONCLUSIONS

The low-FODMAP diet has demonstrated effectiveness in reducing gastrointestinal symptoms and improving quality of life in patients with irritable bowel syndrome. Its implementation is also associated with benefits in psychological well-being, including reductions in anxiety symptoms and dysphoria. These findings highlight the importance of promoting adequate dietary adherence, as well as the need for individualized management supported by professional guidance to maximize the clinical effectiveness of this dietary strategy.

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Case report

Management of Benign Pyloric Syndrome through Endoscopic Ultrasound-Guided Gastroenterostomy: Case Report

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Abstract

Introduction: Pyloric syndrome is a clinical condition characterized by epigastric abdominal pain and postprandial vomiting. Etiologies varies, most commonly including peptic ulcer disease and caustic injuries. The most frequent clinical manifestations include epigastric pain, vomiting, and weight loss. Standard management primarily involves dilation using *stent* placement, which is associated with high failure rates. Consequently, endoscopic gastroenterostomy has recently been implemented as an alternative therapeutic strategy, as illustrated in the present case. **Case Report:** A case is reported involving a female patient presenting with epigastric abdominal pain and recurrent emetic episodes. Upper gastrointestinal endoscopy revealed complete pyloric obstruction. Initial endoscopic dilation was unsuccessful; therefore, endoscopic management was performed through endoscopic gastroenterostomy, resulting in low morbidity and restoration of intestinal transit within 72 hours. **Discussion:** Pyloric syndrome has multiple etiologies, both malignant and benign, including complete pyloric obstruction, which produces symptoms such as epigastric pain, vomiting, and weight loss. The present report aims to highlight current management strategies based on endoscopic surgical approaches in order to reduce patient morbidity. **Conclusion:** Pyloric syndrome is a complex pathology that predisposes patients to poor quality of life due to symptom burden and associated malnutrition. Endoscopic surgical management via gastroenterostomy currently demonstrates promising outcomes, including reduced hospital length of stay and lower morbidity.

Keywords

Pyloric stenosis, hypertrophic pyloric stenosis, natural orifice transluminal endoscopic surgery, surgical anastomosis.

INTRODUCTION

Pyloric syndrome, or gastric outlet obstruction (GOO), is a condition characterized by the inability of the stomach to empty its contents, secondary to motility disorders or, more commonly, mechanical causes[1,2]. The latter arise from intrinsic or extrinsic obstruction at the level of the distal stomach, pylorus, or duodenum. These conditions cause acute or chronic symptoms such as abdominal pain, nausea, vomiting, and postprandial fullness[4]. Prior to the introduction of proton pump inhibitors, peptic ulcer disease was the most common cause of gastric outlet obstruction, although its incidence varied across different regions of the world. Currently, this condition is strongly associated with malignant disease and accounts for approximately 50% to 80% of cases. It predominantly affects men, with a male-to-female ratio of 3:1[5-7].

The onset of symptoms varies primarily according to the underlying etiology, with acute causes such as pancreatitis, gallstones, peptic ulcer disease, and volvulus more commonly producing pain, abdominal distension, and postprandial fullness. Malignant causes, in addition to abdo-

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minal pain and food intolerance, are also associated with weight loss and chronic malnutrition[3,8,9].

Diagnostic suspicion is established through appropriate clinical evaluation and a detailed history of symptoms and prior conditions. Imaging studies may be required depending on clinical suspicion, such as computed tomography, which can provide information regarding intrinsic or extrinsic pathology. However, confirmation is generally achieved through endoscopy, which allows objective evaluation of the etiology and enables additional diagnostic procedures, such as biopsy, according to endoscopic findings[10,11].

The management of GOO depends on the underlying etiology. In both benign and malignant conditions, different therapeutic alternatives may be required to achieve adequate relief of the obstruction. These range from conservative approaches focused on local control of inflammation to surgical management (gastroenteric bypass) and endoscopic interventions such as dilation, stent placement, and diversion procedures, including natural orifice transluminal endoscopic surgery (NOTES) and endoscopic ultrasound-guided gastroenterostomy (EUS-GE)[10,12,13]. The latter has emerged as a safe alternative, as it avoids surgical morbidity and reduces the risk of recurrent obstruction, stent migration, or tumor ingrowth[14].

The aim of this article is to present the experience of a high-complexity referral center in Colombia with EUS-GE, as well as to describe technical aspects of the procedure and patient outcomes.

PATIENT AND METHODS

The case of a 62-year-old female patient with a medical history of arterial hypertension, type 2 diabetes mellitus, chronic peptic ulcer disease, and hypertrophic pyloric stenosis is presented. She had previously undergone endoscopic stent placement on two occasions, the most recent two months prior. She presented to the emergency department with a 24-hour history of burning epigastric pain associated with multiple episodes of emesis and intolerance to oral intake. Over the previous two months, she reported an approximate weight loss of 8 kg, as well as early satiety and nausea following food intake during the previous two weeks. Given the patient's symptoms and medical history, upper gastrointestinal endoscopy was performed. Imaging demonstrated punctate benign pyloric stenosis (**Figure 1**) with complete luminal occlusion and no evidence of malignant tissue.

Considering the patient's history of two prior dilations and the findings on upper gastrointestinal endoscopy, a structured clinical evaluation was performed. This evaluation revealed a high comorbidity burden and high nutritional risk. The patient was deemed unsuitable for surgical gastrojejunostomy due to the high risk of complications. Therefore, endoscopic ultrasound-guided gastrojejunostomy was selected using a lumen-apposing metal stent (LAMS).

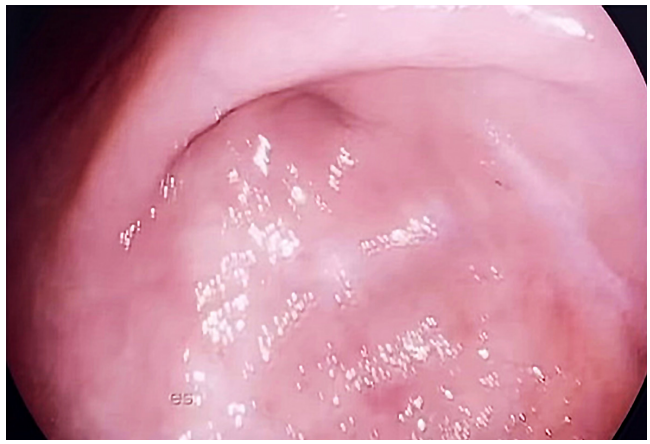


Figure 1. Punctate pyloric stenosis visualized by upper gastrointestinal endoscopy. Image property of the authors.

TECHNICAL PROCEDURE

Upper gastrointestinal endoscopy confirmed punctate pyloric stenosis. The pylorus was subsequently intubated using a Fogarty extraction balloon to advance a biliary guidewire distally (**Figure 2**). The guidewire was then advanced through the Fogarty balloon, contrast was administered, and the guidewire was visualized within the jejunal loop. The guidewire was left in situ, followed by advancement of a nasojejunal tube. Through the large-caliber tube, methylene blue irrigation of the jejunal loop was performed (**Figure 3**).



Figure 2. Pyloric intubation using a Fogarty balloon. Image property of the authors.

Subsequently, deployment of a 10 × 15 mm Hot AXIOS lumen-apposing metal stent (Boston Scientific) was perfor-

med. The prosthesis was deployed (**Figure 4**) to create the gastroenteroanastomosis. A guidewire was then advanced through the prosthesis, and both the afferent and efferent loops were successfully identified (**Figure 5**).



Figure 3. Irrigation and dilation of the jejunal loop through a nasojejunal tube visualized by endoscopic ultrasound. Image property of the authors.

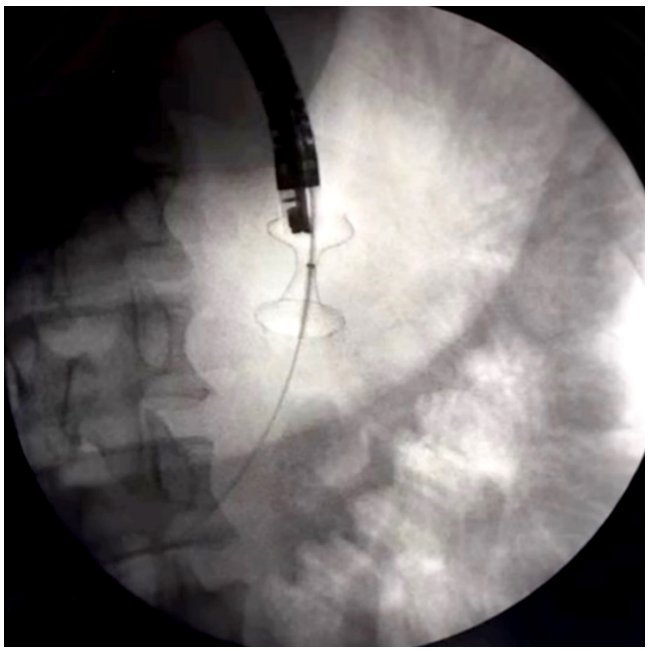


Figure 4. 10 × 15 mm lumen-apposing metal stent (Hot AXIOS). Image property of the authors.

The patient was transferred to the general ward after the procedure. She was reassessed at 24 hours, at which time oral intake was initiated with a liquid diet. At 48 hours, the diet was advanced to soft consistency, which was well tolerated without recurrence of obstructive symptoms. The patient was discharged at 72 hours without complications.



Figure 5. Gastroenteroanastomosis using a 10 × 15 mm lumen-apposing metal stent. Afferent and efferent loops. Image property of the authors.

DISCUSSION

Pyloric syndrome, or gastric outlet obstruction, is a disabling condition associated with high treatment costs. Although therapeutic approaches vary according to etiology, the use of self-expanding metal stents is widely adopted in both benign and malignant conditions to relieve obstruction. However, this strategy presents important limitations due to recurrence of luminal obstruction caused by tumor ingrowth or prosthesis migration[15]. Surgical gastroenterostomy represents another established alternative. Although it appears to effectively resolve obstruction with a lower risk of tumor ingrowth into the lumen, it is associated with higher complication rates, longer hospital stays, and consequently greater morbidity and healthcare costs[16].

The development of endoscopic ultrasound over recent decades has enabled the emergence of several advanced endoscopic techniques, some of which remain under investigation. These advances have positioned EUS-GE as a safe, reproducible option associated with lower morbidity. Since early experimental animal studies conducted by Fritscher-Ravens et al.[17] and Binmoeller Shah et al.[18], multiple case series have reported favorable outcomes with EUS-GE, including those described by Khashab-Kumbhari et al.[14]. More recently, in 2025, two meta-analyses published by Rizzo et al.[19] and Canakis et al.[20] demonstrated that EUS-GE is a minimally invasive technique with a high success rate of up to 90%. Nonetheless, performance of this procedure requires centers with specialized expertise due to potential technical challenges, including intestinal loop identification, endosonographic localization, and precise puncture. Technological advances in dedicated devices, such as lumen-apposing metal stents, have facilitated the implementation of these techniques[21].

CONCLUSIONS

Pyloric syndrome is a multifactorial condition caused by pyloric stenosis. It significantly affects patients' quality of life and is associated with high nutritional risk. This condition predisposes individuals to a greater likelihood of complications, which may interact with surgical risk during therapeutic management.

Endoscopic management is currently the most widely accepted therapeutic approach and typically begins with endoscopic balloon dilation. However, as demonstrated in this case, although endoscopic ultrasound-guided gastroenteroanastomosis is a relatively recent technique with limited available literature, the present experience supports EUS-GE as a safe technical alternative associated with low morbidity for the management of benign pyloric syndrome. Multicenter randomized controlled trials are required to incorporate this technique into an initial management algorithm. Such incorporation should take into account patient-specific variables and institutional expertise.

Informed consent

Patients provided written informed consent authorizing the use of their medical records and diagnostic images for research and case report purposes. The case report and methodology were approved by the institutional Scientific Ethics and Research Committee under approval record No. 023/22, dated May 17, 2021, in accordance with Resolution 8430 of 1993 (risk-free research) and Resolution 2378 of 2007 issued by the Colombian Ministry of Social Protection, as well as the provisions of the Universal Declaration on Bioethics and Human Rights of the United Nations Educational, Scientific and Cultural Organization (UNESCO).

Conflicts of interest

The authors declared no conflicts of interest.

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Case report

Severe Anemia Secondary to *Trichuris trichiura* Hyperinfestation: The Critical Role of Endoscopic Evaluation

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Abstract

Intestinal parasitic infection caused by *Trichuris trichiura* represents a significant public health concern in socioeconomically disadvantaged regions, where inadequate sanitation infrastructure and limited health education facilitate transmission. A case is presented involving a 35-year-old woman with severe hypochromic microcytic anemia (hemoglobin 6.2 g/dL), associated with gastrointestinal symptoms and signs of hemodynamic instability. Stool examination revealed *T. trichiura* ova, and colonoscopy demonstrated multiple filiform structures causing mucosal erosions throughout the colon, extending from the rectum to the distal ileum. Treatment consisted of albendazole 400 mg daily for three days, red blood cell transfusions, and iron supplementation, resulting in clinical improvement and hemodynamic stabilization. This case underscores the importance of considering *T. trichiura* infection in the differential diagnosis of anemia and highlights the relevance of multidisciplinary approaches integrating nutritional interventions, health education, and community-based control measures to interrupt transmission cycles and reduce associated morbidity.

Keywords

Trichuris trichiura, iron-deficiency anemia, intestinal parasitoses, colonoscopy, albendazole.

INTRODUCTION

Intestinal parasitic infections constitute a global public health concern, particularly in regions with limited socioeconomic resources and insufficient healthcare systems that are unable to ensure adequate basic sanitation[1]. This situation contributes to the persistence of multiple parasitic diseases and leads to significant delays in the physical and intellectual development of affected populations[1,2]. Within this broad group of infections, soil-transmitted helminths occupy a prominent position, including whipworms, primarily *Trichuris trichiura*[1]. These parasites, also known as whipworms due to their capacity to adhere to the intestinal mucosa and feed on blood, represent a frequently underestimated cause of anemia in developing countries[2]. In severe cases, infection may lead to hypovolemic shock and poor response to blood transfusions, a risk that is increased in individuals with immunosuppression or concomitant nutritional deficiencies[2-5].

The World Health Organization (WHO) defines anemia as a reduction in hemoglobin levels below two standard deviations from the normal values for age and sex[5-7]. In some developing countries, prevalence reaches 43%, and infection with *T. trichiura* contributes significantly to this

burden, particularly because it causes chronic blood loss within the gastrointestinal tract, resulting in worse clinical outcomes in individuals with malnutrition or immune dysfunction[3,8-10].

Although the primary route of transmission for hookworms involves direct contact with soil contaminated with infective larvae, fecal–oral transmission also plays a relevant role in *T. trichiura* infection, particularly in areas with inadequate sanitation infrastructure[1,2,11]. It is estimated that approximately 24% of the global population is affected by soil-transmitted helminthiasis, with higher incidence in sub-Saharan Africa, Asia, and South America[1,12]. This high prevalence, combined with the disproportionate impact on children and immunocompromised individuals, perpetuates the cycle of poverty and health deterioration[12].

Factors such as malnutrition, lack of footwear, overcrowding, poor hygiene practices, and inadequate living conditions facilitate parasite penetration and dissemination, thereby contributing to greater infection severity[1,2,13]. Consequently, management extends beyond the administration of antiparasitic pharmacotherapy and requires nutritional interventions, mass deworming programs, and improvements in sanitation infrastructure and health education[2]. These comprehensive strategies are essential to reduce morbidity associated with *T. trichiura* and other soil-transmitted helminths.

This article presents the case of a patient with severe anemia associated with *T. trichiura*, whose diagnosis was established through endoscopic evaluation. The report highlights the need to consider parasitic infections in the differential diagnosis of anemic syndromes.

CASE PRESENTATION

A 35-year-old woman, homemaker, residing in an urban area of Cartagena, Colombia, of low socioeconomic status, unemployed, and unaccompanied at the time of admission, presented challenges in obtaining initial clinical information. She sought medical attention for a one-week history characterized by asthenia, adynamia, positional vertigo, and one episode of orthostatic hypotension with transient loss of postural tone and no loss of consciousness. Additionally, she reported multiple episodes of vomiting (approximately six per day) containing food material, accompanied by three daily diarrheal bowel movements of dark appearance. Her medical history was notable only for prior laparoscopic appendectomy; she denied allergies or relevant gynecological or obstetric history.

Physical examination at admission revealed marked mucocutaneous pallor, tachycardia (heart rate: 120 beats per minute [bpm]), arterial hypotension (70/50 mm Hg), axillary temperature of 36.5 °C, and respiratory rate within normal limits. Orthostatic testing was positive, with symptom onset upon postural change. No signs of peritoneal irritation or neurological abnormalities were identified.

Initial laboratory tests (**Table 1**) demonstrated severe microcytic hypochromic anemia (hemoglobin: 6.2 g/dL), classified as grade IV according to World Health Organization (WHO) criteria, with thrombocytosis (595,000/µL), moderate leukocytosis (11,700/µL), and eosinophilia (1,521/µL). Iron studies showed reduced ferritin and transferrin saturation, confirming WHO grade III iron deficiency anemia. Two units of packed red blood cells were administered, resulting in a post-transfusion hemoglobin level of 7.8 g/dL. Serum vitamin B12 and folic acid levels were within normal limits, as were renal function parameters, liver function tests, coagulation times, and transaminases. Serum albumin was mildly decreased. Serologic testing showed a non-reactive fourth-generation human immunodeficiency virus (HIV) assay. However, a reactive Venereal Disease Research Laboratory (VDRL) test was identified and subsequently confirmed with the fluorescent treponemal antibody absorption test (FTA-ABS). Appropriate antibiotic therapy was then initiated.

Stool examination revealed a significant number of *T. trichiura* eggs, a finding that, together with eosinophilia and the clinical context, supported intestinal parasitosis as a potential differential diagnosis for the anemia.

Based on the abnormalities identified in laboratory testing and the clinical findings obtained during history-taking, the patient was initially managed as a possible case of gastrointestinal bleeding. Esophagogastroduodenoscopy was therefore performed, with normal findings. Given the need to clarify the etiology of the anemic syndrome, colonoscopy was subsequently performed (**Figure 1**), revealing multiple whitish, filamentous, motile structures associated with erosive areas in the colonic mucosa. These structures were observed from the rectum to the distal ileum. Samples were obtained using biopsy forceps and submitted to microbiology, where the helminth *T. trichiura* was confirmed (**Figure 2**).

Following confirmation of the diagnosis, treatment with albendazole 400 mg orally once daily for three days was initiated. The patient showed favorable clinical evolution, with improvement in gastrointestinal symptoms and hemodynamic stability. She was discharged with an oral iron supplement prescription and scheduled outpatient follow-up with internal medicine and clinical nutrition.

DISCUSSION

The *T. trichiura* infection illustrated in this case demonstrates its impact on populations living under limited socioeconomic conditions, in which lack of adequate sanitation,

Table 1. Laboratory tests at admission to the emergency department

Laboratory report		
Test	**Value**	**Reference range**
Sodium	136 mEq/L	135-145 mEq/L
Potassium	4.3 mEq/L	3.5-5.2 mEq/L
Chlorine	101 mEq/L	96-106 mEq/L
Calcium	9.4 mg/dL	8.5-10.2 mg/dL
Ferritin	9 ng/dL	20-200 ng/dL
Transferrin saturation	18%	21%-45%
Vitamin B_{12}	234 pg/mL	160-950 pg/mL
Folic acid	3.1 ng/mL	2.7-15 ng/mL
HIV (4^{th} generation)	Non-reactive	Non-reactive
VDRL	1:4 dilutions	Non-reactive
FTA-ABS	Reactive	Non-reactive
Aspartate aminotransferase	31 U/L	4-40 U/L
Alanine aminotransferase	27 U/L	4-36 U/L
Creatinine	0.61 mg/dL	0.6-1.1 mg/dL
Blood urea nitrogen	11.2 mg/dL	7-21 mg/dL
C-reactive protein	7 mg/dL	<5 mg/dL
PT	12.8 seconds	Control 12.5 seconds
aPTT	26.4 seconds	Control 25.4 seconds
Albumin	3.6 g/dL	3.8-5 g/dL
Complete blood count		
Hemoglobin	6.2 g/dL	12.5-16 g/dL
Hematocrit	22.80%	33%-39%
Mean corpuscular volume	66.3 fL	80-97 fL
Leukocytes	11,700 /mm^3	4,500-10,000/mm^3
Neutrophils	5,616/mm^3	1,500-5,000/mm^3
Lymphocytes	4,329/mm^3	1,000-4,800/mm^3
Eosinophils	1,521/mm^3	<500/mm^3
Platelets	595,000/µL	150,000-450,000/µL

FTA-ABS: fluorescent treponemal antibody absorption test; PT: prothrombin time; aPTT: activated partial thromboplastin time; MCV: mean corpuscular volume; VDRL: Venereal Disease Research Laboratory; HIV: human immunodeficiency virus. Table prepared by the authors.

insufficient health education, and overcrowding facilitate the transmission cycle[1,2,14]. This situation perpetuates the cycle of poverty, as parasitic infection may negatively affect intellectual development through its nutritional impact, while socioeconomic constraints hinder the timely implementation of preventive and therapeutic measures[2]. In the present case, although upper or lower gastrointestinal bleeding was initially suspected, endoscopic evaluation confirmed that chronic blood loss originated from colonic mucosa heavily colonized by large numbers of parasites, which caused mucosal erosions and contributed to iron loss. Together with eosinophilia and the detection of whipworm eggs supported by microbiological confirmation, these findings established the definitive diagnosis, highlighting the importance of including *T. trichiura* and other soil-transmitted helminths in the differential diagnosis of anemia, particularly in endemic regions[9,15-17].

Among the differential diagnoses of parasitic infections, hematophagous soil-transmitted helminths such as hookworms, represented by *Ancylostoma duodenale* and *Necator americanus*, as well as *Schistosoma mansoni*, should be considered. *Enterobius vermicularis* is also frequently associated with these populations. However, it is not hematophagous, and therefore its impact on hemodynamic status may be less significant[1,2,18]. Non-infectious causes must also be considered in the differential diagnosis of anemia, including gynecological bleeding, peptic ulcers, coagulation disorders, and chronic diseases. Comprehensive laboratory support is essential, including serial stool examinations, iron kinetics profile, complete blood count, and specialized studies, complemented by endoscopic evaluation to exclude alternative etiologies[3,6,7,9].

Treatment of trichuriasis is based on broad-spectrum anthelmintic agents such as albendazole or mebendazole, which achieve favorable clinical outcomes in most cases[1,2]. In this patient, administration of albendazole 400 mg orally once daily for three days, combined with packed red blood cell transfusions and iron supplementation, resulted in clinical improvement and stabilization of hemoglobin levels. However, sustained control of parasitic infection at the community level requires the implementation of periodic deworming programs in vulnerable populations, reinforced by strategies addressing malnutrition, limited access to potable water, and inadequate health education[2,14].

Subsequent clinical follow-up should include monitoring hemoglobin and ferritin levels, as well as repeat stool examinations to detect reinfection. Nutritional assessment is essential to correct protein–calorie deficiencies, strengthen immune function, and prevent relapse[2,4].

At the population level, prevention and control of trichuriasis require a multidisciplinary approach involving

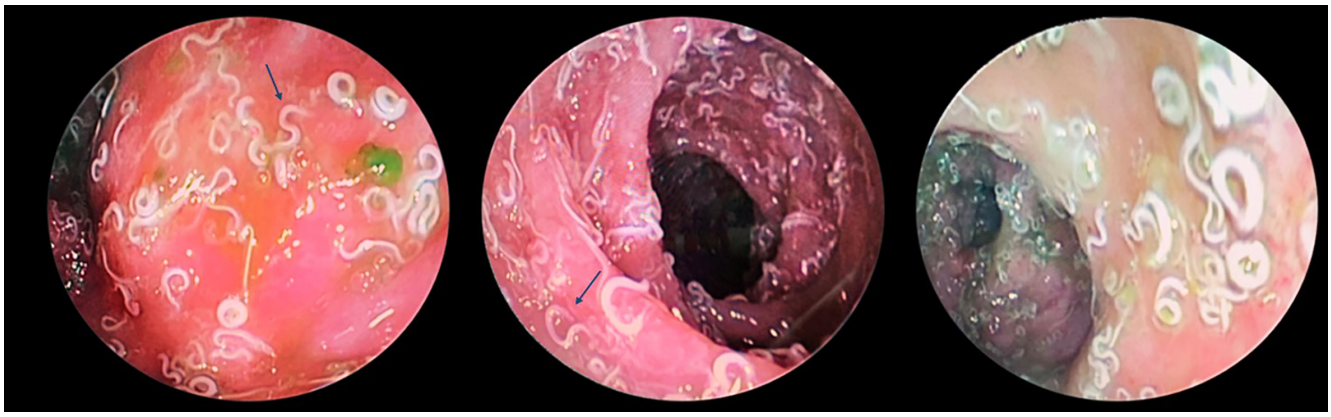


Figure 1. Direct visualization of whipworms during colonoscopy. Multiple whitish filamentous structures are observed extending from the rectum to the distal ileum. Images property of the authors.

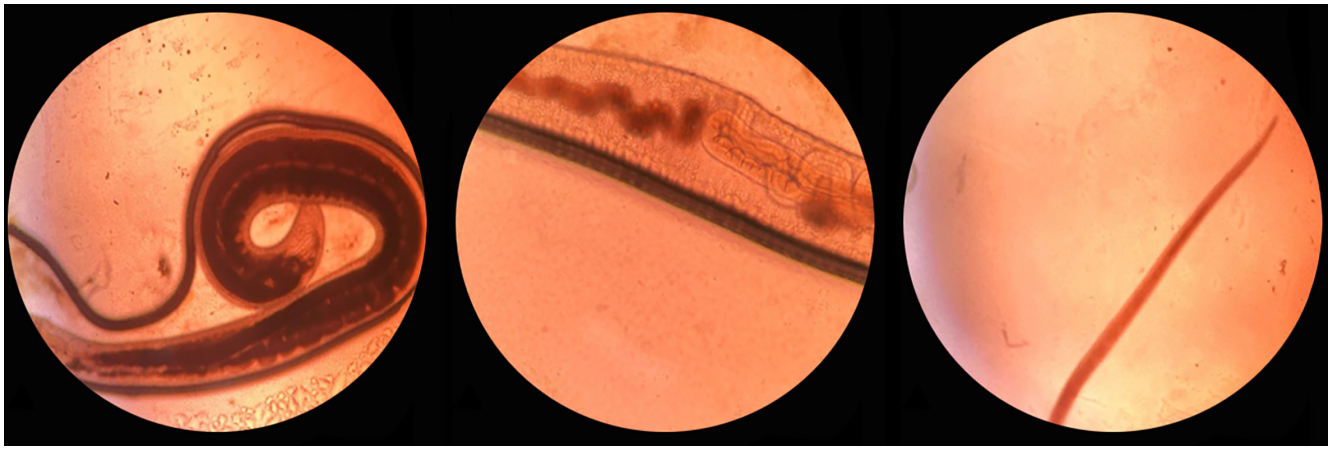


Figure 2. Microscopic visualization of the parasite showing internal structures, head, and tail. Images property of the authors.

increased investment in environmental sanitation, access to safe water, mass deworming programs, and hygiene education[1,2]. Collaboration between governmental institutions and the community is essential to reduce the prevalence of *T. trichiura* and other parasitic infections associated with contaminated soil. Through an integrated approach that combines curative and preventive strategies, it is possible to mitigate the health impact of these infections and improve living conditions in developing regions[2,3,12].

CONCLUSION

As illustrated in this case, trichuriasis remains a relevant and underdiagnosed cause of severe anemia in socially vulnerable and immunosuppressed adult populations. Identification of *T. trichiura* as the etiologic agent in this patient with anemic syndrome underscores the importance of including intestinal parasitic infections in the differential diagnosis in endemic settings and reinforces the need for comprehensive clinical and laboratory evaluation to determine the origin of severe anemia. Although anthelmintic therapy was effective at the individual level, sustained control of this parasitic infection requires community-based strategies addressing social determinants of health, including sanitation infrastructure, access to potable water, and health education. Only through a multisectoral approach can the disease burden associated with *T. trichiura* and its nutritional, hematological, and social complications be effectively reduced.

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Case report

Frantz Tumor: Case Report

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Abstract

Solid pseudopapillary neoplasm (Frantz tumor) is a rare pathological entity, with a higher incidence in young women, and is typically classified as a tumor with low malignant potential. Clinical manifestations are nonspecific and depend on the anatomical location involved. A case is presented involving a 27-year-old female patient with a 10-month history of diffuse abdominal pain and a 5-kg weight loss over the preceding six months. Endoscopic ultrasound with biopsy revealed a 45 × 45 mm solid-cystic mass. A Whipple pancreatoduodenectomy was performed, with postoperative follow-up at eight days showing no complications. Histopathological analysis confirmed a solid pseudopapillary tumor with negative resection margins. This neoplasm accounts for approximately 0.2% to 2.7% of pancreatic tumors, and more than 50% of cases are asymptomatic, often discovered incidentally on imaging studies. Treatment is based on complete surgical resection, with documented five-year survival rates exceeding 90%. These tumors are exceedingly rare and are associated with an excellent long-term prognosis following complete surgical excision.

Keywords

Neoplasm, benign neoplasm, pancreatic neoplasms, pancreatoduodenectomy.

INTRODUCTION

Pancreatic tumors are classified as exocrine or endocrine and may be either malignant or benign. Benign tumors are rare and are generally diagnosed only once they reach a considerable size, as they produce obstructive symptoms affecting the posterior wall of the stomach or compromise the endocrine pancreas. Clinical manifestations are nonspecific and depend on the anatomical region involved; however, these tumors do not produce metabolic alterations or elevation of biomarkers[1,2].

Frantz tumor is a solid pseudopapillary exocrine pancreatic neoplasm with low incidence, accounting for less than 1% of pancreatic tumors. It occurs more frequently in young female patients (mean age: 28 years; 89%), in whom early diagnosis and complete surgical resection are associated with a 5-year survival rate exceeding 95%[1]. It is considered to have benign behavior due to its low metastatic potential (approximately 15%), with lymph node involvement and recurrence being uncommon[1,3]. Given the low incidence of this condition, the following case is reported.

CASE PRESENTATION

A 27-year-old female patient with no significant past medical history, originally from Samaná, Caldas, a home-

maker, presented with a 10-month history of symptoms. She reported diffuse abdominal pain predominantly in the upper abdomen, associated with a 5 kg weight loss over the previous six months and early satiety. Physical examination revealed a palpable mass in the right hypochondrium. The patient was initially evaluated in the outpatient setting, where an abdominal ultrasound was performed. The report described a "rounded mass adjacent to the head of the pancreas, hypoechoic, with well-defined margins and minimal Doppler signal, measuring 5.1 × 4.7 × 4.6 cm, with an estimated volume of 59 mL." Based on these findings, evaluation by general surgery was requested. The surgical team recommended endoscopic ultrasound with biopsy. Endoscopic ultrasound demonstrated the following findings: "A solid-cystic mass measuring 45 × 45 mm, with poorly defined hyperechoic septa and 20 mm cystic components, located in the head and neck of the pancreas. The lesion wall is well defined, hyperechoic, and rounded, with hypervascular areas, without calcifications or perilesional lymphadenopathy. The lesion compresses the mesenteric vessels but does not invade them. The celiac trunk, portal vein, and splenomesenteric confluence are normal. No free fluid is observed in the abdominal cavity" (**Figure 1A** and **B**). Biopsy was performed during the same procedure (**Figure 1A**).

Preoperative triphasic computed tomography (CT) was requested to exclude portomesenteric involvement. Imaging demonstrated a large 45 × 45 mm mass without involvement of the mesenteric vein (**Figure 2**).

A Whipple pancreatoduodenectomy was performed. Intraoperatively, a large tumor of the pancreatic head was identified, intensely vascularized, with multiple large efferent veins draining into the portal vein and superior mesenteric vein. The procedure was completed without complications (**Figure 3**). The patient remained in the intensive care unit (ICU) for three days, followed by two additional days of hospitalization. She was discharged and evaluated at follow-up eight days later without complications. Pathology confirmed the presence of a solid pseudopapillary tumor with negative surgical margins (**Figure 4**).

DISCUSSION

Pancreatic tumors account for approximately 7% of deaths caused by neoplasms. These tumors are classified into exocrine (95%) and endocrine (5%) neoplasms. Ductal adenocarcinoma (85%) is the most frequent exocrine tumor, whereas solid pseudopapillary tumor, also known as Frantz tumor, represents approximately 0.2%–2.7% of the remaining cases[4]. This entity belongs to the group of pancreatic cystic tumors, which may be classified as unilocular or multilocular, neoplastic or non-neoplastic, and composed of epithelial or mesenchymal tissue[5]. This tumor is defined as an uncommon pancreatic lesion characterized by slow growth and low malignant potential, with a reported mortality of approximately 2%. It is typically composed of solid areas, pseudocysts, and pseudopapillary structures interspersed with regions of necrosis and hemorrhage[6].

The tumor is named after V. K. Frantz, who first described it in 1959 in the *Atlas of Tumor Pathology*, based on a patient who underwent pancreatoduodenectomy and died during the procedure[3,7]. At that time, it was defined as a papillary

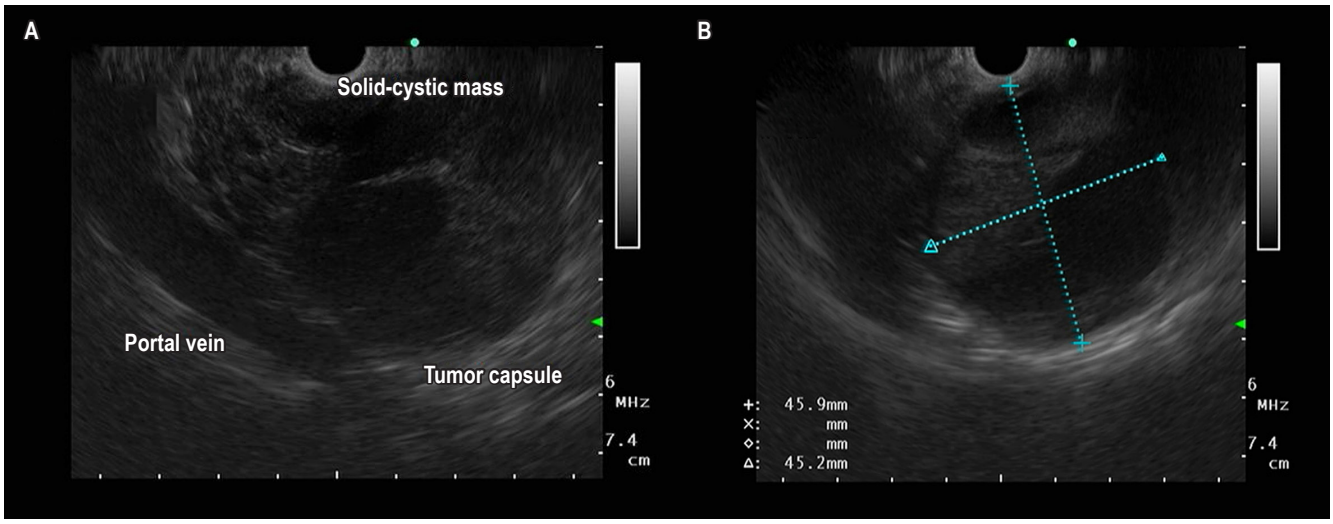


Figure 1. Pancreatic endoscopic ultrasound showing a solid-cystic mass in the head of the pancreas, well defined with a thick capsule. Images property of the authors.

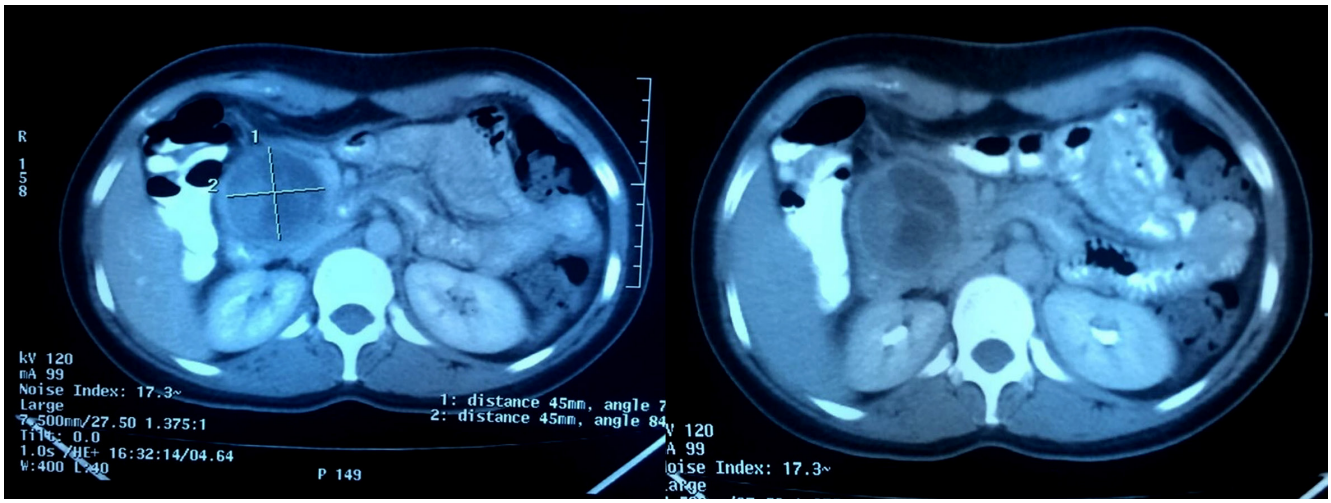


Figure 2. Triphasic abdominal computed tomography: heterogeneous mass involving the head of the pancreas, with a cystic component measuring 5 × 5.5 cm and internal areas of enhancement persisting in the equilibrium phase. Images property of the authors.

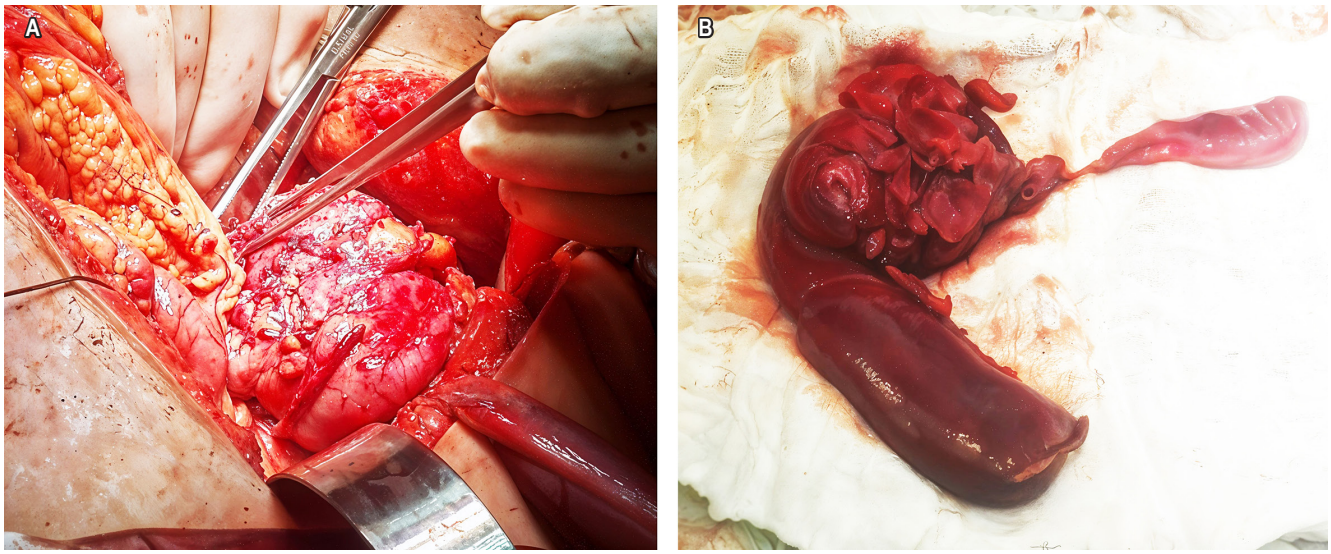


Figure 3. A. Whipple pancreatoduodenectomy. **B.** Surgical specimen of solid pseudopapillary tumor with negative margins. Images property of the authors.

tumor of the pancreas that could be benign or malignant. Subsequently, according to evolving classifications of pancreatic neoplasms, its nomenclature has changed multiple times, including solid and cystic tumor, papillary cystic tumor, papillary-cystic epithelial neoplasm, solid and papillary epithelial neoplasm, until the current designation recommended by the World Health Organization (WHO, 1996): solid pseudopapillary tumor[8].

According to anatomical distribution, this tumor occurs in the following pancreatic segments: head and neck (34%–43%), tail (31%–40%), body (14.8%–25%), and uncinate process (0.43%)[4,9,10]. It occurs more frequently in adolescent and young adult women, with a mean age of 23.9 years. Its predominance in this age group suggests a possible hormonal influence in its development. This hypothesis is supported primarily by immunohistochemical findings (positivity for progesterone and estrogen receptors) and by the close embryologic relationship between pancreatic and genital tissues during early organogenesis[11-13]. However, cases have also been described in men, with a markedly lower frequency, with a male-to-female ratio of approximately 1:10 and a prevalence ranging from 3.9% to 6.6%. Several studies have demonstrated no association between age, sex, or tumor location and degree of malignancy[4].

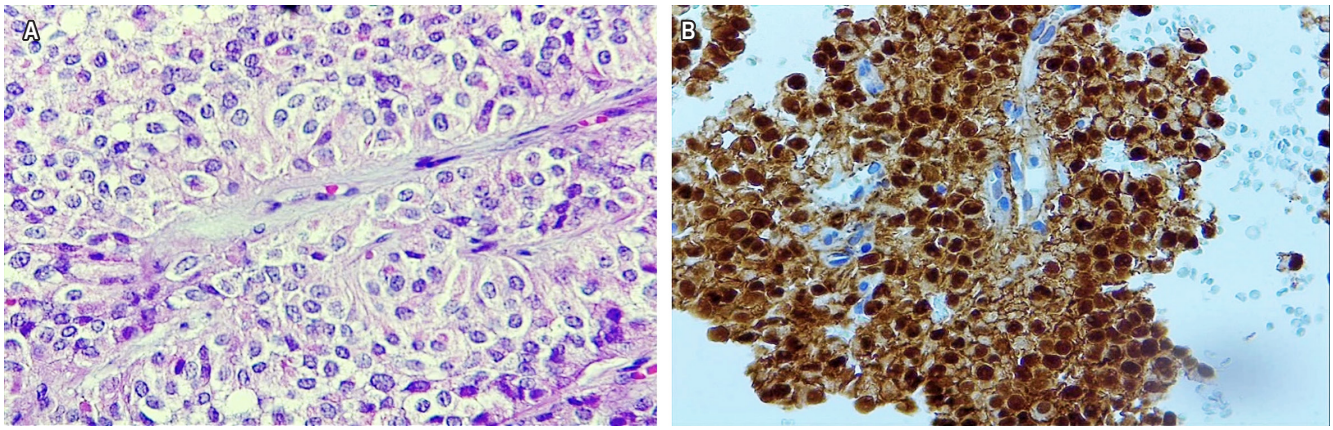


Figure 4. A. Hematoxylin and eosin staining demonstrating a neoplasm composed of monomorphic groups of polygonal cells with abundant cytoplasm and rounded nuclei with well-defined borders and fine chromatin, without mitotic figures. The scant stroma contains delicate vascular stalks. **B.** Immunohistochemistry demonstrating tumor cells with nuclear and membranous immunoreactivity for β-catenin; this staining pattern is characteristic of solid pseudopapillary tumor of the pancreas. Images property of the authors.

Although this tumor is generally benign, approximately 15% of patients may develop metastases or malignant transformation. Metastatic spread most commonly involves the liver, portal vein, spleen, lymph nodes, omentum, duodenum, colon, lung, and retroperitoneum[1,4,8,14].

Clinically, more than 50% of cases are asymptomatic, and the lesion is discovered incidentally on imaging studies. Symptoms typically occur when the tumor is located in the pancreatic head or has grown sufficiently to compress adjacent structures. Manifestations are generally vague and nonspecific. The most common symptoms include poorly localized abdominal pain, nausea, vomiting, weight loss, anorexia, and a palpable epigastric mass or sensation of gastric fullness. In some cases, progression to gastric outlet obstruction may occur. Less frequently, intestinal obstruction, anemia, jaundice (rare, associated with involvement of the pancreatic head or tail), pancreatitis, and even hemoperitoneum secondary to traumatic rupture may be observed[4,11,15].

These tumors are generally large (8–10 cm), rounded, and typically well circumscribed, with a solid, solid-cystic, or purely cystic appearance[16]. Microscopically, they are characterized by polygonal cells with abundant eosinophilic cytoplasm that do not coalesce, surrounded by small-caliber blood vessels. Degenerative changes and intracystic hemorrhage are frequently observed. Pathognomonic histological findings include papillary groups of neoplastic cells with vascular cores surrounded by mucinous stroma and an additional layer of monomorphic cells. Histological degeneration is characterized by cellular vacuolization, formation of pseudopapillae, hemorrhage, collections of foamy macrophages, cholesterol clefts and crystals, foreign-body giant cell reaction, and extensive fibrosis with focal calcifications[5,15].

Furthermore, current literature reports that tumor cells consistently demonstrate positivity for β-catenin and vimentin staining, combined with absence of E-cadherin expression. These markers are highly useful histological indicators for the diagnosis of this tumor, whereas only approximately half of cases exhibit positivity for CD10, CD56, and alpha-1 antitrypsin. Based on these findings, multiple theories have been proposed regarding the tumor's origin and associated cell lineage. Evidence suggests that it arises from pluripotent pancreatic cells and that its development is influenced by genetic and hormonal factors, particularly estrogenic and progesterone-related pathways, as demonstrated by the expression of these receptors in tumor tissue[4,11].

Diagnosis is primarily based on imaging studies, especially cross-sectional imaging modalities. Ultrasound may reveal large, solid, rounded, oblong, or multilobulated masses, typically encapsulated or heterogeneous, with both echogenic tissue components and anechoic cystic components, as well as peripheral vascularity[4,17]. Additionally, peripheral calcifications and posterior acoustic enhancement may be observed, and a mass effect on adjacent structures may be present[18]. Computed tomography (CT) is considered the diagnostic modality of choice because it allows differentiation among various types of cystic neoplasms based on location and intralesional pattern (unilocular, oligocystic, polycystic, mixed, or solid-cystic), presence of calcifications, communication with the main pancreatic duct or side branches, septations, and mural nodules[4,19]. However, CT

has limitations in visualizing and characterizing hemorrhagic and necrotic lesions, which is relevant when establishing differential diagnoses. Magnetic resonance imaging (MRI) represents an alternative imaging modality with high sensitivity and specificity. It allows improved identification of hemorrhage and facilitates assessment of resectability and surgical planning. Nevertheless, MRI is not always readily available and is associated with higher cost[6,20-22].

In these tumors, significant impairment of hepatic or pancreatic function is typically not observed, and laboratory findings are usually within normal ranges. Measurement of carcinoembryonic antigen (CEA) and carbohydrate antigen 19-9 (CA 19-9) is considered essential in patients presenting with these clinical features. Negative results help exclude alternative etiologies and support further diagnostic evaluation for this specific tumor[4].

The differential diagnosis includes any solid or cystic pancreatic disease entity, such as mucinous cystic tumor, serous microcystic adenoma, cystic adenoma, sarcoma, islet cell tumor, cystadenocarcinoma, acinar cell carcinoma, inflammatory pseudocyst, mucin-secreting tumor, angiolymphoma, pancreatoblastoma, and vascular hemangioma[8,20,23]. The first four entities typically occur in older patients and do not demonstrate sex predominance. Pancreatoblastoma is generally observed in younger individuals of both sexes. Radiologically, a characteristic sunburst pattern of linear calcification is typically observed in microcystic adenoma[8].

The treatment of choice is complete surgical tumor resection (R0), which generally involves pancreatoduodenectomy. The specific surgical approach depends on tumor size and anatomical location. When the lesion is located in the pancreatic head or neck, proximal pancreatectomy is recommended. Conversely, when the lesion is located in the body or tail, distal pancreatectomy with or without splenectomy is the preferred approach, depending on whether the tumor involves the tail or body of the pancreas[24]. Current evidence suggests that splenectomy should be avoided whenever possible, as spleen preservation is associated with fewer postoperative complications, including reduced risk of infection, shorter hospital stay, lower incidence of pancreatic fistula, and decreased morbidity and mortality[23].

Other less invasive techniques described in the literature include partial pancreatectomy and tumor enucleation. However, these approaches are less commonly used in clinical practice due to limited evidence and lower rates of complete tumor resection[4,7,25]. Enucleation has been studied in cystic or neuroendocrine lesions with favorable outcomes in some studies and has demonstrated satisfactory postoperative results, with pancreatic fistula representing the primary potential complication[7]. Nevertheless, other reports advise caution due to the potential risk of tumor dissemination and fistula formation, highlighting the need for further studies to establish its safety and efficacy[5]. Additionally, laparoscopic approaches have been explored; however, consensus has not been reached due to the limited number of reported cases and concerns regarding potential tumor dissemination[5].

Surgical management has demonstrated favorable clinical outcomes and is associated with a good prognosis. The literature reports 5-year survival rates exceeding 90%[26,27]. Although the incidence of recurrence is low, recurrence has been documented several years after treatment, particularly in patients presenting risk factors such as vascular or lymphatic invasion, synchronous metastasis, lymphatic involvement, tumors larger than 5 cm, positive surgical margins, and male sex[11,21,28-30].

Although predictors of malignancy remain controversial in the current literature, several authors have identified elevated Ki-67 index, positive surgical margins, presence of an irregular capsule, exophytic growth pattern, and large tumor size as statistically significant factors associated with increased malignant potential[29,31].

Adjuvant chemotherapy and radiotherapy are not currently standardized and evidence supporting their use remains limited. Nevertheless, these therapies are included in certain treatment protocols, particularly in cases with metastatic disease or when tumors become unresectable due to size or anatomical location[1-3,5,7,8]. Routine lymphadenectomy is not considered necessary, as lymph node metastasis is uncommon in Frantz tumor[5].

CONCLUSION

The relevance of the present case lies in the low incidence of this tumor type, which predominantly affects young female patients and demonstrates less aggressive biological behavior compared with other pancreatic lesions. Prognosis is favorable when surgical resection is performed according to oncologic standards (R0), achieving high survival rates (>90%) without the need for adjuvant therapy. Therefore, clinical suspicion in the aforementioned population without significant prior medical history is essential in order to achieve early diagnosis and timely treatment, thereby improving prognosis and reducing mortality.

Ethical considerations

Informed consent: This study was classified as a "no-risk" intervention according to Article 11 of Resolution 8430 of 1993 issued by the Colombian Ministry of Health, as it involved the use of secondary sources (review of medical records and arteriographic studies). No procedures

or interventions were performed on patients; therefore, informed consent was not required. Prior authorization was obtained from the institutional Ethics and Research Committee.

Conflicts of interest

The authors declare no conflicts of interest with any company or commercial entity.

Funding sources

The authors declare that the study was funded exclusively through their own resources. They also declare no financial relationships with pharmaceutical companies or other commercial entities.

Authors' contributions

Each author made substantial contributions to the literature search, manuscript review, adaptation, and writing of the article.

Ethical considerations

No experiments involving human subjects or animals were conducted for this research. Established protocols regarding patient data confidentiality in publications were strictly followed.

Use of artificial intelligence

No artificial intelligence tools were used.

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Case report

Intestinal Failure and Long-Term Complications of Serial Transverse Enteroplasty (STEP): Case Report

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Abstract

A case is presented involving an 11-year-old female patient with a history of gastroschisis repair and intestinal failure, who required neonatal serial transverse enteroplasty (STEP) with successful intestinal rehabilitation. Ten years later, the patient developed severe stenosis and perianastomotic ulceration, necessitating resection of the previously lengthened intestinal segment. This report highlights the importance of long-term follow-up in patients with intestinal failure secondary to short bowel syndrome who undergo STEP procedures. Furthermore, it emphasizes the critical role of integrated intraoperative surgical and endoscopic evaluation for accurate identification of complications, enabling precise resection and preservation of the maximum possible length of viable intestine.

Keywords

Intestinal failure, hemorrhage, ulcer, intestinal diseases.

INTRODUCTION

Short bowel syndrome (SBS) is the leading cause of intestinal failure in childhood[(1)]. Among the surgical strategies used in its management, serial transverse enteroplasty (STEP), first described by Kim et al. in 2003[(2)], consists of lengthening the dilated intestine while preserving the mesentery through transverse divisions using an intestinal stapler and reducing the intestinal lumen diameter in a zigzag configuration (**Figure 1**). This technique has been shown to effectively reduce areas of stasis, optimize nutrient contact with the absorptive surface of the intestine, and improve intestinal motility; nevertheless, the medical literature has documented several complications associated with this procedure, including gastrointestinal bleeding, perianastomotic ulceration, and eosinophilic enterocolitis. These complications may affect clinical outcomes and require additional interventions for appropriate and timely management[(3)].

CASE REPORT

An 11-year-old female patient with a history of gastroschisis repaired at birth and persistent intestinal obstruction is presented. At 31 days of life, distal ileal atresia with absence of the ileocecal valve was identified. A resection of 16 cm of ter-

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minal ileum and a jejunocolic anastomosis were performed. Obstructive symptoms persisted, with progressive intestinal dilation documented on contrast intestinal transit studies. At 140 days of life, the patient underwent a second surgical procedure. The small intestine measured 66 cm in length, with the distal 30 cm markedly dilated. A patent jejunocolic anastomosis and a colon measuring 18 cm were identified. Intestinal lengthening using the STEP technique was performed, together with gastrostomy and tube jejunostomy placement. The patient showed favorable clinical progression, with adequate intestinal adaptation and no complications. She was discharged at 7 months and 19 days of age with a body weight of 6.2 kg, receiving hydrolyzed formula and without the need for parenteral nutrition.

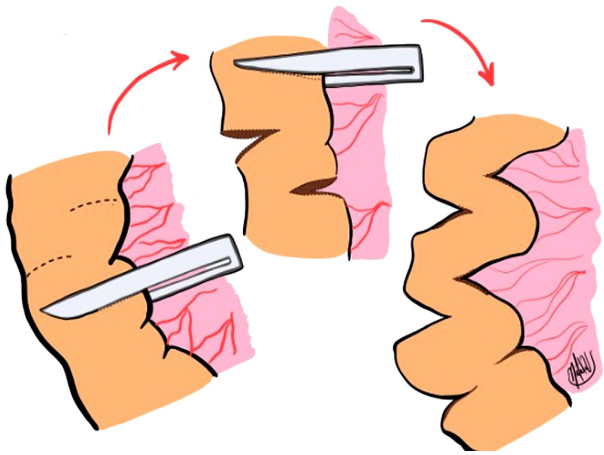


Figure 1. STEP technique. Prepared by: Natalia Velasquez. Adapted from: Almau H, et al. Rev Venez Cir. 2015;68(1):21-4[4].

Ten years later, the patient was readmitted with a one-year history of disabling abdominal pain, melena, abdominal distension, and weight loss, without increased stool output and with a tendency toward constipation. Severe microcytic hypochromic anemia was identified, with normal red cell mass, requiring transfusion without complications. Colonoscopy revealed a 1.5 cm jejunocolic anastomotic ulcer associated with jejunal stenosis. Exploratory laparotomy was performed, including resection of 10 cm of the affected segment and creation of a new anastomosis. Initial postoperative progression was favorable. The patient tolerated the nutritional regimen prescribed by the clinical nutrition team. Parenteral nutrition (PN) was successfully discontinued. Adequate weight gain and stable stool output were observed, with no clinical or hemodynamic deterioration. However, symptom recurrence developed within a few months.

A repeat colonoscopy revealed extensive perianastomotic ulceration and friable mucosa at the STEP suture lines. Histopathological analysis demonstrated chronic active enteritis with neutrophilic and eosinophilic infiltration. Pharmacological management included a two-week course of prednisone, mesalamine, cholestyramine, azathioprine, a proton pump inhibitor (PPI), a prokinetic agent, and cycles of intestinal decontamination. An adequate clinical response was not achieved. Due to persistent symptoms and previously described findings, a new surgical intervention was indicated, including intraoperative endoscopic evaluation.

Intraoperative colonoscopy demonstrated an extensive ulcer and erosive colitis at the mechanical suture line, associated with jejunal stenosis and mesenteric thinning between the STEP segment and the jejunocolic anastomosis (**Figure 2**). Resection of the ulcerated segment was performed, including the portion previously treated with STEP, followed by a new jejunocolic anastomosis. Final intestinal length was 76 cm of small bowel and 95 cm of colon. Postoperative evolution was favorable, with complete resolution of symptoms. At the most recent follow-up, two months after the procedure, the patient was in good clinical condition, without the need for parenteral nutrition and without significant weight loss. Adequate tolerance to fractionated oral feeding was observed. The diet included restriction of simple carbohydrates and saturated fats, a high content of soluble fiber, and supplementation with an oligomeric formula to meet energy and macronutrient requirements. Current treatment includes ferrous sulfate, loperamide, calcium carbonate, vitamin D, and cycles of intestinal decontamination with rifaximin. During recent hospitalizations, progressive increases in weight and height were observed. Nevertheless, the patient continues to present growth delay, with body mass index (BMI) consistent with underweight status and depletion of energy reserves for age according to World Health Organization (WHO) indicators (**Figure 3**). Ongoing follow-up is being conducted by pediatric endocrinology.

DISCUSSION

Intestinal failure (IF) is defined as a reduction in functional intestinal mass below the threshold required to sustain life, resulting in dependence on parenteral support for at least 60 days[5]. According to the RESTORE registry, in Latin America the mortality rate associated with IF is 7.7%, and the rehabilitation rate reaches 53% at five years[6]. Short bowel syndrome (SBS) is the leading cause of IF and represents a condition that requires timely multidisciplinary management. Initial management includes maintenance of acid–base balance and fluid and electrolyte homeostasis, initiation of nutritional support, and pharmacological therapy with antisecretory agents (H2 receptor antagonists, PPIs, loperamide), as well as other medications such as cholestyramine or teduglutide. These interventions aim to pro-

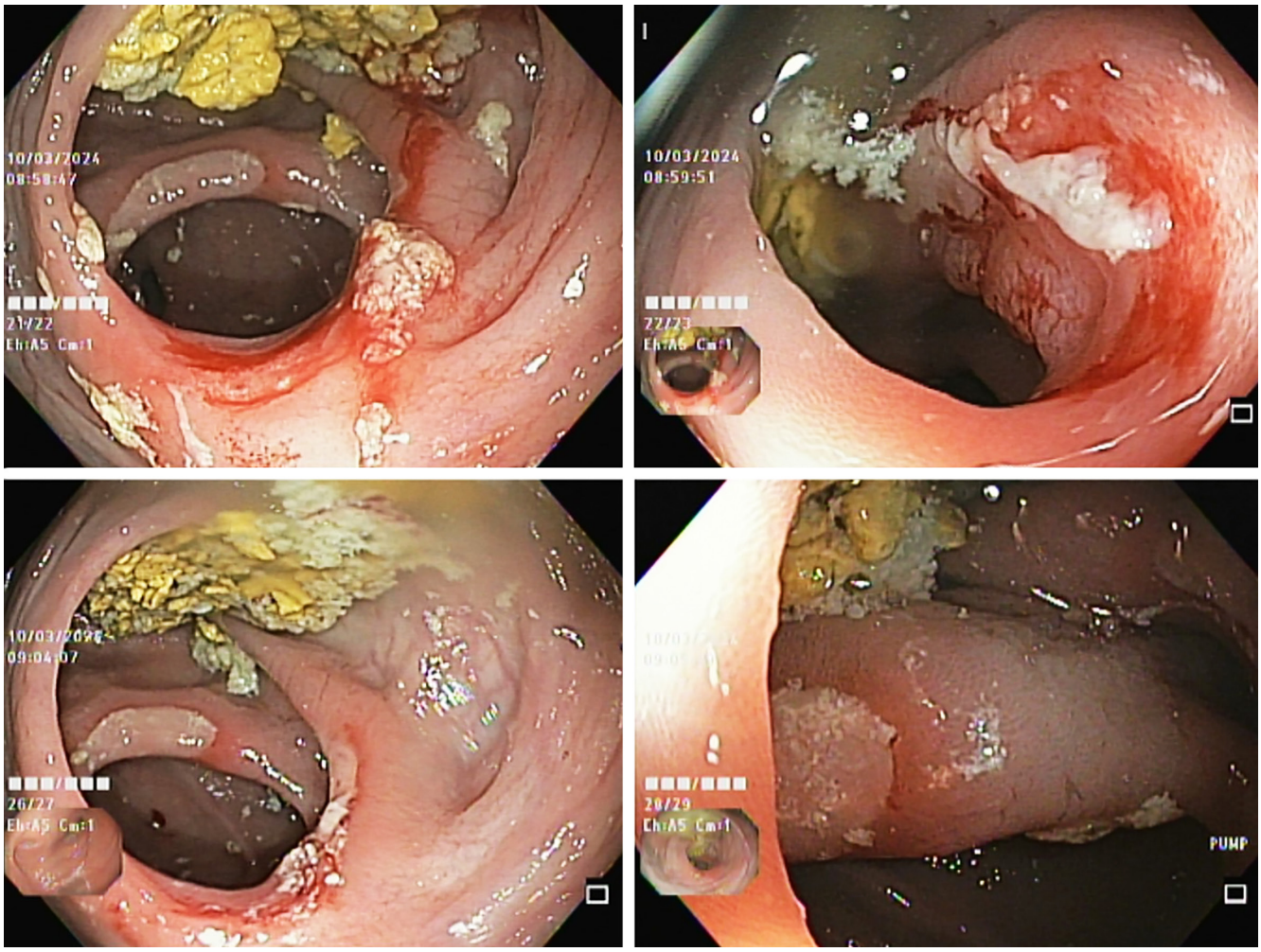


Figure 2. Colonoscopy showing multiple linear perianastomotic ulcerations covered by fibrin, without active bleeding. Images property of the authors.

mote intestinal adaptation, improve intestinal motility and transit, and reduce dependence on parenteral nutrition[7]. However, when medical management is unsuccessful, surgical alternatives should be considered, including stoma closure and gastrointestinal tract reconstruction, enteroplasty procedures, intestinal transit–slowing techniques, or intestinal lengthening procedures[8].

The group of surgical procedures developed to facilitate transition to enteral autonomy is known as autologous intestinal reconstructive surgery (AIR). The AIR procedures most commonly used in clinical practice include serial transverse enteroplasty (STEP), longitudinal intestinal lengthening procedure (LILT), and tapering enteroplasty (TPE)[9,10]. The STEP technique (**Figure 1**) has demonstrated reduction of areas of stasis, increased contact between nutrients and the absorptive intestinal surface, and improvement in intestinal motility[2,11]. According to a Markov decision analysis, this procedure improves long-term survival in pediatric patients with SBS, increasing rates of enteral autonomy and reducing the need for intestinal transplantation[12].

In the experimental study conducted by Kim et al. in 2003 using a porcine model, a 64% increase in final intestinal length was observed. Six weeks after the procedure, the animals demonstrated adequate intestinal adaptation, with weight gain and no associated complications[2]. Similarly, a study conducted by Patrick et al. in 2005 evaluated the surgical and nutritional outcomes of STEP in infants and concluded that it is a technically straightforward intestinal lengthening procedure with favorable results in terms of growth and nutritional status[13]. Additional advantages of this surgical technique include the absence of a requi-

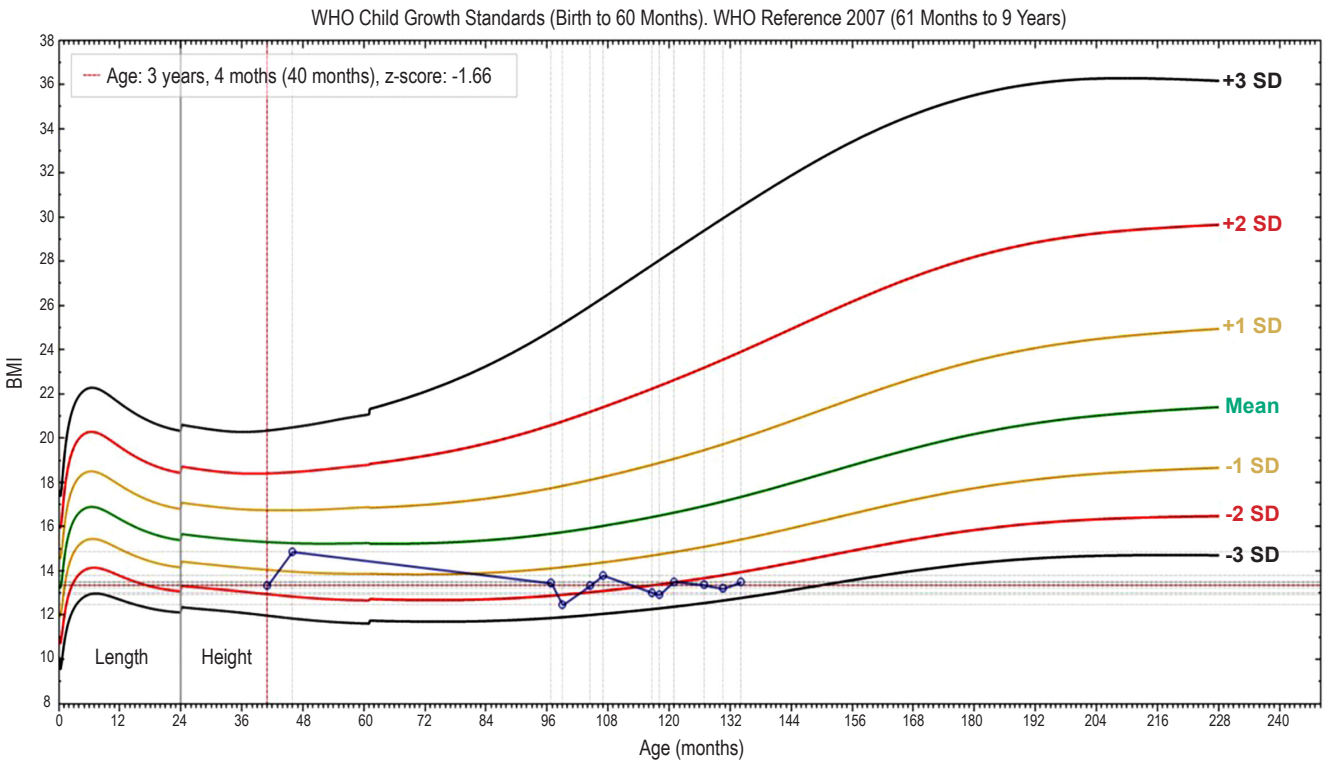


Figure 3. BMI-for-age progression. Image property of the authors, prepared by Geraldine Vargas using WHO Anthro for personal computers, version 3, 2009.

rement for additional anastomoses and preservation of mesenteric integrity. Moreover, the procedure effectively achieves intestinal lengthening, which depends on both the degree of preexisting dilation and the caliber of the newly created intestinal channel.

However, the procedure may be associated with complications such as gastrointestinal (GI) bleeding, perianastomotic ulceration, and eosinophilic enterocolitis[3]. A demographic statistical analysis conducted at the Center for Advanced Intestinal Rehabilitation (CAIR) in Boston included follow-up of 296 patients, of whom 23 underwent STEP surgery, with a median age of 4.5 months. Among these patients, 3 (13%) developed GI bleeding between 5 and 30 weeks after surgery, requiring red blood cell transfusion. In addition, multiple endoscopic evaluations identified staple-line ulceration in 2 patients, which stabilized with bowel rest, and eosinophilic enterocolitis in 1 patient, which responded to treatment with luminal steroids. No technical factors related to the surgical procedure were identified as contributing to these complications[3].

Similarly, a retrospective study conducted in Finland compared pediatric patients with SBS who underwent AIR procedures with those who received conservative management. The results demonstrated that the incidence of perianastomotic ulcerations and the presence of pathological endoscopic findings were similar in both groups. These findings suggest that such alterations are more likely a consequence of SBS itself rather than of the AIR surgical procedure[14]. Thus, available evidence indicates that complications are primarily associated with the underlying intestinal condition rather than the surgical intervention.

The available literature on long-term complications following the STEP procedure remains limited both globally and in Colombia. Historically, insufficient knowledge regarding IF and its therapeutic alternatives has hindered long-term follow-up. However, advances in the field have significantly improved survival through timely management strategies. Patients with IF who undergo AIR techniques require long-term follow-up by a multidisciplinary team, as complications may develop weeks or even years after the procedure. Endoscopic surveillance represents a key tool for early detection.

In the clinical case presented, the STEP procedure promoted intestinal adaptation during the neonatal period. Nevertheless, after ten years of follow-up, the patient developed severe ulceration and stenosis. Intraoperative surgical and endoscopic findings were essential for accurate identification of the affected segments, allowing preservation of the greatest possible length of viable intestine.

From a multidisciplinary perspective, the previously described anemia was considered in the context of the patient's clinical history and the absence of the ileocecal valve. A potential impairment in vitamin B12 absorption was considered, as this process depends on intrinsic factor and occurs primarily in the terminal ileum[15]. However, the morphological characteristics of the anemia (microcytic, hypochromic anemia with normal red cell mass), together with normal serum vitamin B12 levels, allowed exclusion of megaloblastic anemia. Evaluation of iron kinetic parameters confirmed the diagnosis of iron deficiency anemia.

Patients with chronic intestinal failure present impaired nutrient absorption, which negatively affects the GH–IGF-1 axis. This alteration impacts growth and development secondary to growth hormone deficiency or resistance[16]. For this reason, the patient remains under follow-up by pediatric endocrinology to evaluate the potential benefit of adjunctive growth hormone therapy.

Finally, in patients with SBS, it is essential to ensure "volume-for-volume" replacement of gastrointestinal losses in order to prevent complications such as hypovolemia, hydroelectrolytic disturbances, acute kidney injury, and splanchnic hypoperfusion[17]. Enteric losses may rapidly exceed the adaptive capacity of the kidneys, leading to extracellular volume depletion. Omission or inadequate replacement of these components may precipitate metabolic disturbances, hinder intestinal adaptation, prolong dependence on parenteral nutrition, and increase morbidity and mortality[17,18].

As evidence regarding long-term outcomes following STEP surgery continues to expand, further studies are needed to better understand risk factors associated with complications and to optimize postoperative management strategies.

CONCLUSION

Short bowel syndrome, as the most frequent cause of intestinal failure in the pediatric population, represents a complex condition that requires interdisciplinary management and therapeutic strategies aimed at promoting intestinal adaptation. Although the STEP technique provides multiple advantages in terms of intestinal function and long-term quality of life, late complications may occur. Continuous clinical and endoscopic follow-up is therefore strongly recommended. In addition, the incorporation of intraoperative surgical and endoscopic tools allows precise identification of these complications and supports decision-making aimed at achieving the best possible prognosis for the patient.

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Case report

An Uncommon Complication of Post-ERCP Pancreatitis and Duodenal Perforation: Case Report

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Abstract

Introduction: Endoscopic retrograde cholangiopancreatography (ERCP) is a fundamental therapeutic procedure in biliopancreatic disease, although it is associated with potentially severe complications, including post-ERCP pancreatitis (PEP) and duodenal perforation. The latter is rare but carries a high mortality rate. **Case Presentation:** A 52-year-old previously healthy woman underwent ERCP for obstructive choledocholithiasis. Within the first 24 hours, she developed abdominal pain, distension, vomiting, and hemodynamic instability, with elevated serum amylase levels initially consistent with PEP. Due to clinical deterioration, contrast-enhanced computed tomography revealed pneumoretroperitoneum and extensive free fluid, findings suggestive of duodenal perforation. Emergency laparotomy confirmed a perforation in the second portion of the duodenum, which was managed with primary repair and abdominal lavage. The postoperative course was complicated, requiring reinterventions, open abdomen management, and intensive care support. **Discussion:** The coexistence of PEP and duodenal perforation is exceptional and significantly complicates early diagnosis due to overlapping clinical manifestations. Early computed tomography and timely surgical decision-making were decisive in management. **Conclusion:** This case highlights the need for high clinical suspicion and early imaging evaluation in patients with atypical post-ERCP evolution, as well as the importance of a staged, multidisciplinary management approach in highly complex clinical scenarios.

Keywords

Endoscopic retrograde cholangiopancreatography, pancreatitis, intestinal perforation.

INTRODUCTION

Endoscopic retrograde cholangiopancreatography (ERCP) is a hybrid diagnostic and therapeutic technique that combines endoscopy and fluoroscopy. It is widely used in the evaluation of biliary and pancreatic duct disorders. Since its introduction by McCune in 1968, ERCP has evolved into an indispensable tool, particularly for the management of choledocholithiasis, benign and malignant strictures, and postoperative complications[1]. According to the American Society for Gastrointestinal Endoscopy (ASGE) guidelines, ERCP is the treatment of choice for biliary obstruction secondary to lithiasis. Evidence-based recommendations support early intervention in selected cases, such as biliary pancreatitis complicated by cholangitis[2]. However, ERCP carries clinically significant risks. The most common complications include pancreatitis, hemorrhage, cholangitis, and duodenal perforation. The overall incidence ranges

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from 4% to 16%[3]. Post-ERCP pancreatitis represents the most frequent complication, with reported rates ranging from 1% to 30%, particularly in younger patients, women, and individuals with difficult cannulation[4]. Early recognition is essential, and diagnosis is supported by biochemical markers such as serum amylase and lipase, which allow confirmation within the first six hours after the procedure[5].

In contrast, duodenal perforation is an uncommon but highly lethal complication. Its estimated incidence ranges from 0.08% to 1.0%, according to multicenter retrospective studies[3]. Clinical presentation may be silent or nonspecific, which complicates early diagnosis. Current evidence emphasizes the importance of timely detection through contrast-enhanced computed tomography and prompt stratification between conservative and surgical management, depending on the type of perforation and the patient's hemodynamic status[3,5]. Furthermore, in patients with altered gastrointestinal anatomy, such as those with Billroth II or Roux-en-Y reconstructions, the use of double-balloon enteroscopy-assisted ERCP (DB-ERCP) has demonstrated effectiveness. However, it is associated with a non-negligible complication rate, particularly perforation, with an incidence of 3.2% and increased risk in the presence of a native papilla (odds ratio [OR]: 3.268; 95% confidence interval [CI]: 1.426–7.490)[6].

This case report aims to illustrate an unusual presentation of two major complications following ERCP, namely acute pancreatitis and duodenal perforation, which occurred concomitantly and presented with attenuated clinical signs that hindered the initial diagnosis. Its value lies in highlighting how atypical clinical evolution may mask potentially life-threatening events. This underscores the importance of a comprehensive diagnostic approach guided by clinical suspicion, rigorous hemodynamic monitoring, and early use of advanced imaging. In addition, this case emphasizes the role of computed tomography as a critical tool for redirecting therapeutic strategy in ambiguous scenarios. From an academic perspective, the report contributes to understanding the clinical variability of post-ERCP complications. It also promotes a proactive approach among gastroenterologists, radiologists, and surgeons when facing similar situations, thereby fostering early interdisciplinary decision-making that may directly impact patient survival.

CASE PRESENTATION

A 52-year-old previously healthy female patient was referred for ERCP after obstructive choledocholithiasis was documented by magnetic resonance cholangiography. During the procedure, successful extraction of the stone into the duodenal lumen was achieved, with no immediate adverse events. Twenty-four hours after the procedure, during hospitalization, the patient developed moderate-intensity abdominal pain (visual analog scale [VAS]: 7/10), progressive abdominal distension, recurrent emesis, and fever. Physical examination revealed tenderness on palpation of the right upper quadrant and right flank, without signs of peritoneal irritation. Empirical treatment with ampicillin/sulbactam was initiated. However, due to the onset of hemodynamic instability, persistent tachycardia, hypotension, and oxygen saturation below 90%, urgent transfer to a high-complexity referral center in southwestern Colombia was undertaken.

Upon admission, inflammatory parameters were not strongly suggestive of severe sepsis (leukocyte count 5,260/µL, relative neutrophilia 75.1%). Hemoglobin was 15.5 g/dL. However, a significant elevation in serum amylase was observed (809 U/L). The absence of clinical signs of peritonitis initially supported suspicion of post-ERCP pancreatitis, with an APACHE II score of 11, corresponding to an estimated mortality of 7%–15%. The patient was admitted to the intensive care unit (ICU), where severe metabolic acidosis, hyperlactatemia (7.33 mmol/L), and marked deterioration in the PaO_2/FiO_2 ratio (86 with FiO_2 at 100%) were documented, findings consistent with systemic hypoxemic respiratory failure.

Given the clinical severity and atypical disease course, contrast-enhanced computed tomography of the abdomen and pelvis was performed (**Figure 1**). Imaging revealed radiological findings highly suggestive of intestinal perforation, including pneumoretroperitoneum, abundant free fluid, and air within the peripancreatic, right perirenal, right paracolic, subhepatic, subphrenic, and pelvic spaces. The pancreatic gland did not demonstrate major structural abnormalities. Only mild inflammatory changes and peripancreatic fluid involving the body and tail were observed, findings consistent with mild pancreatitis. Based on these tomographic findings, an emergency surgical protocol was activated. During midline supra- and infraumbilical laparotomy, a pinpoint perforation measuring approximately 1 cm was identified in the second portion of the duodenum. The duodenum appeared edematous and friable. Severe peritonitis and right-sided retroperitonitis were also observed. Primary repair of the defect was performed, followed by extensive lavage of the abdominal cavity.

The postoperative course was complex. Continuous vasopressor support was required. Antibiotic therapy was escalated to meropenem and vancomycin. Multiple surgical reinterventions were performed. During one procedure, localized necrosis of the omentum applied over the repaired duodenal area was identified, along with a biliopurulent collection and a new posterior duodenal leak. This was managed with placement of a healthy omental patch and insertion of an ABTHERA® system for temporary abdomi-

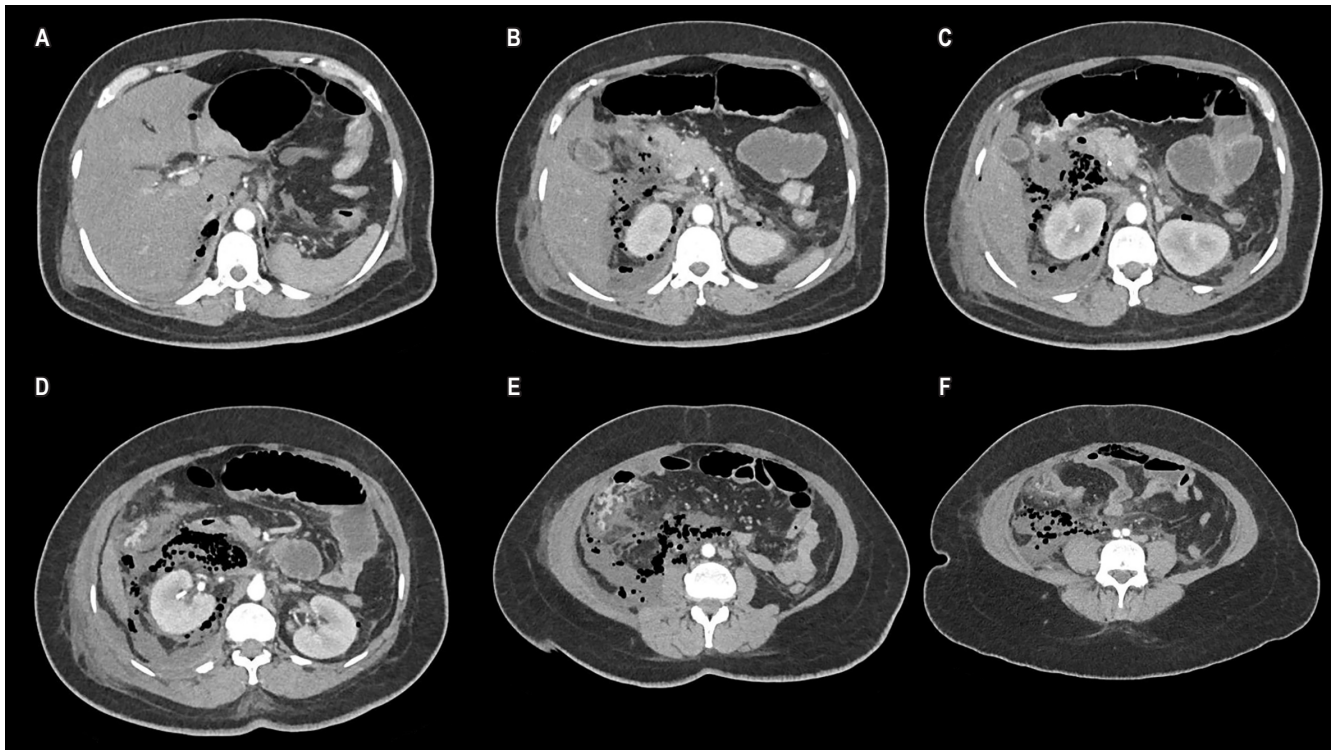


Figure 1. Contrast-enhanced computed tomography of the abdomen and pelvis in the present clinical case. **A-F.** Sequential images in cephalocaudal order demonstrate free air and fluid within the retroperitoneal space, evidenced by involvement of the bilateral perirenal spaces (greater involvement on the right), the right paracolic space, and the subphrenic, subhepatic, and pelvic spaces. These findings demonstrate inflammatory involvement of both the peritoneal and retroperitoneal compartments. Images obtained from the patient's medical record archive.

nal closure. Subsequent procedures demonstrated progression of retroperitoneal necrosis with compartmental involvement: 60% of the intestines, 90% of the retroperitoneum, and 60% of the paracolic gutters. In addition, lateral retraction of the abdominal fascia of approximately 10 cm was observed. Management included traction technique and placement of a temporary mesh. At the time of this publication, the patient remains in the ICU under vasopressor support, with multidisciplinary monitoring by general surgery, infectious diseases, and critical care teams.

DISCUSSION

The coexistence of post-ERCP pancreatitis and duodenal perforation is an uncommon clinical event. It is of particular interest due to its diagnostic and therapeutic implications. Concomitant presentation represents a considerable challenge because of symptom overlap, the possibility of false-negative findings during initial evaluation, and the need for urgent clinical decision-making involving multiple specialties. In this case, progressive clinical deterioration occurred without evident peritoneal signs. This finding underscores the importance of active surveillance and early integration of imaging studies to reassess initial diagnostic impressions[7,8].

Although there is a growing trend toward conservative management of certain post-ERCP duodenal perforations, particularly Stapfer type II and IV lesions[7,9,10], this strategy is not applicable in all clinical settings. Reyes et al. and Dufera et al. documented successful non-surgical management in cases of contained perforations without sepsis or extensive radiological findings[7,10]. In contrast, our patient demonstrated tomographic evidence of pneumoretroperitoneum, periduodenal collection, and free fluid across multiple compartments. These findings, together with hemodynamic instability, justified urgent laparotomy. The radiological profile was consistent with Stapfer type I or II perforation, for which surgical management is clearly indicated[9].

The literature indicates that the decision between surgical and conservative management should be based on multiple variables, including clinical stability, radiological extent, perforation type, and initial response to treatment[7,9]. Stapfer et al. proposed a topographic classification that has proven useful not only for prognostic stratification but also for therapeutic decision-making[9]. Early surgical interven-

tion in this case likely prevented catastrophic complications such as mediastinitis, refractory sepsis, or extensive tissue necrosis.

An unusual finding in this case was subsequent necrosis of the omental patch used to cover the initial duodenal leak. Although the omentum is generally considered reliable due to its angiogenic and anti-inflammatory properties, its viability may be compromised in the context of persistent biliary leakage, bacterial colonization, and enzymatic pancreatic dissemination. Sánchez-Tembleque et al. previously warned of complications related to malpositioned biliary prostheses that may induce distal duodenal trauma and localized necrosis[11]. This observation reinforces the need for meticulous intraoperative assessment of tissue used for primary repair or reinforcement.

The use of open abdomen therapy with the ABTHERA® system in this patient represents another distinctive aspect. Although widely employed in trauma surgery and abdominal sepsis, its use in post-ERCP complications has not been extensively documented. In this case, it facilitated access for sequential reinterventions, containment of the septic focus, and progressive management of fascial closure. This strategy may be considered part of the therapeutic armamentarium in cases of severe retroperitonitis, as suggested by prior reports of catastrophic abdomen secondary to ERCP[12].

From a radiological perspective, the findings of pneumoretroperitoneum, peripancreatic free air, and non-encapsulated intraperitoneal free fluid were critical in directing the diagnosis toward perforation. This is particularly relevant when the clinical presentation overlaps with that of post-ERCP pancreatitis, as described by Peña-Portillo et al. and Cahyadi et al., who emphasized that classical diagnostic criteria for post-ERCP pancreatitis may delay identification of perforation if early imaging findings are not adequately considered[8,13].

This case presents clinically relevant particularities due to the simultaneous coexistence of post-ERCP pancreatitis and duodenal perforation, accompanied by atypical progression and attenuated clinical signs. This presentation contrasts with most national and international reports, in which these complications occur independently and with a more evident clinical picture. In a recent Colombian study conducted by Del Castillo et al., the incidence of post-ERCP pancreatitis was 2%, consistent with the lower rates reported in high-volume, experienced centers. However, asymptomatic hyperamylasemia reached 30%, highlighting the importance of correlating biochemical findings with the clinical context in order to avoid misdiagnosis and delays in identifying severe complications such as perforation[14].

A critical reassessment of surveillance protocols in post-ERCP patients is warranted, particularly in cases involving prolonged procedures, difficult cannulation, or retracted papilla. Elevation of pancreatic enzymes alone should not automatically lead to the diagnosis of post-ERCP pancreatitis when progressive clinical deterioration is present. This case underscores the need for a rigorous and multidisciplinary clinical approach to post-ERCP complications, especially when presentation is atypical or when multiple adverse events, such as pancreatitis and duodenal perforation, coexist. In clinical practice, a high level of diagnostic suspicion should be maintained in the presence of any hemodynamic deterioration or progressive abdominal symptoms, even when classical signs of peritonitis are absent or minimal.

Early imaging studies, particularly contrast-enhanced computed tomography, should be considered essential for confirming or excluding perforation and defining the anatomical extent of involvement. Interdisciplinary coordination is fundamental for timely decision-making. Clinical management must balance conservative and surgical approaches according to the patient's clinical and radiological status. Furthermore, the endoscopist's experience and technical approach, including prudent pancreatic duct cannulation and cautious use of balloon dilation techniques, represent modifiable factors that may reduce the incidence of complications. In accordance with local evidence, including that reported by Del Castillo et al., routine measurement of amylase levels in asymptomatic patients should be avoided in order to prevent diagnostic confusion and unnecessary management. Interpretation of biochemical markers should always be contextualized within the comprehensive clinical picture[14]. Timely use of computed tomography, multidisciplinary collaboration, and up-to-date knowledge of anatomical and clinical classification systems support improved decision-making in highly complex scenarios[7,9,13]. This approach may be graphically summarized as a sequential pathway from clinical suspicion to surgical resolution, structured around five critical axes: recognition of clinical risk, implementation of dynamic monitoring, stratified assessment of tissue injury, stepwise surgical intervention, and prevention of major complications (**Figure 2**).

CONCLUSION

Beyond statistics and classification systems, this case highlights the need to recognize ERCP as a highly precise but also high-risk procedure, whose complications may exceed any initial prediction. The insidious clinical course observed in this patient and the complex sequence of subsequent events demonstrate that potentially lethal injuries may coexist even after an apparently successful technique. This scenario reinforces the need to move beyond conventional linear diagnostic reasoning and to adopt active and sustained surveillance based on clinical judgment, radiological criteria, and readiness to reintervene when

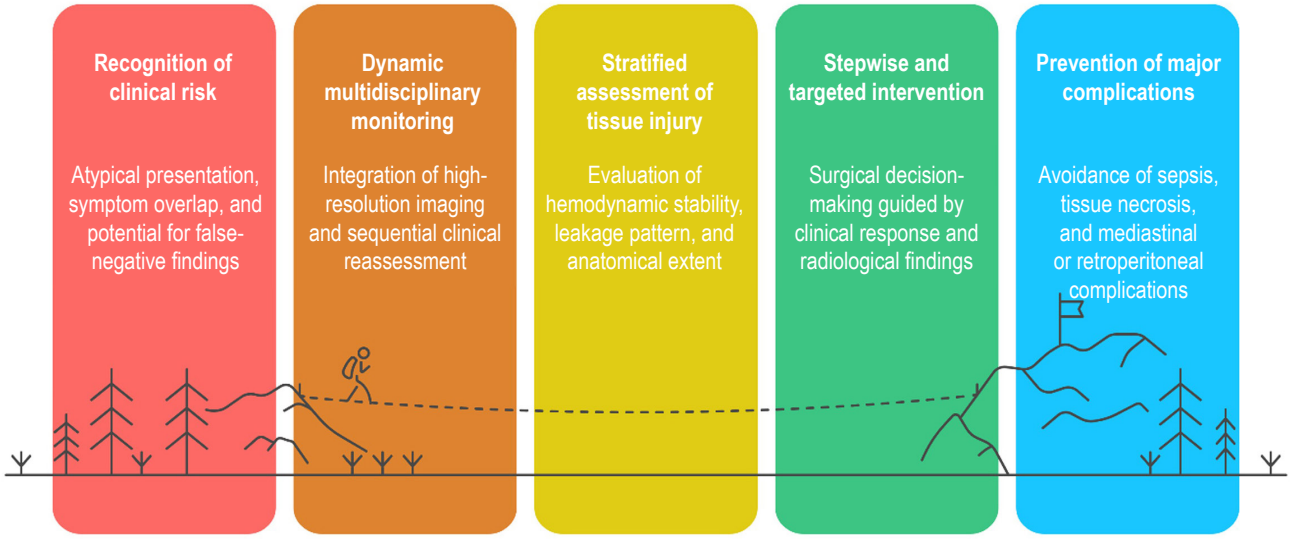


Figure 2. Stepwise resolution pathway in severe post-ERCP complications. Diagram illustrating a five-stage progressive framework for the clinical and radiological management of post-ERCP complications, particularly duodenal perforation associated with pancreatitis. The figure emphasizes the need for a dynamic and interdisciplinary approach that begins with early recognition of clinical risk and culminates in the prevention of catastrophic outcomes. This model integrates clinical judgment, advanced imaging, anatomical stratification of injury, stepwise surgical decision-making, and surveillance of retroperitoneal or mediastinal complications. Image property of the authors.

clinical progression demands it. More than an unusual presentation, this report invites reconsideration of how risk is interpreted in therapeutic endoscopy. In certain contexts, success lies not only in preventing complications but also in detecting them before they become fully manifest.

Conflicts of interest

The authors declare no conflicts of interest. This manuscript was funded with personal resources.

Ethical considerations

Publication of this case was conducted with the patient's authorization for dissemination of clinical, paraclinical, and imaging data derived from the medical record. The principles of beneficence, nonmaleficence, and justice were upheld. Informed consent was duly obtained from the participant, ensuring confidentiality and privacy, with preservation of anonymity.

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Authors' contributions

All authors contributed to the study conception, drafting of the manuscript, preparation of the final version, revision, and approval of the manuscript.

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Case report

Portal Hypertensive Enteropathy Diagnosed by Video Capsule Endoscopy: Case Report

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Abstract

Background: Portal hypertensive enteropathy is an uncommon condition characterized by mucosal abnormalities of the small intestine in patients with portal hypertension. Risk factors include the presence of large esophageal varices, portal hypertensive gastropathy and colopathy, Child–Pugh class B or C cirrhosis, and a history of variceal treatment. Diagnosis is established through video capsule endoscopy or deep enteroscopy. Currently, no standardized management guidelines exist, and therapeutic approaches are primarily based on case reports. **Case Summary:** A 35-year-old male patient with non-cirrhotic portal hypertension secondary to chronic portal vein thrombosis presented to the emergency department with gastrointestinal bleeding. Upper and lower endoscopy were non-diagnostic, while video capsule endoscopy revealed findings suggestive of portal hypertensive enteropathy. The patient was treated with β-blockers and experienced no recurrent bleeding episodes. **Conclusion:** Portal hypertensive enteropathy should be included in the differential diagnosis of patients with portal hypertension, with or without cirrhosis, who present with gastrointestinal bleeding or anemia. In such patients, the use of video capsule endoscopy should not be delayed.

Keywords

Portal hypertension, gastrointestinal hemorrhage, capsule endoscopy.

INTRODUCTION

Portal hypertensive enteropathy (PHE) is an uncommon condition defined by the presence of pathological changes and mucosal abnormalities in the small intestine of patients with portal hypertension (PH)[(1).] Case series report a prevalence of approximately 40%–96.8% among patients with liver cirrhosis and PH[(2).] Based on these studies, several risk factors have been identified, including the presence of large esophageal varices, portal hypertensive gastropathy and colopathy, Child–Pugh class (B or C), prior history of variceal ligation or sclerotherapy, elastography values, and tomographic findings suggestive of portal hypertension, particularly portosystemic shunts[(3)]. The available literature focuses almost exclusively on cases of PHE in cirrhotic patients; the present report describes a 35-year-old male with non-cirrhotic PH secondary to chronic portal vein thrombosis who presented with gastrointestinal bleeding and findings suggestive of PHE on video capsule endoscopy.

CASE DESCRIPTION

A 35-year-old male with a history of portal vein thrombosis with signs of cavernous transformation diagnosed by com-

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puted tomography angiography since childhood due to omphalitis was evaluated. The patient underwent splenectomy at 21 years of age for hypersplenism. Thrombophilia testing was negative, and liver elastography (FibroScan) showed a value of 5.2 kPa. He had experienced multiple previous episodes of variceal upper gastrointestinal bleeding since the age of 12, treated with endoscopic band ligation and sclerotherapy. He had also received anticoagulation therapy with warfarin for thrombosis, with the last dose administered two days prior to admission. The patient was admitted to the emergency department with hematochezia and generalized weakness. He was hemodynamically stable on admission, and digital rectal examination was positive for hematochezia. Laboratory tests revealed mild normocytic, normochromic anemia with hemoglobin of 12.6 g/dL, platelet count of $217 \times 10^3/\mu L$, leukocyte count of $14.1 \times 10^3/\mu L$, and an international normalized ratio (INR) of 1.78. The remaining biochemical and liver profile parameters were within normal limits. Abdominal ultrasound demonstrated dilation of the portal vein with multiple collateral vessels, no signs of cirrhosis, and no free fluid.

Treatment with octreotide was initiated. Upper gastrointestinal endoscopy revealed moderate portal hypertensive gastropathy and small esophageal varices without signs of recent bleeding. Given the presence of gastrointestinal bleeding, colonoscopy was performed, which showed no evidence of recent bleeding or residual blood. Mild erythema was observed in several segments of the colon, findings compatible with portal hypertensive colopathy but insufficient to explain the previously documented hematochezia. Video capsule endoscopy (VCE) was subsequently performed, identifying multiple red spots (Yano–Yamamoto type 1a) in the duodenum, jejunum, and ileum (**Figure 1**), as well as an angiodysplasia-like lesion (Yano–Yamamoto type 1b) measuring 2–4 mm in length without signs of active bleeding in the proximal ileum (**Figure 2**). Areas of hyperemia measuring 2–3 mm were also detected between the distal jejunum and proximal ileum (**Figure 3**).

The patient completed five days of octreotide therapy at an initial dose of 50 µg as an intravenous bolus followed by continuous infusion at 50 µg/hour. After diagnosis, the patient was discharged on carvedilol 12.5 mg/day. No additional episodes of gastrointestinal bleeding were observed during one year of follow-up.

DISCUSSION

Findings associated with PHE are usually classified as vascular or nonvascular. Vascular findings include red spots, telangiectasias, angiodysplasia-like lesions, and varices. Nonvascular findings, also described as inflammatory abnormalities, include edema, hyperemia, granularity, and friability[4,5]. Vascular lesions are more prevalent than nonvascular lesions[6]. Available case series report angiectasias in 24.3%–67% of patients, red spots in 16.6%–62.2%, inflammatory lesions in 5.6%–41.9%, varices less frequently

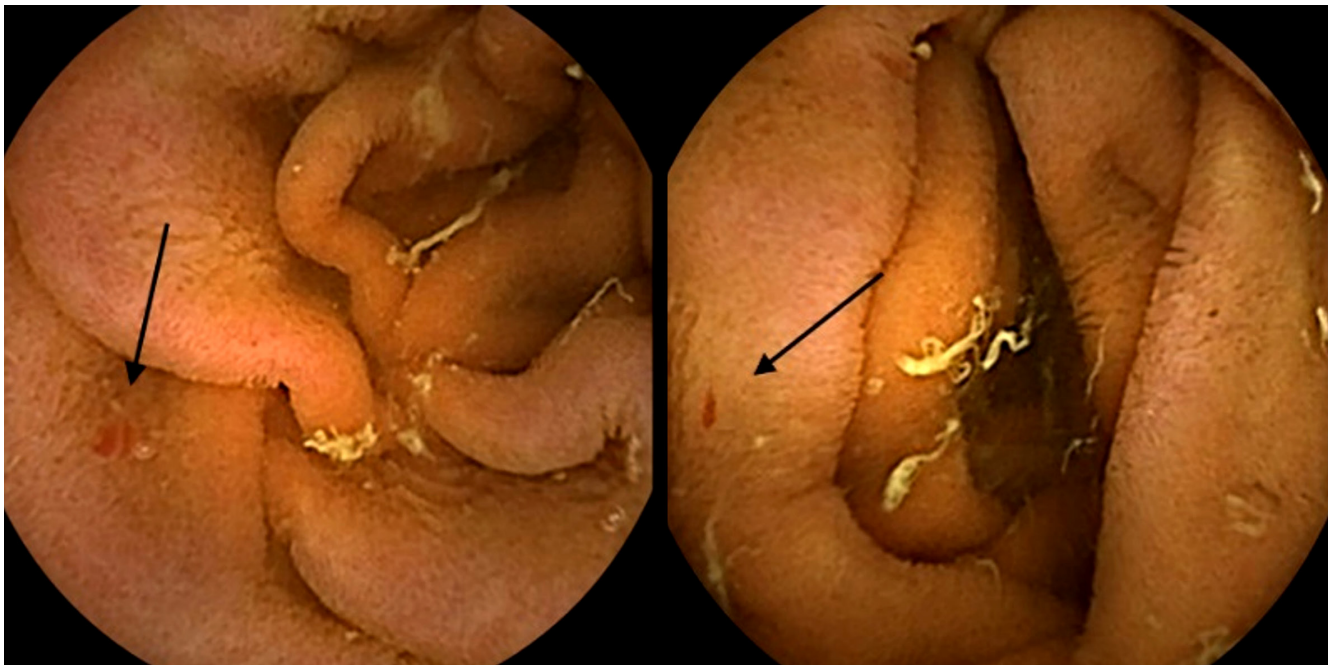


Figure 1. Vascular lesions: red spots in the distal jejunum (Yano–Yamamoto type 1a). Images property of the authors.

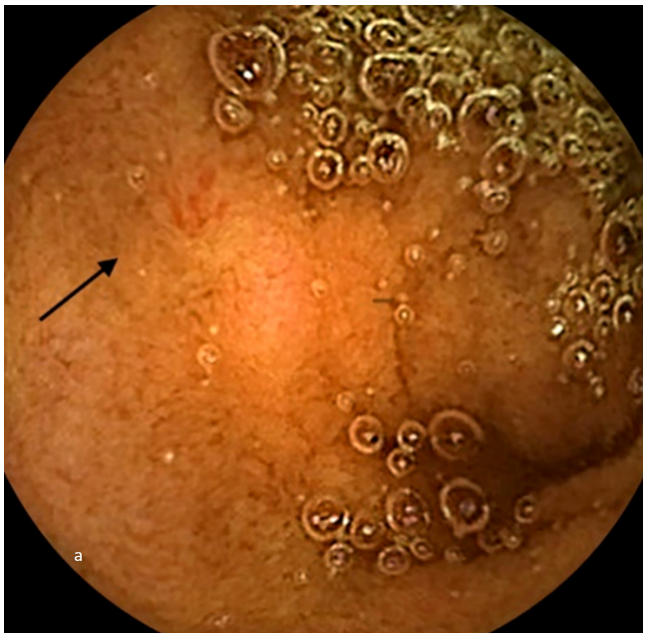


Figure 2. Vascular lesion: angiodysplasia-like lesion in the proximal ileum (Yano–Yamamoto type 1b). Image property of the authors.

in 6.2%–16.1%, and active bleeding in 5.5%–17.8% of patients with PHE[7]. Other rare findings include pedunculated or sessile protrusions, either solitary or multiple, that may mimic polyps[2,6]. Vascular lesions, including angiectasias, red spots, and varices, are usually responsible for overt gastrointestinal bleeding[2]. In contrast, nonvascular or inflammatory lesions are more nonspecific and appear to carry a lower risk of bleeding. Both types of endoscopic findings may also be observed in other conditions, including inflammatory bowel disease, celiac disease, arteriovenous malformations, radiation enteritis, hereditary hemorrhagic telangiectasia, and familial adenomatous polyposis.

Although histopathology may assist in the evaluation of nonvascular lesions, imaging techniques such as computed tomography[3] and transient elastography may help determine the likelihood of portal hypertension and its severity[8]. Diagnosis should always be established with a high index of suspicion in conjunction with clinical and endoscopic findings. In the present case, mucosal hyperemia, multiple red spots, and angiodysplasia-like lesions were identified in a patient with portal hypertension and additional risk factors. These findings supported the diagnosis of PHE.

Currently, no clinical guidelines are available for the management of symptomatic PHE. The usefulness of balloon-assisted enteroscopy has been described, including therapeutic interventions such as argon plasma coagulation, hemoclip placement, and sclerotherapy. Interventional radiology procedures, including transjugular intrahepatic portosystemic shunt (TIPS) placement or percutaneous embolization, as well as surgical management, have also been reported. Small studies have suggested potential benefits of nonselective β-blockers, somatostatin, and thalidomide in this condition[6,9]. In the most recent Baveno VII consensus, regarding the use of β-blockers in patients with

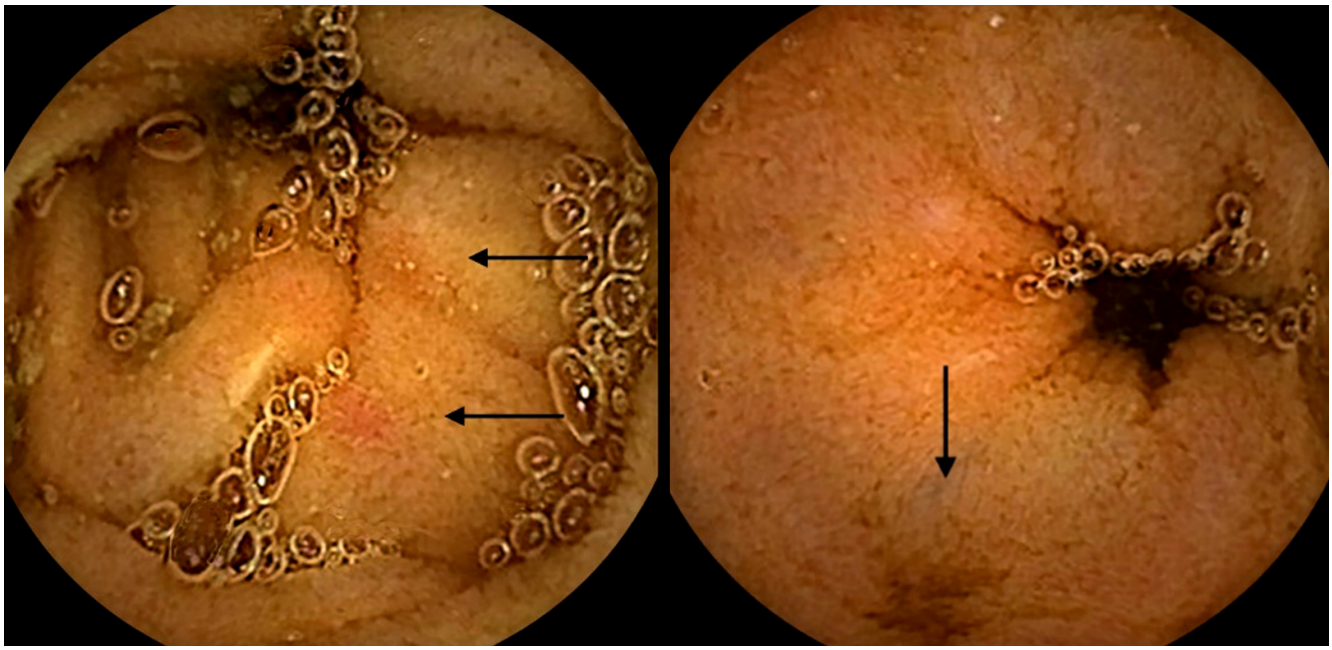


Figure 3. Nonvascular lesions: areas of mucosal hyperemia between the distal jejunum and proximal ileum. Images property of the authors.

portal hypertension–related bleeding due to portal vein thrombosis with cavernous transformation, insufficient evidence was identified to support their use for primary or secondary prophylaxis. Therefore, recommendations for patients with cirrhosis should be followed[10]. The patient described in this report was initially treated with octreotide, followed by nonselective β-blockers. No evidence of gastrointestinal bleeding was observed during one year of follow-up. This case is noteworthy because most published reports involve cirrhotic patients[1,3,7], whereas the present case involves non-cirrhotic portal hypertension secondary to portal vein thrombosis in a patient with risk factors for developing PHE.

CONCLUSION

Portal hypertensive enteropathy is an uncommon and likely underdiagnosed condition. It should be suspected in patients with portal hypertension, whether cirrhotic or non-cirrhotic, who present with gastrointestinal bleeding or anemia, in order to avoid delays in the use of video capsule endoscopy. Management is not standardized; however, octreotide and nonselective β-blockers may represent a therapeutic option.

Ethical considerations

The authors declare that no experiments involving human subjects were conducted for this study. Patient data collection forms from our institution were used. Patient anonymity was preserved, and informed consent was obtained prior to inclusion.

Conflicts of interest

The authors declare no conflicts of interest.

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Case report

Hepatoid Gastric Adenocarcinoma with Adenosquamous Overlap, a Diagnostic Challenge in a Poor-Prognosis Tumor: Case Report

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Abstract

Introduction: Gastric cancer (GC) remains one of the most lethal malignancies worldwide and represents a major global public health concern. The most common histological subtypes are classically classified as intestinal and diffuse. According to the World Health Organization (WHO) classification, gastric adenocarcinomas are further categorized as papillary, mucinous, poorly cohesive, mixed, and tubular types. Hepatoid gastric adenocarcinoma is considered an exceptionally rare tumor, with an incidence ranging from 0.3% to 1.0% of all gastric cancers. **Clinical Case:** A 68-year-old male patient was diagnosed with hepatoid adenocarcinoma with adenosquamous overlap. He presented with epigastric pain and three episodes of coffee-ground emesis. Upper gastrointestinal endoscopy was performed, and biopsy samples were obtained. Based on histopathological and immunohistochemical analysis, the tumor was classified as a hepatoid subtype with adenosquamous overlap. **Discussion and Conclusion:** This case represents a true clinical and histopathological diagnostic challenge, as definitive characterization was achieved only through immunohistochemistry. Fundamental aspects of these histopathological subtypes are described, highlighting their low incidence and potential tumor histogenesis, with particular emphasis on their aggressive biological behavior and poor prognosis.

Keywords

Gastric cancer, epidemiology, prognosis, health classifications.

INTRODUCTION

Gastric cancer (GC) is among the most lethal malignancies worldwide and represents a major global public health concern. According to recent data from the Global Cancer Observatory (GLOBOCAN), GC remained the fifth leading cause of cancer-related mortality in 2022[(1)]. Projections for 2040 estimate more than 1,300,000 deaths and 1,800,000 new cases[(2)]. Chronic infection with *Helicobacter pylor*i is responsible for at least 80% of gastric cancers worldwide[(3)], including approximately 90% of non-cardia (distal) tumors and 50% of cardia (proximal) tumors[(4,5)]. GC can be classified as cardia or non-cardia, each exhibiting distinct epidemiological and clinical characteristics. Cardia GC is associated with genetic factors, the diffuse histotype, and reduced survival, reflecting more

aggressive biological behavior and diagnosis at advanced stages. In contrast, non-cardia GC predominantly exhibits the intestinal histotype. It typically arises in the antropyloric region, is strongly associated with environmental factors, demonstrates improved prognosis when detected early, and shows higher prevalence of chronic *H. pylori* infection[6–9]. According to the Lauren and Jarvi classification, GC is categorized as intestinal or diffuse based on clinical and epidemiological features.

The intestinal type is more frequent in men and older populations, predominantly involves the antropyloric region, and is strongly associated with environmental risk factors, including suboptimal public health conditions, water sanitation deficiencies, chronic *H. pylor*i infection, and premalignant conditions described in Correa's cascade[10,11]. The diffuse histotype is more common in women and in younger individuals and is associated with mutations in the *CDH1* gene, which encodes E-cadherin. These molecular alterations contribute to carcinogenesis in this tumor subtype. Diffuse-type GC shows limited association with environmental factors and *H. pylori* infection[10,11]. According to the most recent World Health Organization (WHO) classification, the most common histological subtypes include tubular, papillary, poorly cohesive, mucinous, and mixed adenocarcinoma. Within this classification framework, hepatoid gastric adenocarcinoma (HGA) is described as a rare subtype included in the category of hepatoid adenocarcinoma and related entities[12–14]. HGA is an uncommon entity, accounting for approximately 0.3%–1.0% of all gastric cancers, and exhibits morphological features highly similar to hepatocellular carcinoma (HCC). This subtype is characterized by high short-term mortality, as it is frequently diagnosed at advanced stages[15].

This report presents the clinical case of a 68-year-old male patient diagnosed with hepatoid adenocarcinoma with adenosquamous overlap. The diagnosis represented a significant challenge and was ultimately clarified through immunohistochemistry. In addition to describing the fundamental features of this histopathological subtype, the present report highlights its low incidence and possible tumor histogenesis.

CASE DESCRIPTION

A 68-year-old male patient presented to the emergency department with progressive dysphagia initially affecting solid foods and later liquids, with long-standing progression. The patient also reported anorexia and severe weight loss of 20 kg over a three-month period. At the time of consultation, he presented with intermittent burning epigastric pain without radiation and three episodes of coffee-ground emesis occurring eight hours prior to admission. No relevant personal or family medical history was reported. Physical examination revealed a hemodynamically stable patient with marked wasting of adipose and muscle tissue, mucocutaneous flaccidity, anorexia, and kwashiorkor-type malnutrition. No additional abnormalities were identified on physical examination. Upper gastrointestinal endoscopy revealed a protruding and ulcerated lesion (Bormann type IV), from which biopsy samples were obtained.

Histopathological evaluation described a strongly eosinophilic tumor arranged in a rosette-like pattern, mimicking hepatoid, squamous, and neuroendocrine differentiation (**Figure 1**). Immunohistochemical analysis demonstrated strong positivity for HepPar-1 and moderate positivity for alpha-fetoprotein (AFP), CK7, and Ki-67, with negative expression for SALL-4 (sal-like protein 4), findings that confirmed hepatoid differentiation (**Figure 2**). Computed tomography (CT) scans of the abdomen and chest were performed as part of staging studies, revealing hepatic and retroperitoneal metastases as well as peritoneal carcinomatosis. Given the patient's clinical condition, the multidisciplinary tumor board referred the patient for comprehensive management by Clinical Oncology, Nutrition, Psychology, and Palliative Care. After six months of multidisciplinary management, the patient died due to cardiorespiratory arrest.

DISCUSSION

This case is noteworthy because this rare histological subtype may be confused with other uncommon tumor types within the WHO classification and may also overlap with metastatic hepatocellular carcinoma (HCC) due to its similar histopathological architecture. As in the present case, overlap with adenosquamous carcinoma may occur, representing a significant diagnostic challenge. Immunohistochemistry plays a crucial role in clarifying cellular lineage and establishing an accurate diagnosis, as conventional histopathological evaluation using hematoxylin and eosin staining may be insufficient to definitively determine tumor origin and biological nature. Diagnostic uncertainty may negatively affect diagnostic timing and prognosis due to the aggressive biological behavior of this tumor subtype.

The incidence of HGA ranges between 0.3% and 1.0% of all gastric tumors. Hepatic metastases and increased peritoneal dissemination occur in 46.3%–75.6% of patients with HGA[15-17]. A recent systematic review by Ling et al.[18] reported low three-year overall survival (hazard ratio [HR]: 3.21; 95% confidence interval [CI]: 1.54–6.67; p = 0.002). The most common clinical manifestations include abdominal pain, epigastric discomfort, hematemesis, and melena[19]. HGA demonstrates low incidence but high diagnostic complexity and aggressive biological behavior,

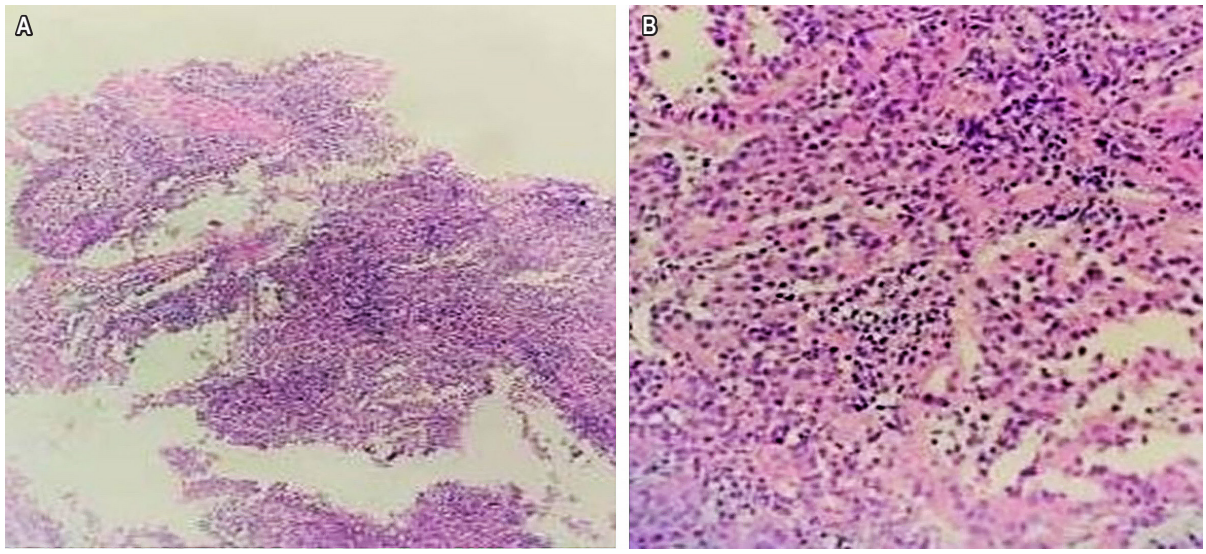


Figure 1. Histopathological description of the tumor. **A and B.** The images show a strongly eosinophilic tumor arranged in a rosette-like pattern with cells resembling hepatocytes. Images obtained from the archives of the Department of Pathology, Fundación Hospital San Pedro.

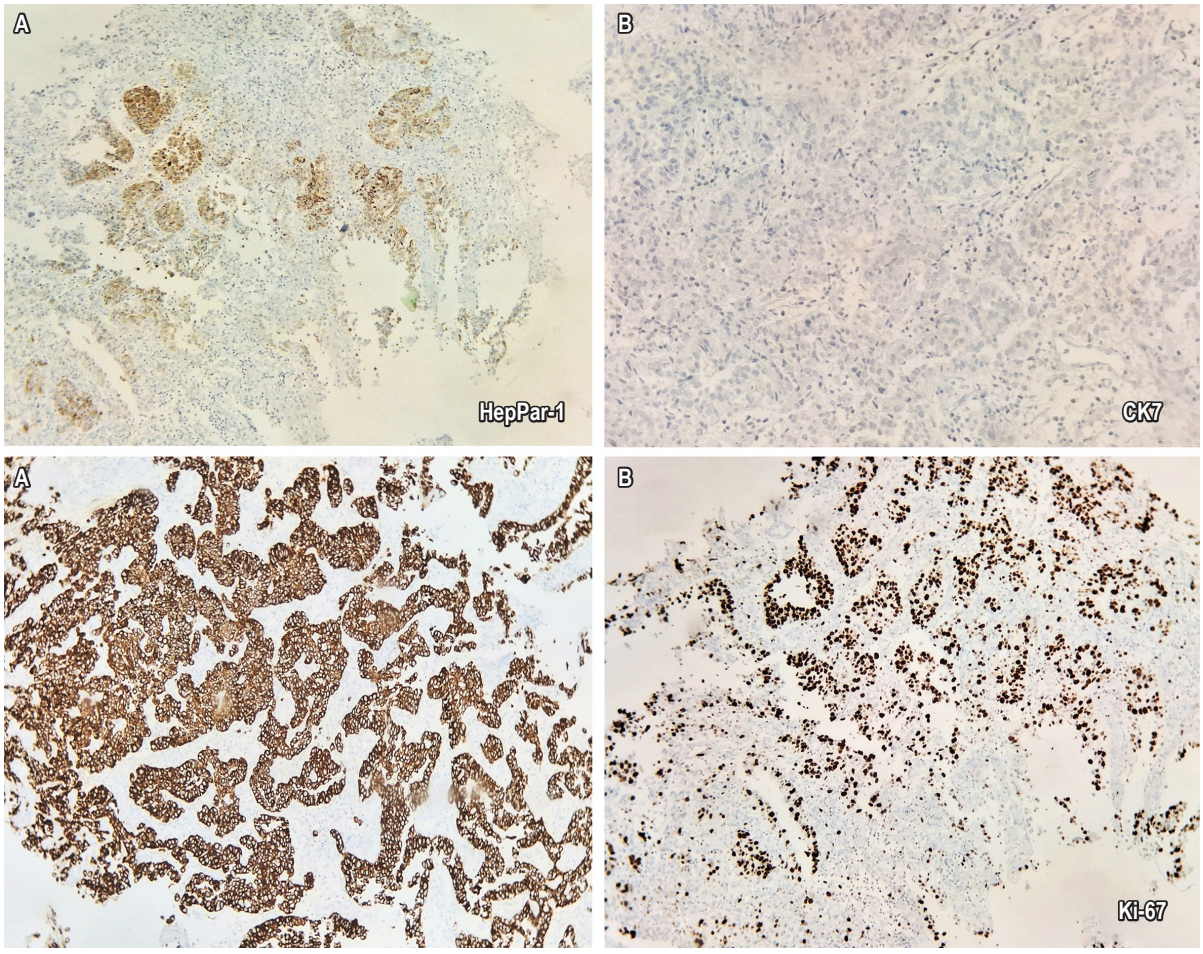


Figure 2. Tumor immunohistochemistry. **A, B, C, and D.** The slides show strong immunoreactivity for HepPar-1 and alpha-fetoprotein (AFP), confirming hepatoid differentiation. Immunohistochemical staining for cytokeratins (CK7) and Ki-67 was also performed. Images obtained from the archives of the Department of Pathology, Fundación Hospital San Pedro.

with marked propensity for vascular invasion and early metastasis, particularly to the liver (97.3%) and peritoneum (35.3%)[20]. Less frequent metastatic sites include the lungs, spleen, and brain[18].

Given the inherent limitations of conventional hematoxylin and eosin histopathology, accurate diagnostic confirmation requires immunohistochemistry. Immunohistochemical characterization is the cornerstone of correct tumor identification, as macroscopically HGA resembles a Bormann type III–IV tumor with poor differentiation. Histopathological evaluation demonstrates morphology similar to hepatocellular carcinoma, characterized by large eosinophilic cells arranged in trabecular architecture or solid nested patterns separated by sinusoidal vascular channels[21,22]. Immunohistochemical markers with the highest specificity include HepPar-1 for determining tumor lineage and cellular differentiation. Increased mismatch repair (mMR) protein proficiency has been reported. Positive expression of alpha-fetoprotein (AFP) and transcription factor SALL-4 (Spalt-like transcription factor 4) has also been described. Overexpression of HER2 and negative expression of EBER (Epstein–Barr virus-encoded small RNA) have been observed. The molecular profile of HGA is characterized by negative EBER expression and mMR status, whereas AFP and SALL-4 expression support definitive diagnosis[23]. In the present case, immunohistochemistry showed positive expression for HepPar-1 and AFP.

Genetic mutations reported in this tumor subtype include *DK12, MYC, OCT4-pg1, HUWE1*, and *MYCBP2*[20]. Functional MYC overactivation induces hepatoid differentiation through the influence of pluripotent stem cells, a mechanism that contributes to tumor clonality and poor prognosis[18].

The therapeutic approach to HGA is based primarily on surgical management and comprehensive perioperative treatment; however, prognosis remains poor despite adherence to current therapies. These findings underscore the importance of early and accurate diagnosis to guide appropriate treatment strategies[20,24-26]. Further research is required to characterize the molecular pathology of HGA, identify novel biomarkers for targeted therapy, and improve treatment strategies. Potential therapeutic targets such as *ERBB2, FGFR2, MET*, and *HGF* appear promising[27].

CONCLUSIONS

HGA is a rare and aggressive clinical entity that represents both a diagnostic and therapeutic challenge. Immunohistochemistry is essential for confirming the diagnosis using markers such as AFP (64%), HepPar-1, GPC3, and SALL4. HGA is typically diagnosed at advanced stages and demonstrates aggressive biological behavior, with high incidence of hepatic and peritoneal metastases.

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Conflicts of interest

None.

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Case report

Type Ib Choledochal Cyst Treated with Resection, Hepaticojejunostomy, and Subcutaneous Jejunal Loop

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Abstract

Introduction: Choledochal cysts are congenital or acquired dilatations of the biliary tree, rare in adults, with a reported malignant transformation risk ranging from 3% to 11%. Standard treatment for type I cysts consists of complete cyst excision with biliodigestive reconstruction, most commonly via Roux-en-Y hepaticojejunostomy. **Case Presentation:** A 36-year-old patient (G2P1C1), without comorbidities, presented with a six-month history of right upper quadrant pain. Endoscopic ultrasound revealed a type Ib choledochal cyst associated with cholelithiasis. Management was performed in two stages: first, laparoscopic cholecystectomy; forty-five days later, open cyst resection. Kocher and Cattell–Braasch maneuvers were employed to achieve adequate surgical exposure. Reconstruction was performed using a Roux-en-Y hepaticojejunostomy, incorporating a modified Praderi-type subcutaneous jejunal loop to facilitate future endoscopic access. **Discussion:** Clinical manifestations of choledochal cysts in adults are typically nonspecific, often leading to delayed diagnosis. Nevertheless, the risk of malignant transformation justifies complete surgical excision. The adopted surgical technique, including cyst resection and Roux-en-Y reconstruction, represents the preferred approach for type I cysts. The Kocher and Cattell–Braasch maneuvers were essential for distal cyst exposure. The subcutaneous jejunal loop provides durable and minimally invasive access for potential complications such as anastomotic stenosis[4]. **Conclusion:** This case demonstrates the successful management of a type Ib choledochal cyst through complete resection and Roux-en-Y reconstruction with a subcutaneous jejunal loop, a technique that reduces procedural risks and improves long-term follow-up.

Keywords

Choledochal cyst, Roux-en-Y anastomosis, Jejunum, laparoscopic cholecystectomy.

INTRODUCTION

Choledochal cysts constitute a rare congenital or acquired anomaly of the hepatobiliary system, characterized by cystic or diverticular dilatation of the biliary tract[1]. Their etiology is primarily associated with an anomalous pancreaticobiliary junction, which facilitates reflux of pancreatic juice into the biliary tree[1]. Although traditionally considered a pediatric condition, choledochal cysts may also present in adulthood, often with less specific symptoms than those observed in children[1].

The Todani classification divides choledochal cysts into five main types, with type I being the most common[2]. Within this group, subtype Ib is defined by focal or segmental dilatation of the common hepatic duct or the distal common bile duct[3]. The complete classification and its subtypes are summarized in **Figure 1**.

The most frequent choledochal cyst subtypes are type I (64%) and type IV (22%), although some series have reported substantial variability, with prevalence rates as high as 88% for type I in one study and 48% for type V in another[5]. Regarding age distribution, type I cysts occur

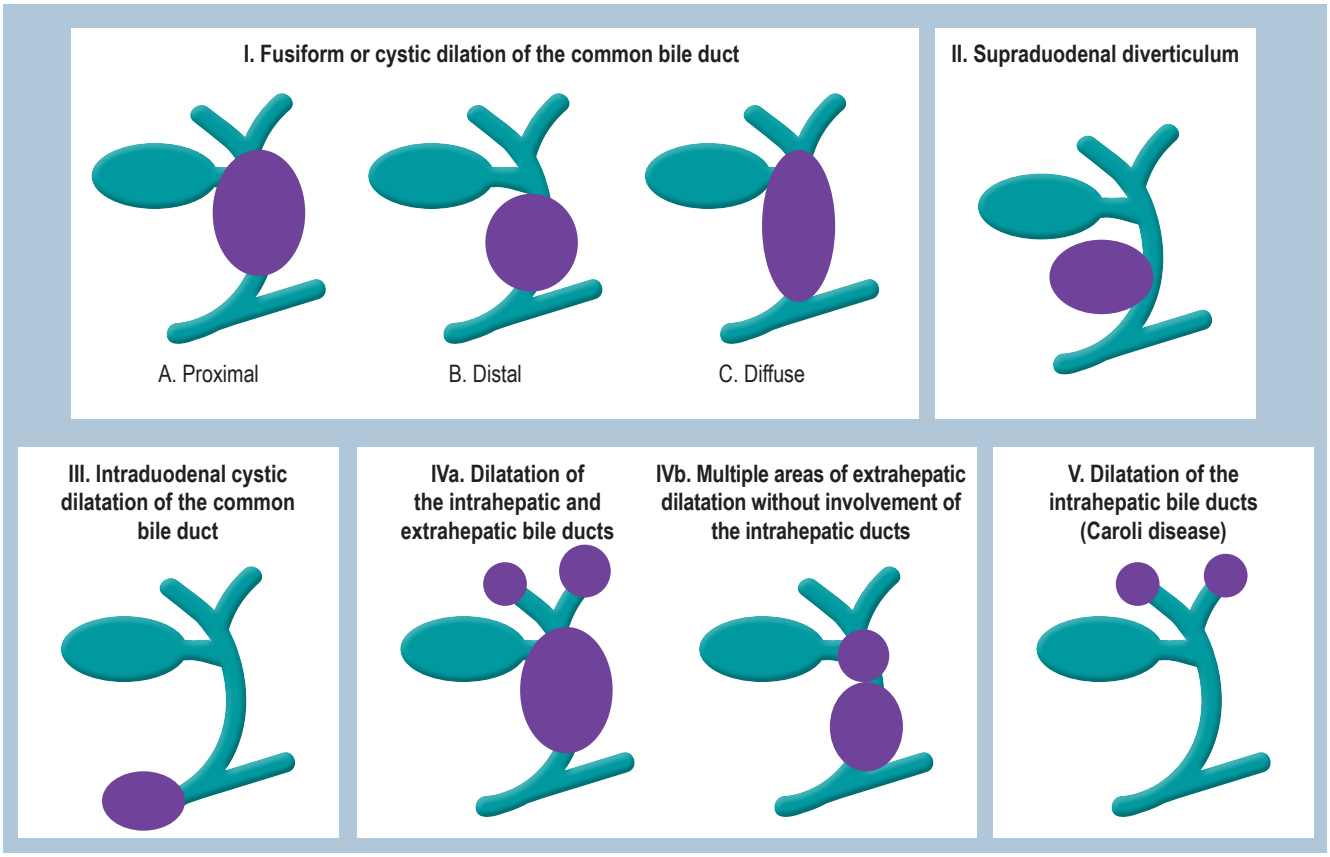


Figure 1. Todani classification of choledochal cysts. Adapted from: Brown ZJ, et al. *HPB*. 2023;25(1):14-25[4].

more commonly in children, whereas type IV cysts are more prevalent in adults. Together, types I and IV account for approximately 90% of all cases in both adult and pediatric populations[4].

Among the available noninvasive imaging modalities, magnetic resonance cholangiopancreatography (MRCP) is the reference standard because it allows precise characterization of biliary anatomy and accurate preoperative classification of cysts[6], with reported sensitivities ranging from 81% to 100% and specificities up to 100%[7]. Abdominal ultrasonography remains the initial screening modality, with variable sensitivity ranging from 33% to 90%[8], whereas computed tomography is primarily used to evaluate complications and intrahepatic extension, providing intermediate diagnostic accuracy[8]. Other modalities, such as endoscopic ultrasonography, are useful for detecting small tumors and differentiating choledochoceles from other lesions[9]. Direct cholangiography through endoscopic retrograde cholangiopancreatography (ERCP) or percutaneous transhepatic cholangiography (PTC), previously considered the reference standard, is now reserved for selected cases due to its invasive nature and higher risk of complications[4].

The clinical relevance of choledochal cysts lies in their potential for malignant transformation, particularly in Todani types I, IV, and V. In Western adult populations, the most recent systematic review reports an overall malignancy rate of 10.9%, with cholangiocarcinoma being the predominant histologic type[10]. The mean age at diagnosis of malignancy ranges from 36.8 to 57.2 years, and adults exhibit higher rates of complications and cancer compared with pediatric populations[11].

Regarding subtype-specific risk, the estimated malignancy risk ranges from 6% to 14% for type I, 6% to 30% for type IV, and 7% to 15% for type V, whereas types II and III show considerably lower incidences (<5% and <1%, respectively)[7]. These findings support the indication for complete cyst resection, which reduces—although does not eliminate—the risk of neoplastic transformation, in contrast to internal drainage procedures, which have been associated with malignant recurrence in up to 11% of cases[7]. In this context, complete cyst excision serves not

only a symptomatic purpose but also represents a fundamental strategy to interrupt progression toward malignant disease[10].

Reconstruction of biliary continuity after resection is typically performed using Roux-en-Y hepaticojejunostomy, which is considered the technique of choice due to its technical reliability and favorable clinical outcomes. By separating the bilioenteric anastomosis from the duodenal pathway, this approach reduces reflux risk and ensures stable long-term drainage. Although hepaticoduodenostomy may shorten operative time, Roux-en-Y hepaticojejunostomy is associated with lower rates of reflux and fewer reinterventions, achieving patency rates exceeding 85%–90% in experienced hands[5,7]. The laparoscopic approach has gained acceptance because of its perioperative advantages. However, open surgery remains indispensable in complex scenarios in which maneuvers such as Kocher and Cattell-Braasch facilitate optimal anatomical exposure[2,3].

The objective of this report is to describe the surgical management of a type Ib choledochal cyst in an adult patient, with particular emphasis on the reconstruction technique using a subcutaneous jejunal loop[5]. This strategy provides simple, safe, and permanent access to the anastomosis, thereby facilitating future diagnostic or therapeutic interventions (such as dilation of anastomotic strictures) and offering particular advantages in younger patients by reducing the need for major reinterventions.

CASE PRESENTATION

A 36-year-old female patient with a history of two full-term pregnancies and no known comorbidities presented with recurrent right upper quadrant pain of approximately six months' duration. Endoscopic ultrasonography identified fusiform cystic dilatation of the distal common bile duct, consistent with a type Ib choledochal cyst according to the Todani classification[4], as well as gallstones within the gallbladder, establishing a diagnosis of concomitant cholelithiasis. Imaging evaluation confirmed the anatomy and intrapancreatic extension of the cyst.

Given the diagnosis of symptomatic cholelithiasis and type Ib choledochal cyst, a two-stage surgical approach was planned. Initially, laparoscopic cholecystectomy was performed without complications, followed by an uneventful postoperative recovery. Because biliary surgery in a recently inflamed setting increases the risk of technical and anastomotic complications[7], cyst resection was deferred to an interval ("cold") phase, as reduced tissue inflammation facilitates safer dissection and decreases postoperative morbidity[4]. Accordingly, 45 days after cholecystectomy, complete cyst excision and biliary reconstruction were performed via laparotomy with Roux-en-Y hepaticojejunostomy. The operative field was exposed, and the dilated choledochal cyst was identified (**Figure 2**).

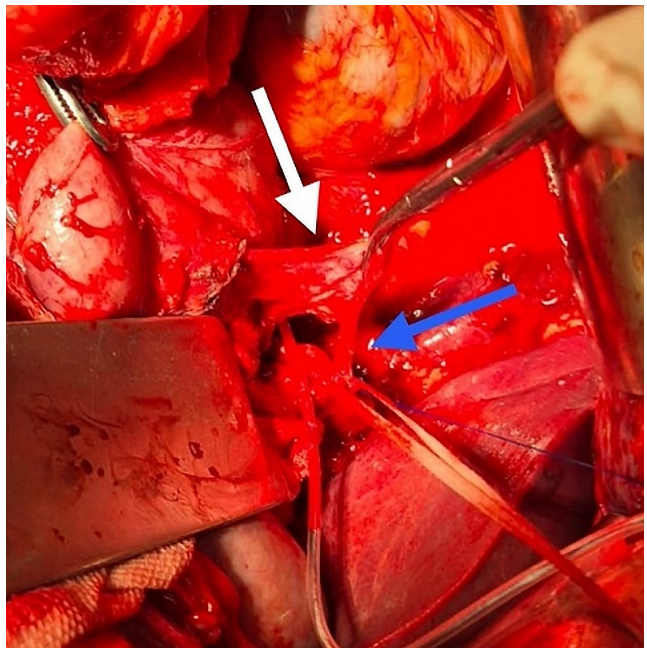


Figure 2. Intraoperative view of the choledochal cyst in situ (Todani IB). The white arrow indicates the dilated cyst, and the blue arrow indicates the common bile duct. Image property of the authors.

To achieve adequate exposure and mobilization of the duodenum and pancreatic head, thereby facilitating complete resection of the distal portion of the cyst, the Kocher and Cattell-Braasch maneuvers were performed. The Kocher maneuver involves incising the peritoneum lateral to the duodenum at the level of its second portion and carefully dissecting the posterior avascular plane. This allows medial mobilization of the duodenum and pancreatic head, exposing the retroperitoneum, inferior vena cava, and right renal pedicle, thereby safely expanding the surgical view of the distal biliary tract[2]. The Cattell-Braasch maneuver, or right medial visceral rotation, complements the Kocher maneuver by mobilizing the hepatic flexure of the colon and the small intestine toward the midline. This provides wide exposure of the third and fourth portions of the duodenum, as well as retroperitoneal structures such as the right iliac vessels and ureter, thereby optimizing surgical access to the biliary tract and reducing the risk of inadvertent injury[3]. Intraoperative cholangiography was performed to visualize the proximal biliary tree anatomy and confirm the extent of the cyst (**Figure 3**).

Complete cyst excision was performed, including its intrapancreatic portion, as shown in the surgical specimen in **Figures 4** and **5**.

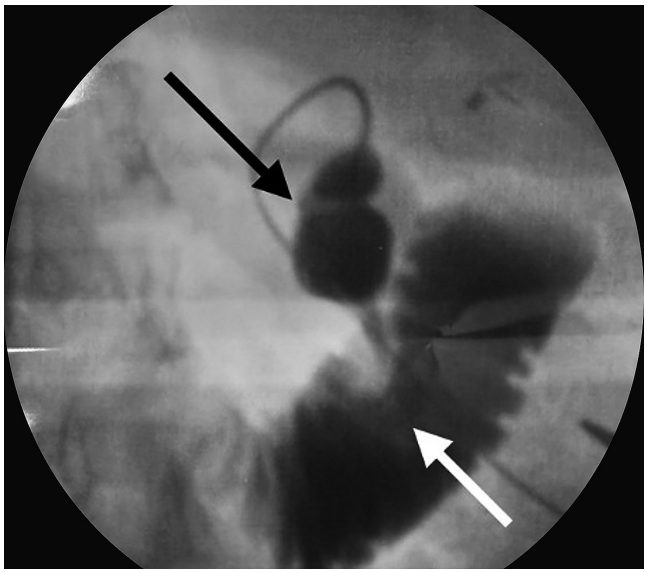


Figure 3. Intraoperative cholangiography. The black arrow indicates the choledochal cyst (fusiform dilatation), and the white arrow indicates the second portion of the duodenum. Image property of the authors.



Figure 4. Gross resection specimen of the choledochal cyst. Fusiform dilatation of the extrahepatic biliary tract measuring 3.5 × 2.0 cm is observed. Image property of the authors.

Reconstruction of biliary-enteric continuity was performed using Roux-en-Y hepaticojejunostomy (**Figure 6**). A defunctionalized jejunal limb was created. A termino-lateral anastomosis was constructed between the distal end of the jejunal limb and the proximal biliary tract (common hepatic duct and left hepatic duct), ensuring the absence of tension along the suture line. An enteroenterostomy (jejunojejunostomy, Y-limb) was created approximately 50–60 cm distal to the hepaticojejunostomy. As a technical particularity, a subcutaneous jejunal loop was fashioned by fixing the blind end of the Roux jejunal limb to the abdominal wall within the subcutaneous tissue.



Figure 5. Gross resection specimen of the choledochal cyst opened longitudinally. The cystic cavity and the characteristics of its thickened internal surface, with papillary folds, are visualized. Image property of the authors.



Figure 6. Preparation of the subcutaneous jejunal access loop: intraoperative view of the open abdominal cavity showing the jejunal limb that will be prepared as a permanent subcutaneous access route. The asterisk (*) indicates the defunctionalized jejunal limb, and the white arrow indicates the skin flap where the subcutaneous pocket will be created to accommodate the end of the loop. Image property of the authors.

The postoperative course was uneventful, with adequate oral tolerance and restoration of bowel function. The patient was discharged in good clinical condition. The pathology report confirmed the diagnosis of a type Ib choledochal cyst with areas of fibrosis associated with chronic inflammatory changes, as well as glandular hyperplasia of the lining with associated cholesterosis, without evidence of malignancy.

DISCUSSION

Choledochal cysts are an uncommon entity in the adult population[1]. Clinical presentation is often nonspecific, which may delay early diagnosis. However, the risk of malignant transformation to cholangiocarcinoma represents one of the principal concerns, particularly in type I and type V cysts[7], thereby supporting the indication for complete cyst excision once the diagnosis has been established[7].

The standard treatment for type I choledochal cysts consists of complete cyst excision followed by biliary-enteric reconstruction using Roux-en-Y hepaticojejunostomy[4,7]. This technique is the most widely used worldwide due to its safety and durability in the management of benign biliary tract obstruction[4], although it is not free of complications. The most clinically relevant long-term complication is anastomotic stricture, with an incidence of approximately 6.9% in follow-up periods ranging from 2 to 13 years and a cumulative prevalence that may reach up to 25% in some series[11].

Resection should be as complete as possible, particularly in the distal intrapancreatic portion, in order to reduce the risk of persistent or recurrent malignant transformation[10]. In the present case, an open surgical approach was selected. Although the laparoscopic approach has gained increasing acceptance in recent years[12], the technical complexity associated with resection of the intrapancreatic segment and the need to construct a subcutaneous jejunal loop justified the use of a conventional open approach. The Kocher and Cattell-Braasch maneuvers were essential to achieve safe exposure of the duodenum and right retroperitoneum, thereby enabling complete resection of the distal portion of the cyst[2,3].

A technically relevant aspect of this case is the creation of a subcutaneous jejunal loop (or modified Praderi loop) [13], which consists of fixing the end of the Roux limb to the abdominal wall within the subcutaneous tissue[13]. Its principal advantage is the provision of simple and permanent access to the hepaticojejunostomy, thereby facilitating subsequent endoscopic evaluation or intervention, such as dilation of anastomotic strictures[5].

The literature addressing this technique and its variants remains limited and is based primarily on small series or isolated reports, without prospective studies or large cohort analyses. This limitation makes it difficult to establish its precise clinical impact and long-term applicability. Nevertheless, the available data support its potential usefulness. One prospective study reported successful endoscopic access to the anastomosis in 26 of 28 attempts (93%), although without subcutaneous positioning of the loop[14]. Another series evaluating intrahepatic lithiasis reported successful outcomes in all 55 procedures performed[11]. Clinically, resolution of anastomotic strictures was documented in three patients through endoscopic dilation and clearance, with normalization of liver function tests and no need for revision surgery[14]. Similarly, in another cohort, complete stone extraction was achieved in 21 of 28 patients (75%) using the access loop[11]. These findings suggest that this strategy enables repeated, minimally invasive interventions with low morbidity and without the need for general anesthesia, thereby representing a valuable option for patients at increased risk of anastomotic stricture or recurrent lithiasis.

Although no consensus exists regarding the routine use of stents or access loops in all hepaticojejunostomies, their use is considered appropriate in selected cases, particularly in younger patients with a higher probability of requiring long-term access to the anastomosis.

Postoperative complications of Roux-en-Y hepaticojejunostomy include biliary fistula, bilioma, cholangitis, and, in the long term, anastomotic stricture[11]. In this context, the subcutaneous jejunal loop provides a less invasive alternative than relaparotomy for the management of certain complications[5].

The decision to perform surgery in two stages, with initial cholecystectomy followed by delayed cyst excision, was intended to resolve gallstone disease first and allow resolution of acute inflammation prior to definitive resection. Although simultaneous resection of the cyst and gallbladder represents a valid strategy, the selected approach aimed to optimize surgical safety and reduce morbidity.

Ultimately, management of choledochal cysts in adults requires a high index of diagnostic suspicion and timely surgical treatment because of the risk of malignancy[10]. Complete excision with Roux-en-Y reconstruction remains the standard of care. Incorporation of a subcutaneous jejunal loop, as described in this case, represents a useful technical modification for long-term follow-up and minimally invasive management of anastomotic complications[5].

This case underscores the importance of combining a comprehensive surgical approach with reconstructive techniques adapted to the complexity of this uncommon but clinically significant condition.

CONCLUSION

Management of type Ib choledochal cysts in adults requires complete excision combined with safe biliary-enteric reconstruction. In the present case, the combination of

Roux-en-Y hepaticojejunostomy with incorporation of a subcutaneous jejunal loop proved to be an effective strategy that not only mitigates oncologic risk but also provides permanent access for potential future interventions. This experience highlights the value of adapting innovative reconstructive techniques to complex clinical scenarios, offering durable and less invasive solutions for late complications, and reinforces the importance of a comprehensive surgical approach in this uncommon yet clinically relevant entity.

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Case report

Beyond the Lauren Classification: An Uncommon Case of Mixed Gastric Adenocarcinoma

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Abstract

Gastric cancer (GC) is a heterogeneous neoplasm with high mortality, particularly in countries such as Colombia. Among its variants, mixed gastric adenocarcinoma—combining intestinal and diffuse components—represents an infrequent but clinically aggressive form (6%–22%). An atypical case is presented involving an apparently benign gastric polyp, whose histopathological examination revealed a poorly differentiated (grade 3) mixed adenocarcinoma, classified as Borrmann type I. Cases of this nature underscore the importance of meticulous endoscopic and histological evaluation, even in lesions with an innocuous appearance, and highlight the need for rigorous surveillance in neoplasms with aggressive biological behavior.

Keywords

Gastric neoplasms, adenocarcinoma, stomach neoplasms.

INTRODUCTION

The gastrointestinal (GI) tract comprises the esophagus, stomach, small intestine, colon, and rectum. Benign and malignant tumors may develop along this anatomical continuum. In the United States, an estimated 26,500 new cases of gastric cancer (GC) were diagnosed in 2023, with 11,130 deaths attributable to the disease[(1)]. The five-year survival rate is 32%, reflecting that fewer than 25% of cases are detected at early stages[(2)]. In Colombia, according to Globocan 2022 data, approximately 8,938 new cases of GC are reported annually. This positions GC as the fourth most frequent malignancy (7.6%) and the leading cause of cancer-related mortality, with 6,901 deaths per year (12.2%)[(3)].

Several risk factors have been identified as contributors to GC development. These include *Helicobacter pylori* infection, tobacco use, high dietary salt intake, a family history of gastric cancer, and geographic or ethnic factors[(4)]. Of particular concern is the increasing incidence of early-onset GC, defined as occurring in individuals younger than 50 years, especially among those born between 1980 and 1994. In this population, the incidence rate is twice that observed in individuals born in the 1950s[(5)]. Early-onset GC is associated with more aggressive biological features, including poorly differentiated tumors, diffuse histological subtype, and the presence of signet ring cells. Distinct genomic alterations have also been identified, contributing to an unfavorable prognosis[(6-8)].

Clinically, GC may present with nonspecific symptoms such as dyspepsia, loss of appetite, unintentional weight loss, and abdominal pain[6]. Upper gastrointestinal endoscopy is the most effective diagnostic tool for both screening and surveillance in patients at high risk of GC. It allows direct visualization of the gastric mucosa, identification of suspicious lesions, and biopsy sampling for histopathological analysis. Endoscopic and histological evaluation are essential for accurate staging, risk stratification, and decision-making regarding the need for and frequency of follow-up[2].

Gastric cancer is a clinically and biologically heterogeneous entity. Traditionally, it has been classified according to the Lauren classification into two main subtypes: intestinal and diffuse. The intestinal subtype is characterized by well-formed glandular structures. In contrast, the diffuse subtype is defined by poorly cohesive and infiltrative tumor cells, often exhibiting signet ring cell morphology. Mixed forms combining both patterns also exist. These are associated with a poorer prognosis because of their aggressive biological behavior and dual dissemination pattern. Although additional histological classifications have been proposed, their practical utility for guiding treatment remains limited (**Table 1**)[9].

Mixed adenocarcinoma is an uncommon but clinically relevant subtype. Reported relative frequency ranges from 6% to 22%. These tumors exhibit greater aggressiveness than those composed of a single histological component[10].

The present report describes a clinical case that challenges traditional paradigms of tumor classification and biological behavior. The lesion consists of a gastric polyp that could easily be overlooked during routine endoscopic evaluation. However, histopathological analysis revealed a poorly differentiated mixed gastric adenocarcinoma, histological grade 3, classified as Borrmann type 1 (polypoid), with invasion of the lamina propria but a tumor-free base. This finding is paradoxical given the high biological aggressiveness of the tumor. Due to its rarity and complexity, this case highlights the importance of maintaining a high index of clinical suspicion when evaluating apparently benign lesions. It also raises questions regarding the progression and behavior of mixed adenocarcinomas at early stages.

CASE PRESENTATION

A 55-year-old male patient with a medical history notable for exposure to biomass smoke and cigarette consumption presented with a long-standing clinical course characterized by persistent dyspepsia, abdominal distension, and unintentional weight loss. Symptoms did not improve with antispasmodics, H2 receptor blockers, or proton pump inhibitors. For this reason, the patient was referred from the outpatient clinic for upper gastrointestinal endoscopy as part of the complementary diagnostic workup.

During the endoscopic procedure, a multipolypoid lesion was identified in the antrum, with no macroscopic features suggestive of malignancy (**Figure 1**). Polypectomy was successfully performed, and the specimen was submitted for histopathological examination to establish a definitive diagnosis (**Figure 2**).

Histopathological analysis demonstrated a poorly differentiated mixed intestinal and diffuse-type adenocarcinoma, histological grade 3, Borrmann type 1 (polypoid), with invasion of the lamina propria, absence of lymphovascular invasion, and a tumor-free base of the lesion.

Based on the endoscopic and histopathological findings, the polypectomy was considered to have been performed with curative intent, as the lesion met criteria for gastric tumors smaller than 2 cm that do not penetrate beyond the submucosa and show no evidence of lymphovascular invasion.

DISCUSSION

A review of the literature indicates that risk factors for GC can be grouped into six major categories, reflecting the complexity of its etiology (**Figure 3**). First, infectious fac-

Table 1. Lauren Classification (1965)

Subtype	Histological characteristics	Dissemination	Prognosis
Intestinal	Well-differentiated glandular or papillary structures	Hematogenous	Intermediate
Diffuse	Poorly cohesive, infiltrative cells; signet ring cells may be present	Peritoneal	Unfavorable
Mixed	Combined intestinal and diffuse components	Hematogenous + peritoneal + lymphatic	Worse than the above
Indeterminate	Does not clearly fit other subtypes	Variable	Variable

Table prepared by the authors.

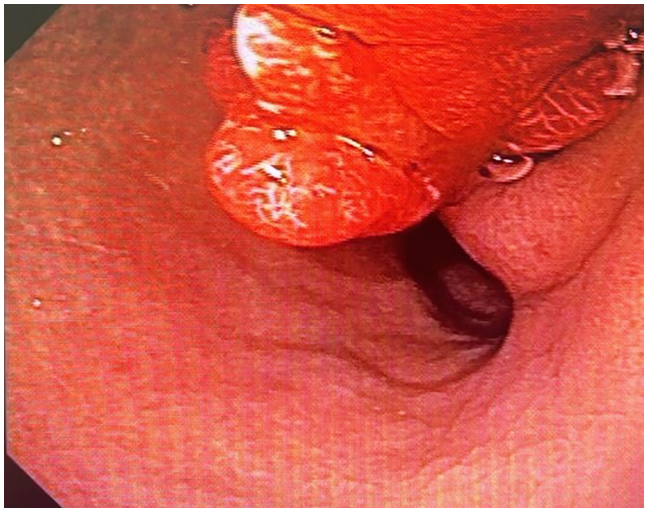


Figure 1. Endoscopic view of multipolypoid antral lesion. Image property of the authors.



Figure 2. Polypectomy specimen of a light-brown multipolypoid lesion measuring 3 × 5 cm and 3 × 2 cm. Image property of the authors.

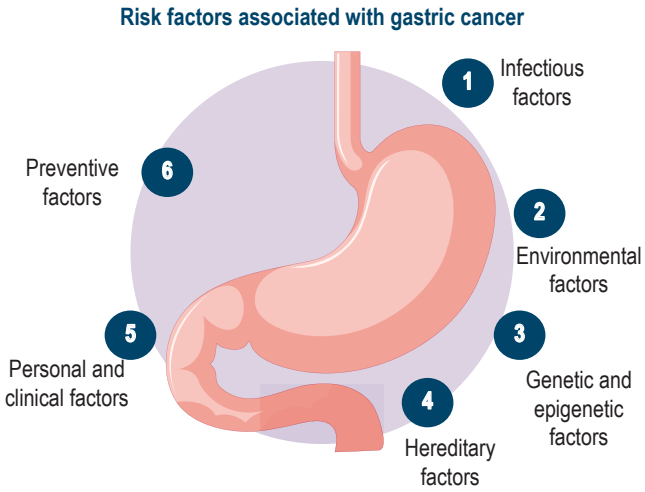


Figure 3. Risk factors associated with gastric cancer. Adapted from: Sundar R, et al. *Lancet*. 2025;405(10494):2087-2102[6].

tors are particularly relevant, especially *H. pylori* infection, classified as a Group 1 carcinogen by the World Health Organization (WHO) and responsible for up to 75% of cases. Epstein–Barr virus infection has also been associated with 5%–10% of cases[6]. Second, environmental and lifestyle factors play a significant role, including high-salt diets, obesity, gastroesophageal reflux, tobacco use, alcohol consumption, and low socioeconomic status. Third, acquired genetic and epigenetic alterations have been identified, such as chromosomal instability, copy number variations, and aberrant DNA methylation. The fourth category includes hereditary factors, with germline mutations in genes such as *CDH1*, *BRCA1/2*, *ATM*, and *PALB2*, as well as syndromes including Lynch syndrome and familial adenomatous polyposis. The fifth category encompasses personal factors such as advanced age, pernicious anemia, and personal or family history of gastric cancer. Finally, preventive factors highlight the importance of strategies such as targeted *H. pylori* eradication and the implementation of active surveillance programs in high-risk populations[6,12].

Gastric adenocarcinoma has been classified from multiple perspectives, including clinical stage, macroscopic morphology, histology, growth pattern, and histogenesis. From a staging standpoint, it is categorized as early cancer (confined to the mucosa and submucosa, with or without lymph node metastasis) and advanced cancer (invasion of deeper layers)[11,13]. The latter is further classified according to Borrmann into five types (1–5), based on macroscopic morphology.

Regarding histological classification, the World Health Organization (WHO) recognizes subtypes such as papillary, tubular (TUB1 to TUB3), mucinous, signet ring cell, and undifferentiated, among others. The Broders classification, based on cellular differentiation, categorizes tumors into grades 1 through 4. The Lauren classification distinguishes three forms: intestinal type (glandular, well differentiated), diffuse type (poorly cohesive, infiltrative cells), and indeterminate[9,11,13].

With respect to growth pattern, Ming proposed the expansive and infiltrative types[14]. In contrast, Nakamura and Sugano employed histogenesis to classify gastric cancer as differentiated (associated with intestinal metaplasia)

or undifferentiated (originating from the native gastric mucosa), with distinct clinical, prognostic, and epidemiological characteristics[14]. Additional classifications, such as the Mulligan classification (pyloric, intestinal, and mucous cancer) and the Vienna classification (focused on early-stage lesions and dysplasia), further contribute to this multidimensional framework[13]. These classification systems are not mutually exclusive but complementary. Together, they allow a more comprehensive diagnostic, therapeutic, and prognostic approach to gastric adenocarcinoma.

The most recent classification of GC is no longer based solely on the traditional Lauren histological subtypes (intestinal and diffuse). Instead, it incorporates molecular profiles that enable more precise stratification with therapeutic implications[15,16]. Integrative analyses from The Cancer Genome Atlas (TCGA, 2014) and the Asian Cancer Research Group (ACRG, 2015) identified four principal molecular subtypes: chromosomal instability GC, microsatellite instability GC, genomically stable GC, and Epstein–Barr virus–positive GC. This updated classification provides substantial advances by identifying specific genetic and epigenetic alterations, including mutations in *TP53*, *ARID1A*, and *PIK3CA*, tyrosine kinase receptor amplifications, and *CLDN18–ARHGAP* fusions. These findings enable the development of targeted therapies and more personalized management strategies. Moreover, this approach facilitates identification of subgroups with distinct prognostic profiles. For instance, microsatellite instability GC is associated with improved survival and potential differential response to immunotherapy or targeted therapies, thereby overcoming limitations of previous histological classification systems (**Table 2**)[15].

In the present case, the tumor corresponds to a poorly differentiated mixed gastric adenocarcinoma, histological grade 3, classified as Borrmann type 1 (polypoid), with invasion of the lamina propria, a tumor-free base, and no lymphovascular invasion. These features allow classification as early-stage GC despite its high histological aggressiveness.

CONCLUSION

This case represents an unusual and clinically challenging manifestation of mixed gastric adenocarcinoma. Detection at an early stage underscores the importance of endoscopy

Table 2. Gastric cancer classification systems

Classification system	Subtypes	Main characteristics
Lauren (1965)	- Intestinal - Diffuse - Mixed	- Intestinal: gland-forming, associated with intestinal metaplasia - Diffuse: signet ring cells, poor cellular cohesion
WHO (2019)	- Tubular - Papillary - Mucinous - Poorly cohesive (including signet ring cell) - Rare variants	- Internationally standardized histological classification
TCGA (2014)	- EBV+ - MSI - CIN - GS	- EBV+: hypermethylation, *PIK3CA* mutations, favorable response to immunotherapy - MSI: high mutational burden, improved prognosis - CIN: *TP53* alterations, tyrosine kinase receptor amplification, *HER2* amplification - GS: *CLDN18–ARHGAP* fusions, diffuse phenotype
ACRG (2015)	- MSI - MSS/TP53+ - MSS/TP53- - MSS/EMT	- MSI: improved prognosis - MSS/TP53+: Intermediate prognosis - MSS/TP53-: Intermediate-poor prognosis - MSS/EMT: Diffuse phenotype, increased recurrence and peritoneal metastasis
Current integrated classification (2020–2023)	- Molecular subtypes applied in clinical practice: *HER2*+, PD-L1+, CLDN18.2+, *FGFR2b*+, MSI-H, EBV+	- Directly guides targeted therapy and immunotherapy (trastuzumab, zolbetuximab, nivolumab, pembrolizumab, anti-*FGFR2b*)

CIN: chromosomal instability; EBV: Epstein–Barr virus; GS: genomically stable; MSI: microsatellite instability. Adapted from: Januszewicz W, et al. *Cancers (Basel)*. 2023;15(3):664[16].

as a key diagnostic tool, even when lesions appear benign. Given its rarity and unpredictable biological behavior, this case highlights the need to strengthen screening programs, endoscopic surveillance, and rigorous histopathological evaluation, particularly in regions with moderate incidence such as Colombia, where GC remains a leading cause of cancer-related mortality.

Ethical considerations

This case report was conducted in accordance with the principles of the Declaration of Helsinki and the International Conference on Harmonisation Good Clinical Practice guidelines, following prior authorization from the participant.

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Case report

Dieulafoy Syndrome: Case Report

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Abstract

Dieulafoy lesion (DL), also known as persistent caliber artery, is a rare vascular anomaly accounting for approximately 1%–2% of non-variceal upper gastrointestinal bleeding. It most commonly occurs in the stomach (74%), but may also involve the duodenum, colon, esophagus, and jejunum. Clinically, it is characterized by massive gastrointestinal hemorrhage, intermittent abdominal pain, hematemesis, and melena, potentially leading to hemodynamic instability. Risk factors include advanced age, male sex, and cardiovascular comorbidities. Pathogenesis remains uncertain, although associations with antral motility disorders and altered gastric blood flow have been described. Diagnosis is established through esophagogastroduodenoscopy, which is effective in up to 70% of cases. Treatment is based on endoscopic hemostatic techniques, including electrocoagulation, laser photocoagulation, and band ligation.

Keywords

Gastrointestinal hemorrhage, stomach, duodenum, hematemesis, melena, risk factors, aging, cardiovascular diseases, endoscopy.

INTRODUCTION

Dieulafoy lesion (DL) is a rare but potentially life-threatening condition characterized by a persistent, abnormally large-caliber artery associated with a significant risk of non-variceal upper gastrointestinal bleeding. Despite its low incidence, accounting for approximately 1%–2% of gastrointestinal hemorrhages, the profuse and painless bleeding it produces may compromise the patient's hemodynamic stability, requiring prompt and effective intervention[1,2]. DL most commonly affects the stomach; however, it may also occur in other regions of the gastrointestinal tract, including the duodenum, colon, and gastric anastomoses. Early diagnosis by endoscopy is essential to identify the lesion and apply appropriate management techniques, primarily endoscopic interventions such as electrocoagulation, hemoclip placement, and laser photocoagulation[3,4].

This report presents the case of a 70-year-old female patient with a medical history of type II diabetes mellitus and arterial hypertension who was admitted with massive hematemesis and severe epigastric pain. Severe anemia (hemoglobin [Hb]: 4.5 g/dL) was documented, and upper gastrointestinal endoscopy revealed a DL located on the lesser curvature of the stomach, with active bleeding successfully controlled by epinephrine sclerotherapy and hemoclip placement. The patient demonstrated favorable clinical progression and was discharged without complications. The objective of this article is to highlight key risk

factors, pathogenesis, and treatment options in order to improve clinical outcomes and prevent serious complications associated with this condition.

CLINICAL CASE

A 70-year-old female patient with a history of type II diabetes mellitus and treated arterial hypertension presented to the emergency department with a one-hour history of abundant hematemesis in two episodes and severe burning epigastric abdominal pain associated with loss of postural tone. On admission, the patient was diaphoretic and hemodynamically unstable, with marked hypotension (blood pressure [BP]: 90/55 mmHg) and tachycardia (heart rate [HR]: 110 beats per minute [bpm]) in the context of upper gastrointestinal bleeding. Initial medical management included administration of 2000 mL of normal saline solution (NSS), omeprazole 80 mg intravenously (IV) as a bolus followed by continuous infusion at 8 mg/hour, one ampoule of IV tranexamic acid, and one ampoule of IV metoclopramide.

Laboratory tests performed at admission demonstrated severe anemia (Hb: 4.5 g/dL) and thrombocytosis (platelet count: 638,000), and four units of compatible packed red blood cells were transfused. Three hours after admission, the patient was evaluated by the Gastroenterology service, where the Glasgow-Blatchford score was calculated, yielding a result of 11 points (indicating a greater than 50% risk of requiring endoscopic, surgical, or transfusional intervention). Upper gastrointestinal endoscopy (esophagogastroduodenoscopy) was therefore performed, revealing:

- Upper gastrointestinal bleeding secondary to a DL located in the distal third of the lesser curvature (**Figures 1** and **2**).
- Successful control of active bleeding following epinephrine sclerotherapy and placement of two endoscopic hemoclips (**Figures 3** and **4**).
- Hyperemic antral gastropathy with an erosive component.

Following successful endoscopic control of active bleeding, the patient was transferred to an intermediate care unit for continued medical management and hemodynamic monitoring. Due to favorable clinical progression, absence of signs of active gastrointestinal bleeding, and stabilization of hemoglobin levels, the patient was transferred to the general ward after 24 hours and discharged 24 hours later.

DISCUSSION

Upper gastrointestinal bleeding refers to the signs and symptoms caused by hemorrhage originating from the gastrointestinal tract proximal to the ligament of Treitz. It is classified as variceal or non-variceal according to its etiology[5]. DL, also referred to as a persistent-caliber artery or cirsoid aneurysm, is characterized by a visible artery of constant caliber with an abnormal course that does not follow normal vascular branching patterns[1]. DL accounts for approximately 1%–2% of non-variceal upper gastroin-

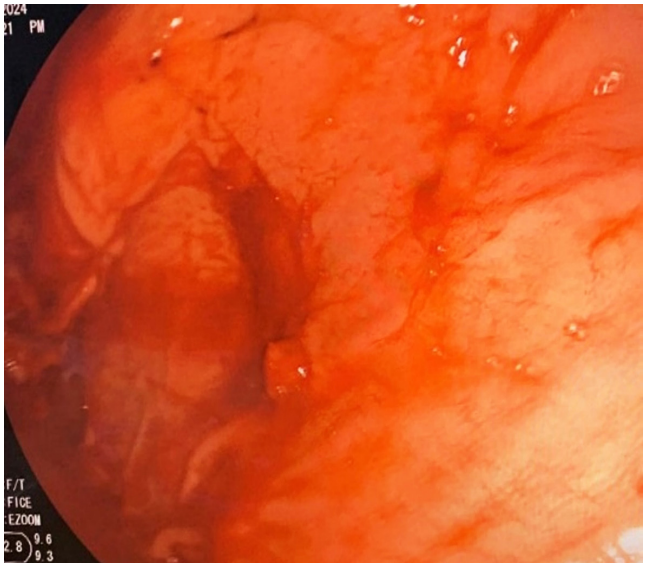


Figure 1. Dieulafoy lesion in the distal third of the lesser curvature (active bleeding). Image property of the authors.

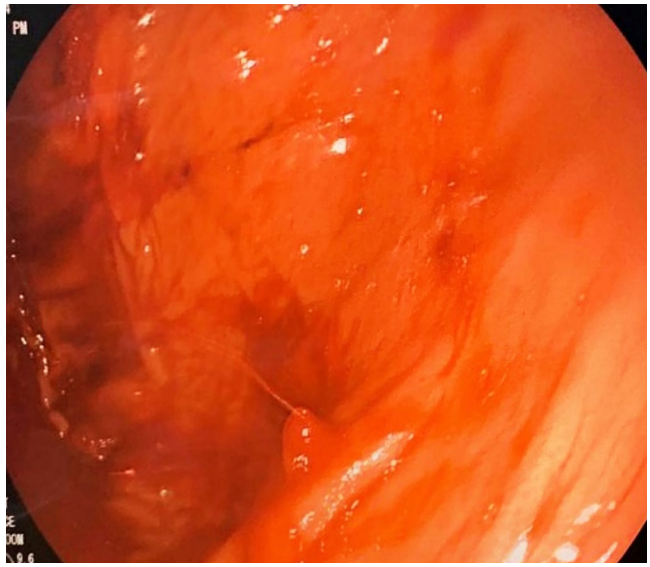


Figure 2. Dieulafoy lesion in the distal third of the lesser curvature (active bleeding). Image property of the authors.

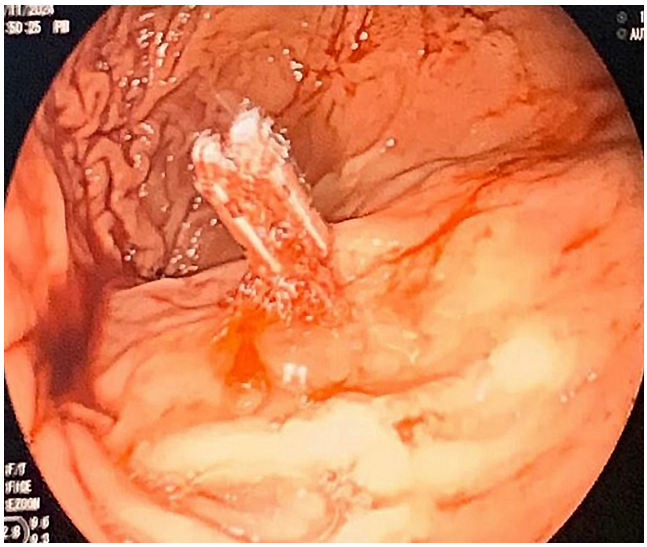


Figure 3. Dieulafoy lesion in the distal third of the lesser curvature after placement of endoscopic hemoclips. Image property of the authors.

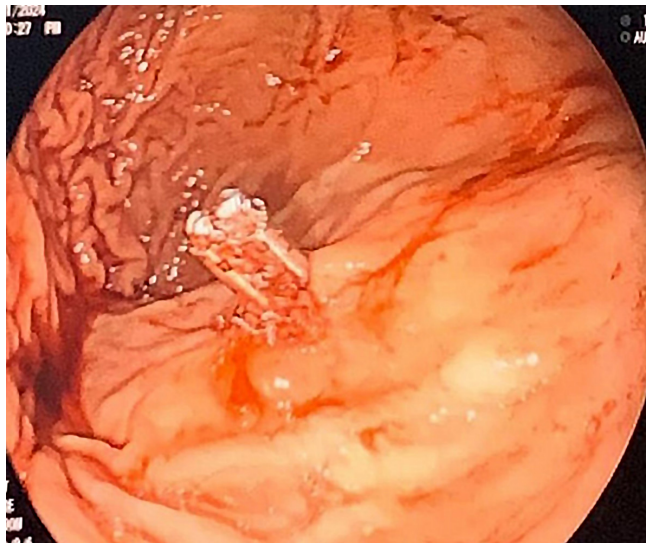


Figure 4. Dieulafoy lesion in the distal third of the lesser curvature after placement of endoscopic hemoclips, with successful control of bleeding. Image property of the authors.

testinal bleeding episodes that may threaten the patient's life. It occurs in approximately 74% of cases in the stomach, 14% in the duodenum, 5% in the colon and gastric anastomoses, and 1% in the esophagus and jejunum/ileum[1,2]. Clinically, it is characterized by recurrent or intermittent episodes of abdominal pain, hematemesis, melena, hematochezia, and profuse painless bleeding requiring transfusion of blood products due to signs of hemodynamic instability[6]. Reported risk factors associated with this condition include advanced age, male sex (with a 2:1 ratio), and cardiovascular comorbidities.

The pathogenesis of DL remains uncertain. No genetic mutations have been described; however, vascular ectasia in the antrum has been associated with the following developmental abnormalities: disorders of antral motility (muscle hyperplasia), reduced blood flow in the antrum compared with the gastric fundus, the presence of neuroendocrine cells, and spontaneous arterial thrombosis and rupture[1]. Under normal conditions, arteries of the gastrointestinal tract progressively narrow as they approach their destination. In Dieulafoy syndrome, however, bleeding originates from an artery that, although histologically normal, is abnormally large (1–3 mm in diameter) and tends to penetrate the submucosa. This artery follows a tortuous course and protrudes toward the mucosa through a small mucosal defect (2–5 mm) accompanied by a fibrinonecrotic base. This lesion is commonly located in the upper third of the stomach, particularly along the greater curvature, where mucosal defects more frequently allow vascular protrusion[5].

Diagnosis is established by endoscopic evaluation of the gastrointestinal tract, and diagnostic and therapeutic esophagogastroduodenoscopy is effective in identifying up to 70% of cases, as observed in the patient described[6]. The Glasgow-Blatchford score is a risk stratification tool used to predict the need for medical intervention (such as transfusion, endoscopy, or surgery) in patients with suspected upper gastrointestinal bleeding (**Table 1**). Scores of 0–1 indicate minimal need for intervention and allow outpatient management; scores between 2 and 6 require hospital-based intervention, with early endoscopic evaluation within 24 hours or sooner; scores of 7 or higher require continuous monitoring, hemodynamic resuscitation, and early endoscopy within the first 12 hours[7].

Management of these patients is based on endoscopic hemostatic techniques such as electrocoagulation, laser photocoagulation, sclerotherapy, hemoclip placement, and band ligation[3]. DL responds well to mechanical therapies due to its focal nature and protruding morphology. However, electrocoagulation and thermocoagulation have been reported to increase the risk of transmural injury in organs with thin walls, such as the duodenum; therefore, hemoclips are preferred as an effective and safe hemostatic method[4].

The present case involves a 70-year-old female patient with a history of type II diabetes mellitus and arterial hypertension who was admitted with massive hematemesis and epigastric pain, accompanied by severe anemia (Hb: 4.5 g/dL). Endoscopy identified a DL on the lesser curvature of the stomach, with active bleeding that was

successfully controlled by epinephrine sclerotherapy and hemoclip placement. The patient showed stable clinical progression without complications and was discharged in good general condition. A comparison can be made with a previously reported case of a 17-year-old male patient at the Hospital de Veracruz, Mexico, previously healthy, who presented with sudden-onset upper gastrointestinal bleeding, hemodynamic instability, and severe anemia (Hb: 7 g/dL, decreasing to 3 g/dL after a second bleeding episode). Endoscopy revealed a lesion in the first portion of the duodenum with active bleeding and no evidence of ulceration, suggesting a DL. Initial treatment consisted of epinephrine injection at a 1:10,000 dilution administered in four quadrants, which achieved temporary hemostasis. However, the patient experienced severe recurrent bleeding requiring intensive resuscitation, intubation, and repeat endoscopy with repeated therapy, after which favorable clinical evolution was observed[8].

Table 1. Glasgow-Blatchford Score

Risk factor	Threshold	Score
Blood urea nitrogen (mmol/L)	6.5-7.9 8.0-9.9 10.0-24.9 ≥25.0	2 3 4 6
Hemoglobin in men (g/L)	120-130 100-119 <100	1 3 6
Hemoglobin in women (g/L)	100-120 <100	1 6
Systolic blood pressure (mmHg)	100-109 90-99 <90	1 2 3
Heart rate (bpm)	>100	1
Melena	Present	1
Syncope	Present	2
Liver disease	Present	2
Heart failure	Present	2

bpm: beats per minute. Table prepared by the authors.

Despite differences in lesion location, both cases highlight the importance of timely endoscopic diagnosis and the appropriate use of hemostatic therapies. Combined therapy (sclerotherapy plus hemoclip placement) is highly effective. In the present patient, bleeding control was successfully achieved in a single session without recurrence.

CONCLUSION

DL is an uncommon but serious cause of non-variceal upper gastrointestinal bleeding that may threaten the patient's life due to its profuse and painless hemorrhage. Although its pathophysiology remains uncertain, it is associated with factors such as advanced age, male sex, and cardiovascular comorbidities. Early and accurate diagnosis by endoscopy is essential for appropriate management, which is based on effective endoscopic hemostatic techniques. A prompt and appropriate approach is critical to prevent major complications.

KEY POINTS

- Dieulafoy lesion is primarily diagnosed by endoscopy, particularly esophagogastroduodenoscopy, which is effective in up to 70% of cases. It most commonly occurs in the stomach (74%), although it may also be located in the duodenum, colon, and other less frequent sites.
- It is characterized by recurrent or intermittent gastrointestinal bleeding episodes, including hematemesis, melena, and hematochezia. Bleeding is typically profuse and painless, often accompanied by signs of hemodynamic instability requiring transfusion of blood products.
- Management is based on endoscopic hemostatic techniques such as electrocoagulation, laser photocoagulation, sclerotherapy, hemoclip placement, and band ligation, which effectively control bleeding.

Conflicts of interest

None declared by the authors.

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Informed consent

Written informed consent was obtained from the patient for publication of this clinical case and the accompanying images.

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