REVIEW ARTICLE

Standardization of quality in bariatric endoscopy: the BEQI framework and a simplified assessment tool (BEQI-S)

Estandarización de la calidad en endoscopia bariátrica: marco BEQI y herramienta simplificada de evaluación (BEQI-S)

Rodrigo Dorelo[1,a], **Martín Varela**[2,b,c], **Martina Bañales**[1,d], **Pablo Machado**[1,a], **Hugo Guillermo Cedrón Cheng**[3,a], **Asadur J. Tchekmedyian**[1,a]

[1] Department of Digestive Endoscopy, Asociación Española, Montevideo, Uruguay.
[2] Surgical Clinic "F", Hospital de Clínicas, Universidad de la República, Montevideo, Uruguay.
[3] Clínica Anglo Americana, Lima, Peru.
[a] Gastroenterologist, [b] Surgeon doctor, [c] Assistant professor, [d] Private doctor

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Correspondence:
Dr. Rodrigo Dorelo
Asociación Española, Montevideo, Uruguay.
E-mail: rodrigodorelomd@gmail.com

ABSTRACT
Upper gastrointestinal endoscopy plays a central role in the preoperative assessment and postoperative follow-up of patients undergoing bariatric surgery. However, despite the increasing procedural volume and the complexity associated with surgically altered gastrointestinal anatomy, no specific validated quality indicators currently exist for this setting. This gap contributes to substantial variability in clinical practice and may impact diagnostic performance and patient safety. The aim of this study was to critically analyze the available evidence on quality in upper gastrointestinal endoscopy in bariatric surgery and to propose a structured framework of specific quality indicators. A structured narrative review was conducted based on a literature search in PubMed, LILACS, Embase, and the Cochrane Library (2015–2025), prioritizing clinical guidelines, position statements, and studies with methodological relevance and clinical applicability. Based on this synthesis, the Bariatric Endoscopy Quality Indicators (BEQI) framework was developed, organizing quality indicators across the pre-procedural, intra-procedural, and post-procedural phases, and integrating established endoscopic quality domains with bariatric-specific variables. In addition, a simplified tool (BEQI-S) was designed as a 13-item binary checklist, enabling a structured assessment of procedural quality and incorporating the concept of critical failures. The implementation of these indicators may contribute to standardizing clinical practice, improving diagnostic quality, enhancing patient safety, and facilitating audit and quality improvement processes. Prospective multicenter validation represents the next essential step to establish this model as a quality standard in bariatric endoscopy.
Keywords: *Bariatric surgery; Endoscopy, Gastrointestinal; Gastroplasty; Quality Indicators, Health Care (source: MeSH NLM).*

RESUMEN
La endoscopia digestiva desempeña un rol central en la evaluación preoperatoria y el seguimiento de pacientes sometidos a cirugía bariátrica; sin embargo, a pesar del creciente volumen de procedimientos y de la complejidad asociada a la anatomía gastrointestinal modificada, no existen indicadores de calidad específicos validados para este contexto. Esta limitación contribuye a una elevada variabilidad en la práctica clínica y potencial impacto en el rendimiento diagnóstico y la seguridad del paciente. El objetivo de este trabajo es analizar críticamente la evidencia disponible sobre calidad en endoscopia digestiva en cirugía bariátrica y proponer un marco estructurado de indicadores específicos. Se realizó una revisión narrativa crítica con enfoque estructurado, basada en una búsqueda en PubMed, LILACS, Embase y Cochrane (2015–2025), priorizando guías clínicas, documentos de posicionamiento y estudios con relevancia metodológica y aplicabilidad clínica. A partir de esta síntesis, se desarrolló el marco conceptual Bariatric Endoscopy Quality Indicators (BEQI), que organiza los indicadores en las fases preprocedimiento, intraprocedimiento y postprocedimiento, integrando dominios clásicos de calidad con variables específicas del contexto bariátrico. Asimismo, se diseñó una herramienta simplificada (BEQI-S), basada en un checklist de 13 ítems evaluados de forma binaria, que permite una clasificación estructurada de la calidad del procedimiento e incorpora el concepto de fallas críticas. La implementación de estos indicadores podría contribuir a estandarizar la práctica, mejorar la calidad diagnóstica, optimizar la seguridad del paciente y facilitar procesos de auditoría y mejora continua. La validación prospectiva multicéntrica representa el siguiente paso necesario para consolidar este modelo como estándar de calidad en endoscopía bariátrica.
Palabras clave: *Cirugía Bariátrica; Endoscopía Gastrointestinal; Gastroplastia; Métricas de Salud (fuente: DeCS Bireme).*

INTRODUCTION

Obesity constitutes one of the leading public health problems worldwide, recognized by the World Health Organization as a chronic, multifactorial disease of increasing prevalence [1,2]. It is associated with multiple comorbidities, including type 2 diabetes, cardiovascular disease, liver disease, and various types of cancer, significantly impacting morbidity, mortality, and patients' quality of life [1,3,4].

In this context, bariatric-metabolic surgery (BMS) has become established as the most effective treatment for patients with severe obesity and/or associated comorbidities, achieving a significant reduction in excess weight and improvement of associated diseases [1,5-7]. Despite its favorable safety profile, a non-negligible percentage of patients present short- and long-term complications, requiring close clinical follow-up and a multidisciplinary approach [8-10].

Upper gastrointestinal endoscopy plays a fundamental role in this setting, both in preoperative assessment and postoperative follow-up, enabling detection of clinically relevant findings and early diagnosis of complications [10].

However, despite the increasing number of procedures and the complexity associated with surgically altered gastrointestinal anatomy, endoscopic practice in patients undergoing BMS continues to rely on extrapolation of quality indicators developed for conventional endoscopy. Currently, no universally validated quality indicators specific to this setting exist, resulting in variability in clinical practice and a potential impact on diagnostic quality and patient safety [10].

Given this need, it is essential to move toward the standardization of quality criteria adapted to endoscopy in bariatric surgery.

The aim of this study was to critically analyze the available evidence on quality in digestive endoscopy in the context of bariatric surgery and to propose a structured framework of specific indicators, together with a simplified tool to facilitate its application in clinical practice.

MATERIAL AND METHODS

A structured critical narrative review was conducted, aimed at analyzing the available evidence on quality in upper gastrointestinal endoscopy and developing a specific conceptual framework applicable to the context of bariatric surgery.

A literature search was performed in PubMed, LILACS, Embase, and the Cochrane Library, including publications between January 2015 and March 2025. Combinations of the terms "quality," "quality indicators," "upper gastrointestinal endoscopy," "gastroscopy," "bariatric surgery," "sleeve gastrectomy," "Roux-en-Y gastric bypass," and "one-anastomosis gastric bypass" were used, together with their Spanish and Portuguese equivalents.

Clinical practice guidelines, position statements, systematic reviews, meta-analyses, and observational studies with clinical relevance were prioritized. Selection was based on methodological quality, currency, and applicability to clinical practice.

Study selection was performed in two stages. In the first stage, two reviewers independently assessed the titles and abstracts of the identified publications. In the second stage, full-text review of articles considered potentially relevant was conducted. Discrepancies were resolved by consensus.

Given the aim of the study, PRISMA protocols were not applied and no meta-analysis was performed; instead, a critical and comparative analysis of the evidence was carried out.

Based on this synthesis, the Bariatric Endoscopy Quality Indicators (BEQI) conceptual framework was developed through a structured process that included identification of key quality domains across the pre-procedural, intra-procedural, and post-procedural phases, adaptation of validated indicators from conventional endoscopy, and incorporation of variables specific to the bariatric setting, such as targeted anatomical assessment and interdisciplinary coordination. This process was based on available evidence and on expert consensus among physicians experienced in digestive endoscopy and bariatric surgery.

With the aim of facilitating its application in clinical practice, a simplified tool called the Simplified Bariatric Endoscopy Quality Index (BEQI-S) was designed, based on a 13-item checklist selected for clinical relevance and measurement feasibility. Each item is assessed in a binary fashion (met/not met), allowing rapid and reproducible application. Quality classification was established in three categories (high, intermediate, and low) according to the number of criteria met, with cutoff points defined by expert consensus.

Additionally, the concept of critical failures was incorporated, defined as deficiencies with a potential direct impact on patient safety or diagnostic quality, the presence of which determines reclassification of the procedure regardless of the total score. When an item is not applicable to the surgical anatomy under assessment (e.g., blind limb length in patients with sleeve gastrectomy, in whom no jejunal loop exists), it is marked as not applicable and excluded from both the numerator and the denominator; the quality classification thresholds are then recalculated proportionally over the applicable items, preserving comparability of the BEQI-S across the different bariatric surgical techniques.

The conceptual framework and the BEQI-S cutoff points were established through a consensus process among

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the six authors, comprising five gastroenterologists and one bariatric surgeon, all with clinical experience in the endoscopic and surgical management of bariatric patients. Consensus was reached through iterative, non-structured discussion among all authors until full agreement was obtained on the final set of domains, items, and quality thresholds. This process does not correspond to a formal Delphi methodology and should be regarded as a pragmatic, expert-based first step toward a future structured, ideally multidisciplinary and multicenter, validation process.

The BEQI and BEQI-S constitute an unvalidated conceptual proposal, aimed at establishing a structured basis for the standardization of quality in bariatric endoscopy and serving as a platform for future validation studies.

Quality indicators in upper gastrointestinal endoscopy in bariatric surgery

Quality indicators in upper gastrointestinal endoscopy have been extensively developed and validated in the context of general endoscopic practice by various international scientific societies [11-14]. However, their application in the context of bariatric surgery presents relevant limitations, given that these patients have modified gastrointestinal anatomy and specific clinical scenarios that are not adequately addressed by conventional standards [10,15].

In current practice, endoscopic assessment in patients undergoing bariatric surgery relies on extrapolation of these general indicators, resulting in heterogeneity in clinical practice and a potential impact on diagnostic performance and patient safety [10,15,16].

To address this limitation, we propose a specific conceptual framework of quality indicators for upper gastrointestinal endoscopy in bariatric surgery, called the Bariatric Endoscopy Quality Indicators (BEQI).

The BEQI organizes indicators into three fundamental phases of the endoscopic procedure: pre-procedural, intra-procedural, and post-procedural. Within these phases, key domains are integrated, including appropriate indication for the procedure, knowledge of the surgical technique and its anatomical landmarks, individualized anesthetic assessment, systematic mucosal inspection, mucosal cleansing quality, standardized photodocumentation, appropriate biopsy sampling, precise anatomical assessment, structured reporting, and interdisciplinary communication and follow-up planning.

The complete structure of these indicators and their operational definitions are detailed in Table 1.

This framework provides a conceptual basis aimed at standardizing endoscopic practice in bariatric surgery

Table 1. Bariatric Endoscopy Quality Indicators (BEQI). Quality indicators in upper gastrointestinal endoscopy in bariatric surgery. Systematic Screening Protocol for the Stomach (SSS), World Endoscopy Organization (WEO), International Federation for the Surgery of Obesity and Metabolic Disorders (IFSO).

Phase	Indicator	Description
Pre-procedure	Procedure indication	Clear, justified, and documented indication for upper gastrointestinal endoscopy in patients with obesity or bariatric surgery.
	Informed consent	Obtaining informed consent that includes the specific risks in patients with morbid obesity and/or surgically modified anatomy.
	Presurgical review	Assessment of clinical history and knowledge of the planned or performed surgical technique.
	Anesthetic assessment	Assessment of anesthetic risk and sedation planning in a setting appropriate for patients with obesity.
Intra-procedure	Minimum examination time	Systematic mucosal inspection of sufficient duration to ensure a complete assessment (≥7 minutes).
	Adequate mucosal cleansing	Assessment of gastric mucosal visibility using a validated scale (e.g., Barcelona scale).
	Systematic photodocumentation	Standardized photographic recording of the segments assessed, adapted to bariatric anatomy (pouch, anastomosis, etc.). Use of protocols such as the SSS and/or WEO.
	Use of advanced technology	Use of high-definition endoscopes and chromoendoscopy techniques when indicated.
	Adequate biopsy sampling	Obtaining targeted or systematic biopsies according to findings and established protocols (e.g., modified Sydney protocol).
	Precise anatomical assessment	Detailed assessment of postsurgical anatomy (pouch, anastomosis, loops) and detection of pathological findings.
Post-procedure	Structured report	Preparation of a complete report describing findings, areas assessed, and clinical recommendations.
	Interdisciplinary communication	Transmission of findings to the surgical team for clinical decision-making.
	Follow-up plan	Definition of an endoscopic surveillance strategy in accordance with current recommendations (e.g., IFSO).

Table 2. Simplified Bariatric Endoscopy Quality Index (BEQI-S): a system based on a checklist of 13 key indicators organized across the pre-procedural, intra-procedural, and post-procedural phases. Overall procedure quality is classified into three levels according to the number of items met and the presence of critical failures (inappropriate indication, incomplete anatomical assessment, and absence of a structured report). This approach allows a rapid, reproducible assessment applicable in daily clinical practice, facilitating its use in audit, benchmarking, and continuous quality improvement.

Phase	Item	Operational definition	Met (✓/✗)
Pre-procedure	Appropriate indication	Documented indication in accordance with clinical guidelines	☐
	Specific informed consent	Includes risks associated with obesity and/or modified anatomy	☐
	Knowledge of surgical technique	Type of bariatric surgery identified and understood	☐
	Adequate anesthetic assessment	Assessment of anesthetic risk and sedation planning	☐
Intra-procedure	Systematic inspection	Complete and orderly assessment of the mucosa	☐
	Adequate examination time	≥7 minutes or documented complete examination	☐
	Adequate mucosal cleansing	Adequate visualization of the gastric mucosa	☐
	Standardized photodocumentation	Photographic recording of the segments assessed	☐
	Biopsy sampling when indicated	Obtaining biopsies when clinically or endoscopically indicated. The requirement is considered met when the biopsy indication is appropriately assessed and managed (performed when indicated, or correctly omitted when not indicated).	☐
	Bariatric anatomical assessment	Complete assessment of postsurgical anatomy and detection of pathological findings.	☐
Post-procedure	Structured report	Complete, systematic, and reproducible report	☐
	Clinical recommendations	Clear management plan based on findings	☐
	Follow-up plan	Surveillance strategy defined according to guidelines	☐

Quality classification (BEQI-S)

☐ High quality: ≥10 items met and absence of critical failures
☐ Intermediate quality: 7–9 items met
🔴 Low quality: ≤6 items met or presence of ≥1 critical failure
Critical failures: inappropriate indication, incomplete anatomical assessment, absence of a structured report. Critical failures nullify overall quality regardless of the BEQI-S score

patients, enabling the definition of performance domains and facilitating comparison between operators and centers.

Development of the simplified bariatric endoscopy quality index (BEQI-S)

Although the BEQI establishes a comprehensive conceptual framework, its application in clinical practice may be limited by the absence of simple operational tools that allow real-time implementation.

To facilitate its application, a simplified tool called the Simplified Bariatric Endoscopy Quality Index (BEQI-S) was developed (Table 2).

The BEQI-S consists of a structured system based on a checklist of 13 key indicators, organized across the three phases of the procedure. Each item is assessed in a binary fashion (met/not met), allowing rapid, reproducible application that is easily integrated into daily clinical practice.

Based on the number of criteria met, procedures are classified into three quality levels: high quality (≥10 items), intermediate quality (7-9 items), and low quality (≤6 items).

Additionally, the BEQI-S incorporates the concept of critical failures, defined as deficiencies that may compromise patient safety or the diagnostic quality of the procedure. These include inappropriate indication, incomplete anatomical assessment, and absence of a structured report. The presence of any of these critical failures nullifies the overall quality of the procedure, regardless of the total number of items met. The BEQI-S was designed as a pragmatic tool that prioritizes feasibility and reproducibility over score weighting, assigning equal weight to each item to simplify its use.

The use of advanced technology (high-definition endoscopes and chromoendoscopy) was intentionally not retained as an independent BEQI-S item, since it reflects equipment availability rather than operator performance; including it as a mandatory binary criterion could unfairly penalize technically proficient examinations performed in centers without access to advanced imaging platforms, compromising the cross-setting feasibility that the simplified tool is intended to preserve. This decision is consistent with the position that diagnostic performance depends primarily on systematic, meticulous inspection, with technology serving as a complement rather than a substitute for adequate endoscopic technique.

This approach seeks to balance conceptual rigor with clinical applicability, facilitating its use both in clinical practice and in audit processes, performance assessment, and continuous quality improvement.

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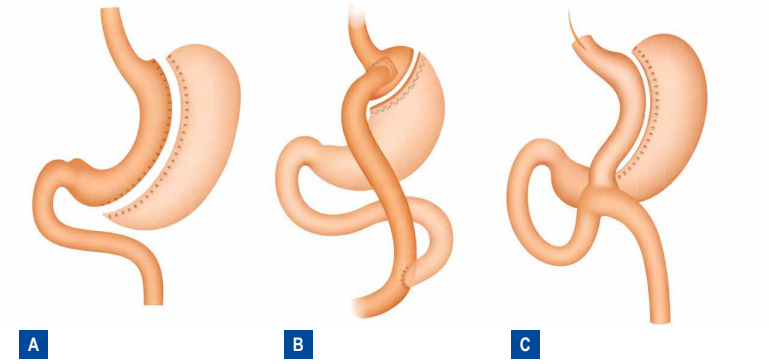

Figure 1. Schematic representation of the main bariatric surgical techniques. **(A)** Sleeve gastrectomy. **(B)** Roux-en-Y gastric bypass. **(C)** One-anastomosis gastric bypass. This figure was generated using an artificial intelligence image-generation tool and subsequently reviewed and corrected by the authors to ensure anatomical accuracy prior to inclusion in the manuscript.

Application of the indicators in clinical practice

Digestive endoscopy plays a fundamental role in BMS, both in the preoperative phase—through assessment aimed at optimizing patient selection and surgical planning—and in the postoperative period, through endoscopic follow-up that allows assessment of clinical progress, identification of relevant findings, and diagnosis or treatment of eventual complications [15,16].

In this context, the quality of upper gastrointestinal endoscopy must be addressed systematically, considering the three phases of the procedure: pre-procedural, intra-procedural, and post-procedural [15]. The application of specific indicators at each of these stages allows standardization of clinical practice, improved diagnostic performance, optimized patient safety, and reduced variability between operators [15].

Additionally, procedure quality is influenced by multiple factors, including the endoscopist's experience, the learning curve, the availability of advanced diagnostic technology, and coordination with the multidisciplinary team. Therefore, it is recommended that these studies be performed at specialized centers by professionals with specific training in bariatric endoscopy [10,15,17].

The main quality indicators for each phase of the procedure are described below:

Pre-procedural indicators

The pre-procedural phase constitutes a critical component of quality in upper gastrointestinal endoscopy in the context of bariatric surgery, as it determines both the safety of the procedure and its diagnostic performance and impact on clinical decision-making.

Appropriate indication for the procedure

Every upper gastrointestinal endoscopy in patients with obesity or candidates for bariatric surgery must have a clear, justified, and documented indication. International guidelines recommend systematic performance of preoperative endoscopy, regardless of the presence of symptoms, due to the high prevalence of relevant findings that may modify the surgical strategy [15].

Several studies have shown that a significant percentage of patients present endoscopic abnormalities, even in the absence of symptoms, including gastritis, hiatal hernia, and esophagitis. In a subset of cases, these findings may lead to changes in the indication or type of bariatric procedure [15,18].

From a quality standpoint, the indication must be aligned with institutional protocols or defined by the treating team, avoiding unnecessary studies or those outside the clinical context.

Specific informed consent

Informed consent must address the particular risks associated with obesity and surgically modified gastrointestinal anatomy, including sedation-related complications, technical difficulties, and potential diagnostic limitations [15].

Knowledge of the surgical technique

Detailed knowledge of the planned or previously performed bariatric technique constitutes an essential requirement for quality endoscopic assessment. The most common techniques include laparoscopic sleeve gastrectomy (LSG), Roux-en-Y gastric bypass (RYGB), and one-anastomosis gastric bypass (OAGB) [15,17,19].

Understanding of the anatomical modifications and their endoscopic landmarks allows for a targeted examination, improves detection of pathological findings, and reduces the risk of misinterpretation (Figure 1).

Anesthetic assessment and procedure planning

Pre-anesthetic assessment is essential in patients with obesity, given the increased risk of respiratory and

cardiovascular complications during sedation. Identification of relevant comorbidities, such as obstructive sleep apnea, cardiovascular disease, and predictors of difficult airway, allows optimization of procedure planning and reduction of adverse events [20].

Additionally, the pharmacokinetic particularities of these patients require adjustments in sedative dosing and performance of the procedure in appropriate settings, with equipment suitable for patients with elevated body mass index and experienced staff [20].

Intra-procedural indicators

- Minimum observation time: In the absence of specific evidence establishing the optimal procedure duration in these patients, we propose extrapolating the minimum threshold of 7 minutes described for conventional upper gastrointestinal endoscopy as a reference for systematic and complete mucosal inspection across all accessible segments. To optimize visualization of the total or partial stomach, administration of antifoaming and mucolytic agents, such as simethicone (100-200 mg) and N-acetylcysteine (500–1000 mg) diluted in 50-100 ml of water, 20 to 30 minutes before the procedure, is recommended [21].

- Mucosal cleansing quality: Adequate visualization of the gastric mucosa constitutes a fundamental requirement for quality endoscopic assessment. In this regard, the Barcelona gastric cleansing scale [22,23] has recently been developed and validated as an objective and reproducible tool that allows classification of the degree of mucosal cleansing through segmental assessment of the stomach. In simplified form, it establishes different levels of cleansing based on the presence of mucus, foam, or debris that interfere with adequate visualization, allowing a standardized and reproducible assessment of examination quality. Its application facilitates detection of subtle lesions and contributes to improving the diagnostic performance of the procedure.

- Systematic photodocumentation: protocols such as the Systematic Screening Protocol for the Stomach (SSS) and that of the World Endoscopy Organization (WEO) recommend capturing systematic images of at least 8 regions of the stomach, including the gastroesophageal junction, fundus, body, incisura, antrum, bulb, and second portion of the duodenum [12]. In patients with sleeve gastrectomy or gastric bypass, this documentation should be adapted to include: gastroesophageal junction (assessing hiatal hernia, esophagitis, Barrett's esophagus), staple line of the sleeve or pouch, gastrojejunal anastomosis (GJA), length and configuration of the blind loop (in RYGB), and antral and duodenal region (if accessible) [10,15].

- Use of advanced technology: The use of high-definition endoscopes constitutes the current standard for adequate mucosal assessment. The incorporation of chromoendoscopy techniques, both conventional and digital (NBI, i-Scan, BLI), can improve detection and characterization of subtle lesions, including atrophy, intestinal metaplasia, dysplasia, and early neoplastic lesions [24]. However, international guidelines emphasize that diagnostic performance depends primarily on systematic and meticulous inspection, with technology serving as a complement rather than a substitute for adequate endoscopic technique [25].

- Appropriate biopsy sampling: targeted or systematic according to findings. Biopsy sampling should be performed in a targeted manner and, when appropriate, systematically, according to endoscopic findings and clinical context.

In RYGB and OAGB, the excluded stomach is often inaccessible by conventional endoscopy, although endoscopic assessment of the excluded posterior stomach may be feasible in patients with a short limb using balloon-assisted enteroscopy or surgically assisted transgastric access, [25] which highlights the importance of high-quality preoperative upper endoscopy performed by an experienced endoscopist. This assessment is key for detecting premalignant lesions, such as atrophy and intestinal metaplasia, as well as for diagnosing Helicobacter pylori infection, considering that relevant late complications have been reported, including the development of adenocarcinoma in the excluded stomach [26].

Helicobacter pylori affects more than 50% of the general population [26,27], with a similar or even higher prevalence in patients with obesity [28]. Its presence is associated with chronic gastritis, atrophy, and intestinal metaplasia, conditions that increase the risk of postoperative complications [25], particularly in the context of bariatric surgery [28]. Additionally, infection may influence the regulation of appetite-related hormones, such as ghrelin and leptin; although eradication is associated with an increase in ghrelin levels, the clinical impact of these changes on postoperative weight outcomes is not clearly established [29].

In this context, systematic screening and eradication of H. pylori prior to bariatric surgery is recommended, using validated methods for detecting active infection, such as gastric biopsies or non-invasive tests (urea breath test or fecal antigen test), in accordance with international guidelines [30].

Biopsy according to the modified Sydney protocol constitutes the standard for detection of H. pylori and for assessment of gastritis, atrophy, and intestinal metaplasia [25]. However, in clinical practice, sampling is often limited to visible lesions, which may significantly reduce detection of premalignant lesions. Therefore, implementation of systematic sampling strategies in selected patients may be considered an additional quality indicator in preoperative endoscopic assessment.

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Regarding eradication therapy, some studies suggest that obesity may negatively influence the efficacy of H. pylori eradication therapy. In this regard, Laudanno *et al*. reported a lower eradication rate in obese patients compared with eutrophic controls (69% vs. 88%), possibly related to pharmacokinetic alterations [31]. In response, weight-adjusted therapeutic regimens have been proposed, including quadruple therapies, with encouraging preliminary results. However, additional studies are required to validate these findings and define their impact on clinical practice.

Although celiac disease (CD) does not present a higher prevalence in people with severe obesity compared with the general population, its diagnosis in the context of bariatric surgery acquires particular clinical relevance [32]. Cases of severe malabsorption, nutritional deficiencies, and excessive weight loss after surgery, attributable to previously undiagnosed CD, have been reported [32]. This has generated debate regarding the potential value of preoperative screening.

Currently, the major international guidelines (IFSO and ASMBS) recommend routine performance of upper gastrointestinal endoscopy prior to surgery, regardless of the presence of symptoms, but do not explicitly include systematic duodenal biopsy sampling as part of the standard protocol [32]. However, in particular clinical situations, such as unexplained anemia, chronic diarrhea, persistent iron deficiency, family history of CD, or suggestive endoscopic findings, biopsy sampling of the second portion of the duodenum may be fully justified [32].

From a quality perspective, especially at referral centers, the selective incorporation of duodenal biopsies could be considered a value-added practice, allowing identification of subclinical conditions with potential impact on nutritional status and postoperative follow-up. This approach is not intended to replace the established protocol but rather to enrich it in selected patients through individualized clinical assessment.

- Precise anatomical assessment: key in postsurgical patients for detecting dilations, ulcers, or fistulas. Detailed assessment of postsurgical anatomy constitutes a central element of intra-procedural quality. The structures modified according to the technique performed must be systematically analyzed, including the gastric pouch or sleeve, gastrojejunal or duodenojejunal anastomoses, and accessible intestinal segments.

In post-RYGB endoscopy, a series of essential parameters must be documented. Among these, the size of the gastric pouch stands out, which generally ranges between 3 and 5 centimeters, and whose enlargement may favor weight regain and the development of gastroesophageal reflux [32-34].

In cases where the patient presented signs of esophagitis or Barrett's esophagus prior to surgery, the evolution of these findings after the procedure should be assessed.

It is essential to measure the caliber of the gastrojejunal anastomosis (GJA), which should have a diameter of less than 15 mm, since its dilation may lead to reduced satiety and contribute to weight regain, as well as dumping syndrome. One way to measure the caliber of the anastomosis is to use an open biopsy forceps [35].

A special step is the appropriate examination of the jejunal mucosa, paying attention to the presence, location, and size of possible marginal ulcerations and the detection of gastro-gastric fistulas [32,33].

The length of the blind limb must also be considered; Candy Cane syndrome results from an excessively long blind jejunal limb of the alimentary loop after GJA. When it measures more than 4 cm, it can fill with food, acting as a pouch or reservoir, causing pain, nausea, or vomiting [33,36].

In the case of laparoscopic sleeve gastrectomy (LSG), endoscopic examination should be performed systematically, following an anatomical order from proximal to distal, documenting both positive and negative findings. First, the esophageal mucosa and the esophagogastric epithelial transition should be assessed. Next, it is essential to assess the anatomy of the gastric tube, including its configuration, as well as the presence of dilation, torsion, or stenosis. Finally, the antral and duodenal mucosa should be examined for lesions [34].

The prevalence of de novo GERD after LSG is 40% to 60%, and Barrett's esophagus up to 17%; therefore, esophagitis and Barrett's esophagus should always be sought [37].

In OAGB, endoscopic assessment should focus on differential aspects arising from direct exposure of the pouch to biliopancreatic content. It is essential to assess not only the presence of bile in the gastric pouch, a frequent finding even in asymptomatic patients, but also its amount and its association with mucosal changes such as erythema, friability, erosions, or ulcerations, consistent with chemical gastritis due to bile reflux. Unlike other techniques, non-acid reflux predominates in OAGB, so systematic assessment of the distal esophagus is essential to detect esophagitis or changes consistent with Barrett's esophagus, whose prevalence continues to be a subject of debate in the literature [38].

Additionally, the configuration of the gastric pouch should be analyzed, which is usually longer and more tubular, as well as the gastrojejunal anastomosis, which tends to be wider and more variable than in Roux-en-Y bypass, which may have functional implications in terms of symptoms and weight regain. It is important to examine the proximal jejunal mucosa and document the presence of marginal ulcers, which may have a chemical inflammatory component associated with bile reflux. Conceptually unlike RYGB, OAGB does not present a completely excluded stomach; however, endoscopic access to the gastric remnant is usually technically difficult due to the length of the jejunal limb, making it limited or

exceptional in practice. Overall, a detailed, protocolized endoscopic assessment is key for early detection of complications and appropriate clinical stratification of these patients [39-41].

Post-procedural indicators

- Structured and complete report: The endoscopic report must be clear, systematic, and reproducible, precisely detailing the areas assessed, endoscopic findings—both positive and negative—and the characteristics of the surgically modified anatomy. It must also include a description of any complications, procedure quality, and specific clinical recommendations, supporting decision-making and continuity of care.

- Effective interdisciplinary communication: Timely communication of findings with the surgical and multidisciplinary team is essential, especially when complications or findings that may modify therapeutic management are identified [15].

- Recommended follow-up: In the context of endoscopic follow-up, various scientific societies have proposed surveillance strategies for patients undergoing bariatric surgery. In particular, IFSO recommends routine upper gastrointestinal endoscopy one year after surgery and every 2 to 3 years thereafter in patients with laparoscopic sleeve gastrectomy, with the aim of enabling early detection of Barrett's esophagus and neoplasia. However, follow-up frequency should be individualized according to risk factors and prior endoscopic findings [15,31].

DISCUSSION

The main contribution of this study is the proposal of a structured framework specifically designed to assess quality in digestive endoscopy in the context of bariatric surgery, an area in which validated standardized tools currently do not exist. In clinical practice, endoscopy in patients with bariatric surgery is usually approached as a variation of conventional upper gastrointestinal endoscopy; however, this approach does not adequately address the complexity arising from modified gastrointestinal anatomy or the clinical particularities of this population [10,15].

In this context, the proposed Bariatric Endoscopy Quality Indicators (BEQI) framework constitutes a comprehensive systematization model, integrating classic quality domains in digestive endoscopy with dimensions specific to the bariatric setting, including knowledge of the surgical technique, targeted anatomical interpretation, adaptation of the examination to modified anatomy, and the need for adequate multidisciplinary coordination [10,15,17]. Unlike the quality indicators proposed by societies such as ESGE, which are not specifically designed for patients with modified gastrointestinal anatomy, the BEQI incorporates domains adapted to the bariatric setting [24]. This approach allows moving beyond a model focused exclusively on the endoscopic act toward a broader view of the care process, aligned with contemporary standards of quality in medicine. It is worth noting that the most recent revision of the ASGE/ACG quality indicators for upper gastrointestinal endoscopy explicitly added indications for endobariatric and third-space endoscopy to its general framework [13]; however, this update does not provide a dedicated set of phase-based domains or an operational assessment tool tailored to bariatric-specific anatomy, which is precisely the contribution that the BEQI and BEQI-S aim to provide.

From a clinical standpoint, standardizing endoscopic assessment criteria in bariatric surgery could have an impact at multiple levels, including better detection of preoperative findings that modify the surgical strategy, greater identification of premalignant lesions in patients with potential gastric exclusion, earlier recognition of postoperative complications, and reduced variability between operators and centers [15,16]. Likewise, adoption of a common quality language would facilitate comparison between centers and operators, promoting continuous improvement processes and structured clinical audit.

It is important to note that diagnostic performance in this context does not depend exclusively on technology. Although the use of high-definition equipment, digital chromoendoscopy, and structured reports contributes to improving detection and characterization of lesions, procedure quality remains closely linked to operator experience, thoroughness of mucosal inspection, and the ability to generate clinically relevant reports [11-13]. In this sense, the BEQI reinforces the concept that systematic examination constitutes a central determinant of endoscopic quality.

Another relevant aspect of this proposal is its potential application in training and quality assurance processes. The use of explicit, structured indicators facilitates teaching, self-assessment, audit, and the future development of objective performance metrics at centers with bariatric endoscopy programs. Along these lines, the BEQI could serve as a basis for the development of accreditation or certification programs specific to bariatric endoscopy, an area currently in expansion and lacking uniform standards.

A relevant methodological question raised by the BEQI-S is the trade-off between simplicity and discriminative capacity. By assigning equal weight to all 13 items, the tool favors ease of use over the possibility that certain domains — such as anatomical assessment or structured reporting — may carry greater clinical weight than others, such as documentation of anesthetic evaluation. This design choice was deliberate, prioritizing feasibility for routine use over psychometric refinement, but it also means that two procedures with the same total score could differ meaningfully in clinical risk. Resolving this tension will likely require empirical item-weighting analyses once outcome data become available, rather than further conceptual adjustment.

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Limitations

This study has some limitations that should be considered. First, it is a critical narrative review rather than a formal systematic review, so the presence of selection bias cannot be completely excluded. Second, the proposed BEQI model is based on the integration of available evidence and clinical experience, without yet having prospective validation.

Additionally, the literature search included PubMed, LILACS, Embase, and the Cochrane Library, but did not include grey literature (conference proceedings, non-indexed technical reports from scientific societies). While this strategy is reasonable for a structured narrative review, the possibility that relevant studies published exclusively in non-indexed sources were not captured cannot be excluded, representing an additional source of selection bias beyond that inherent to the narrative design itself.

This is compounded by the heterogeneity of the available evidence in this field, predominantly consisting of position statements, observational studies, and recommendations extrapolated from conventional digestive endoscopy. Variability in surgical techniques, care settings, and operator experience may limit the immediate generalizability of the proposed indicators.[10,15,17]

These limitations do not invalidate the conceptual value of the model, but they do highlight the need for validation and comparative studies between centers.

Future perspectives

Future research should focus on prospective validation of the BEQI and BEQI-S, assessing their reproducibility and impact on clinically relevant outcomes. Specifically, we propose a two-phase validation process: first, a modified Delphi panel including international experts in bariatric endoscopy and clinical epidemiology, aimed at refining and re-weighting the BEQI-S items and quality thresholds; second, a prospective multicenter study across the three main surgical techniques (laparoscopic sleeve gastrectomy, Roux-en-Y gastric bypass, and one-anastomosis gastric bypass), assessing inter-rater reliability and the correlation between BEQI-S classification and clinically relevant outcomes, such as the detection rate of complications and the need for reintervention.

Among the potential indicators to be evaluated are the detection rate of relevant findings, their impact on surgical decision-making, complication rates, the need for reintervention, the quality of endoscopic reports, and patient-centered outcomes.

Additionally, the incorporation of digital tools, structured reporting systems, and artificial intelligence–assisted metrics could contribute to the future development of quality assessment in bariatric endoscopy.

BMS constitutes a fundamental pillar in the treatment of severe obesity, and upper gastrointestinal endoscopy plays a central role in both preoperative assessment and postoperative management.

However, endoscopic practice in this context presents specific challenges that are not fully addressed by conventional quality indicators.

Based on the available evidence, we propose the Bariatric Endoscopy Quality Indicators (BEQI) framework as a structured, clinically oriented strategy to guide quality in digestive endoscopy in bariatric surgery. This model integrates key aspects such as appropriate indication, knowledge of surgical anatomy, systematic inspection, standardized photodocumentation, rational biopsy sampling, structured reporting, and multidisciplinary integration.

Adoption of this approach has the potential to reduce clinical variability, improve diagnostic performance, increase patient safety, and optimize decision-making.

In conclusion, prospective multicenter validation represents the next necessary step to consolidate specific quality standards in this expanding field.

Declaration of generative AI use

An artificial intelligence image-generation tool was used solely to create the schematic illustration in Figure 1. No generative AI was used for literature search, data analysis, interpretation, or drafting of the manuscript text.

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