



Persistent Abdominal Pain After Endoscopic Sleeve Gastroplasty: A Multicenter Case Series and Hypothesis-Generating Management Framework

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Abstract

Introduction Endoscopic sleeve gastroplasty (ESG) is an established minimally invasive treatment for patients with obesity, with a favorable safety profile. Although transient abdominal pain is common in the early post-ESG period, persistent pain remains poorly characterized. We aimed to describe the clinical presentation, diagnostic evaluation, management strategies, and outcomes of patients with persistent abdominal pain after ESG, and to propose a pragmatic management pathway.

Methods We conducted a retrospective multicenter case series across six expert bariatric endoscopy centers. Patients with abdominal pain lasting more than 15 days after ESG were identified. Demographic, procedural, diagnostic, therapeutic, and follow-up data were collected.

Results Among 4,350 ESG procedures, nine patients developed persistent abdominal pain (0.21%; 95% CI, 0.09–0.39%). Mean baseline BMI was 33.7 ± 1.4 kg/m². The median interval from the 15-day post-ESG threshold to documented pain treatment was 21 days [IQR, 1–52.5]. Laboratory testing, radiologic evaluation, and endoscopy excluded major complications; one gastric wall hematoma was identified on CT. Suspected mechanisms included excessive plication-related tension (55.6%), possible extra-gastric tissue capture or adhesions (33.3%), and gastric wall hematoma (11.1%). Conservative management (mainly nutritional reset and conventional analgesia) improved symptoms in 77.8% of cases. Mean numerical pain score decreased from 4.9 ± 1.8 to 1.2 ± 1.2 . Two refractory cases required complete and selective endoscopic suture release.

Conclusions Persistent abdominal pain after ESG is uncommon but clinically relevant. A stepwise strategy prioritizing exclusion of serious adverse events, conservative management, and selective endoscopic suture release in refractory cases may be appropriate. Prospective validation is required.

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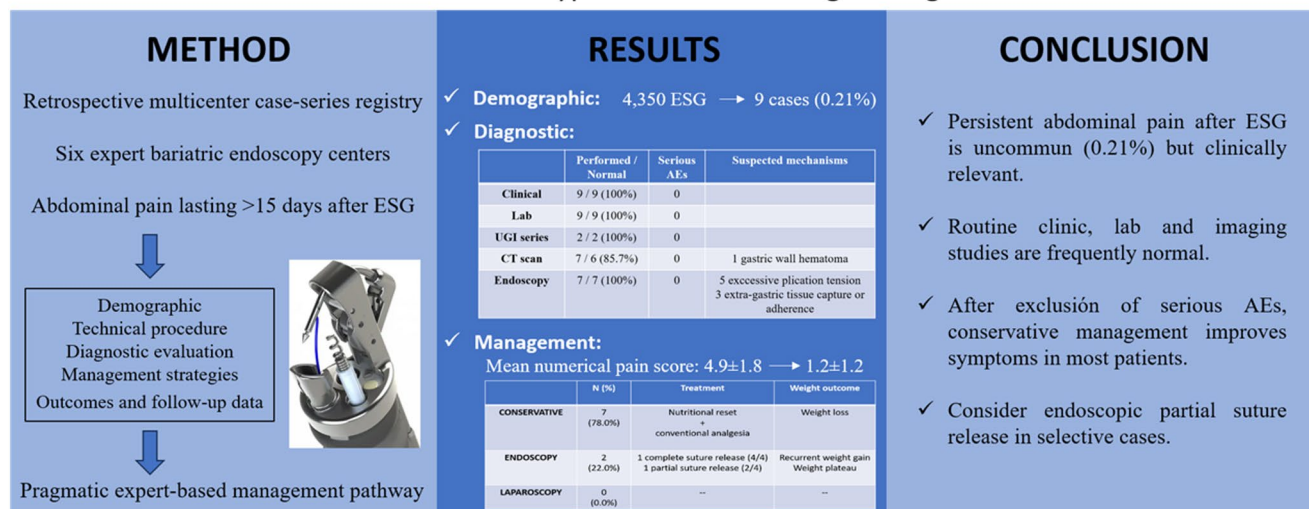
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Graphical Abstract

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Key Points

- Persistent abdominal pain after ESG is uncommon but clinically relevant.
- Conservative management (nutritional reset and conventional analgesia) improved pain in 77.8% of patients.
- Suture release was used in two refractory cases and requires careful weight monitoring.

Keywords Endoscopic sleeve gastroplasty · Persistent abdominal pain · Complications · Bariatric endoscopy · Obesity

Abbreviations

ESG	endoscopic sleeve gastroplasty
%TWL	percentage of total weight loss
SAEs	serious adverse events
PPIs	proton pump inhibitors
OMMs	obesity management medications
BMI	body mass index
AGREE	adverse events in gastrointestinal endoscopy classification
GI	gastrointestinal
VAS	visual analog scale
CT	computed tomography
UGI	upper gastrointestinal

Introduction

Obesity remains a major global health challenge associated with a range of obesity-related medical problems, reduced quality of life, and substantial healthcare burden

[1]. Endoscopic bariatric and metabolic therapies have expanded therapeutic options for patients with obesity who are not candidates for surgery, prefer minimally invasive approaches, or require alternative interventions [2–6].

Endoscopic sleeve gastroplasty (ESG) has demonstrated clinically meaningful weight loss, with an average of 15–20% total weight loss (%TWL) reported at 12–24 months and emerging longer-term outcomes [7–18]. ESG also has a favorable safety profile, with rates of serious adverse events (SAEs) generally below 2.5% [10–13]. However, although early post-procedural abdominal discomfort, nausea, and vomiting are common, persistent or delayed abdominal pain has not been systematically characterized.

Persistent symptoms may lead to repeated emergency assessments, extensive diagnostic evaluation, patient dissatisfaction and anxiety, requests for revision or reversal procedures, and financial burden [19–23]. Evidence guiding evaluation and management is limited, and clinical practice is largely based on individual experience.

The objective of this multicenter case series was to describe the clinical presentation, diagnostic evaluation, management strategies, and clinical outcomes of patients with abdominal pain persisting beyond 15 days after ESG. We also sought to propose a pragmatic, hypothesis-generating expert framework for evaluation and management.

Methods

Study Design and Setting

This retrospective multicenter case series included patients with persistent abdominal pain after ESG who were identified at six expert bariatric endoscopy centers. The study period was January 2014 to December 2025 and included 4,350 ESG procedures. Case ascertainment was based on routine follow-up, patient-initiated contact, emergency assessment, study dataset review, or a combination thereof. Because this was a retrospective case series, the observed frequency should be interpreted as a lower-bound estimate rather than a population incidence (Fig. 1).

The six contributing endoscopists represented the six participating centers (one per center), and used similar pre- and postoperative pathways, but diagnostic evaluations and treatment decisions were performed according to local clinical practice. There was no centralized adjudication. No single prospective surveillance or centrally enforced diagnostic protocol was used. This heterogeneity was considered when interpreting the findings.

ESG Periprocedural Care

All ESG procedures were performed using the OverStitch™ Endoscopic Suturing System (Apollo Endosurgery Inc., Austin, TX, USA; currently Boston Scientific, Marlborough,

MA, USA) according to standardized institutional protocols within multidisciplinary bariatric programs. Procedures were performed by experienced ESG endoscopists under general anesthesia, using CO₂ insufflation and a dedicated 25-cm overtube. A single intravenous dose of an antibiotic and a proton pump inhibitor (PPI) were routinely administered before the procedure.

Sutures were placed from distal to proximal, beginning at the incisura angularis and extending toward the fundus, thereby creating a tubular gastric configuration. The antrum and lesser curvature were intentionally preserved. The suture pattern, number of sutures, and number of stitches were left to the discretion of the endoscopist. Final endoscopic inspection was performed to confirm the new gastric configuration and exclude immediate complications.

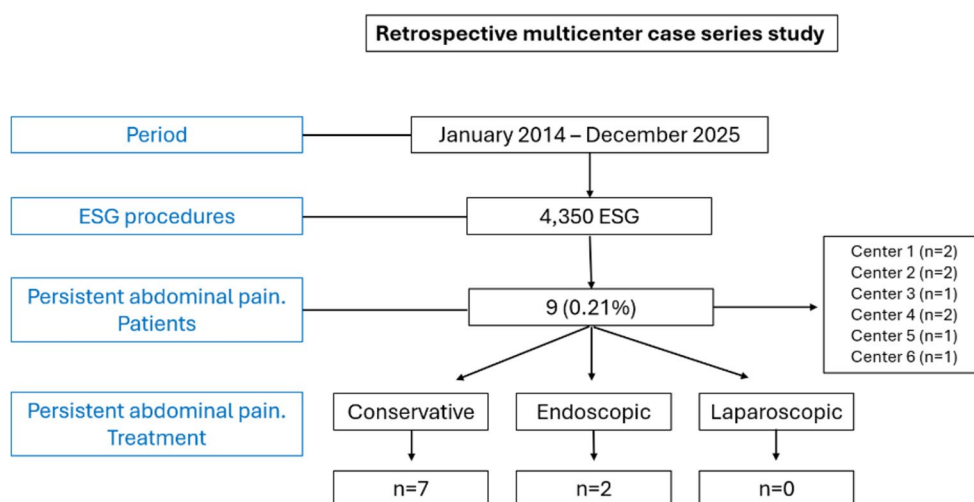
Preprocedural education was delivered within multidisciplinary bariatric programs and included nutritional counseling, psychological assessment and counseling, nursing education, dietary progression instructions, medication education, and a follow-up schedule. The authors acknowledge that adherence to these elements was not prospectively quantified in the registry.

All participating centers used similar postoperative dietary advancement schedules and medication regimens. A liquid diet was prescribed for 2 weeks, followed by gradual progression to soft and then hypocaloric solid food. Oral analgesics and antiemetics were generally prescribed for 1–3 days, while PPIs were prescribed for 6–8 weeks. No obesity management medications (OMMs) were used.

Participants and Data Collection

Persistent abdominal pain was arbitrarily defined, for the purposes of this exploratory study, as abdominal pain continuing beyond 15 days after ESG. This threshold was derived from clinical experience and was not based on a validated definition.

Fig. 1 Flowchart showing patient's selection and inclusion in the study, and treatment options



All patients included in the study had abdominal pain lasting more than 15 days after ESG. Data were retrospectively extracted using a standardized spreadsheet. Variables included:

- a) Baseline characteristics: age, sex, and baseline BMI.
- b) Procedural characteristics: suture pattern, number of sutures and stitches, intraoperative incidents, and adverse events classified according to the AGREE classification for adverse events in gastrointestinal (GI) endoscopy [24].
- c) Clinical evolution: timing of pain onset, duration, intensity, and associated symptoms were assessed retrospectively from available prospectively collected data. Information was obtained from medical records and clinical documentation at baseline and at 3-month follow-up after specific treatment. When pain-related variables were not explicitly documented, patients were contacted to obtain missing information, and a numerical pain intensity score was estimated from the clinical history and documented findings. For consistency, pain intensity was reported as a numerical pain score on a 0–10 scale (adopting the Visual Analog Scale - VAS score as a reference); however, these scores represent documented or retrospectively reconstructed pain assessments rather than standardized VAS measurements.
- d) Diagnostic investigations: laboratory testing, computed tomography (CT), upper gastrointestinal (UGI) series, and upper endoscopic findings were obtained according to the usual clinical practice of each center. A final suspected mechanism was assigned by the bariatric team based on expert interpretation of the available findings.
- e) Treatment strategies: conservative treatment (dietary modification, nutritional reset, hydration, and bowel regulation); medications (PPIs, opioid and non-opioid analgesics, antibiotic, antiemetics, and corticosteroids); and endoscopic, radiologic, or surgical management were recorded. When endoscopic suture release was required, endoscopic scissors were used to cut the higher-tension sutures at the discretion of the experienced endoscopist.
- f) Outcomes: numerical pain score on a 0–10 scale, and weight evolution 3 months after abdominal pain treatment were recorded. Clinical improvement was defined when the numerical pain score decreased, and complete resolution was defined when the final value of the numerical score was 0. Weight trajectory was categorized as weight loss ($>5\%$ TWL), weight plateau (0–5% TWL), or recurrent weight gain. No obesity management medications (OMMs) were used.
- g) Recommendations: the endoscopist and the bariatric team provided final recommendations based on their experience with the case. These recommendations were

combined into a proposed clinical algorithm, which is hypothesis-generating and will require prospective validation in a larger cohort.

Follow-up and Outcomes

Patients were followed with the study dataset target of assessment at 3 months after treatment. Follow-up was complete for 9/9 (100%) patients. The primary descriptive outcomes were the observed number of identified cases, clinical presentation, diagnostic findings, treatment strategy, and pain trajectory. Weight outcomes were reported as weight loss ($>5\%$ TWL), weight plateau (0–5% TWL), and recurrent weight gain.

The proposed management framework was not pre-specified as a formal study outcome. Rather, it represents a hypothesis-generating synthesis of the treating endoscopists' experience and the registry findings. No formal Delphi process, voting procedure, or agreement threshold was used.

Statistical Analysis

Continuous variables were reported as mean $\pm$ standard deviation or median with interquartile range [IQR], as appropriate. Categorical variables were summarized as frequencies and percentages. The Wilcoxon signed-rank test was used to compare paired numerical pain score at baseline and 3-month follow-up. Spearman rank correlation was used to explore associations between the number of sutures or stitches and numerical pain score. Given the small sample size and exploratory design, these analyses should be interpreted cautiously, and no causal inference was made. The 95% CI for the observed frequency proportion was calculated using the exact binomial (Clopper–Pearson) method. Statistical significance was defined as a two-sided p -value < 0.05 . Statistical analyses were performed using SPSS version 27.0 (IBM Corp., Armonk, NY, USA).

Ethical Considerations

The study was conducted in accordance with the Declaration of Helsinki and local institutional ethical regulations. All procedures were performed after informed consent. All data were anonymized before analysis.

Data Availability

The datasets generated and/or analyzed during the current study are not publicly available because they contain potentially identifiable clinical information from a small case

Table 1 Baseline characteristics, patient and procedural data included in the registry

Variable	Value
Registry characteristics	
Contributing endoscopist (one per center), <i>n</i>	6
Total ESG procedures, <i>n</i>	4,350
Cases of persistent abdominal pain, <i>n</i>	9
Observed frequency of persistent abdominal pain, %	0.21% (95% CI, 0.09– 0.39%)
Patient data	
Age (mean±SD), <i>years</i>	44.3±6.7
Female, <i>n</i> (%)	5 (55.6%)
Baseline BMI (mean±SD), <i>kg/m</i> ²	33.7±1.4
Procedural data	
Number of sutures (mean±SD), <i>n</i>	4.6±0.9
Number of stitches (mean±SD), <i>n</i>	31.2±13.8
Baseline numerical pain intensity score (mean±SD)	4.9±1.8
Time from 15 days after ESG to documented pain treatment (median), [IQR], <i>days</i>	21 [1–52.5]

series but may be available from the corresponding author on reasonable request, subject to institutional and ethical restrictions.

The manuscript has been prepared with reference to the applicable STROBE recommendations for observational studies.

Results

Incidence and Baseline Characteristics

Among 4,350 ESG procedures performed across six participating centers during the study period, nine patients were identified from the retrospective case series dataset as having persistent abdominal pain beyond the predefined 15-day threshold. The observed proportion was 0.21% (9/4,350; 95% CI, 0.09–0.39%). This figure should be interpreted as an observed lower-bound frequency rather than a definitive

incidence (Fig. 1; Table 1). The nine patients constituted the entire analytic cohort; no comparator group of patients without persistent pain was available.

The mean patient age was 44.3±6.7 years; five (55.6%) were female, and the mean baseline BMI was 33.7±1.4 kg/m². All procedures used a predominantly ‘U-shaped’ suture pattern, and in one case it was completed by an additional ‘Z-shaped’ pattern. The mean number of sutures was 4.6±0.9 (range, 4–6), and the mean number of stitches was 31.2±13.8 (range, 15–48) (Tables 1 and 2).

Clinical Presentation and Follow-up

The median interval from the 15-day post-ESG threshold to documented pain treatment was 21 days [IQR, 1–52.5]. Baseline documented numerical pain scores ranged from 3 to 7 (mean, 4.9±1.8). Associated symptoms were uncommon. No patients had fever, tachycardia, hypotension, GI bleeding, persistent vomiting, dyspnea, or hypoxia, and all patients were able to tolerate oral intake. Follow-up was completed in all nine patients approximately 3 months after treatment for abdominal pain.

A moderate positive trend was observed between the number of sutures and numerical pain score (Spearman $\rho=0.474$; $p=0.198$). The number of stitches showed a moderate negative correlation with numerical pain score (Spearman $\rho=-0.512$; $p=0.159$). Neither association reached statistical significance in this cohort.

Diagnostic Evaluation (Fig. 2, Tables 3 and 4)

Initial specialist clinical assessment and laboratory testing were performed in all nine cases and were normal. The assessment consisted of clinical history, physical examination, vital signs, oral intake, associated symptoms, and review for clinical red flags as documented in the medical records. Although laboratory tests were not uniform, in most

Table 2 Individualized patient demographic, clinical, and procedural characteristics

Patient	Age (years)	Sex ¹ (F/M)	BMI (kg/m ²)	Suture pattern ²	Sutures (number)	Stitches (number)	Time ³ (days)	Pain ⁴ (0–10)
1	50	F	36	‘U’	4	35	180	7
2	45	F	35	‘U’	4	32	60	6
3	38	M	32	‘U’	4	48	1	3
4	39	M	33	‘U’	4	46	1	3
5	38	M	32	‘U’	4	48	1	3
6	54	F	34	‘U+Z’	4	17	1	3
7	37	F	33	‘U’	6	20	45	6
8	45	M	35	‘U’	5	15	28	7
9	53	F	33	‘U’	6	20	21	6

¹F/M Female / Male, ²Suture pattern ‘U’ U-shaped suture pattern, ‘U+Z’ additional Z-shaped suture pattern, ³Time interval from the 15-day post-ESG threshold to documented pain treatment, ⁴Pain score numerical pain score on a 0–10 scale (Visual Analog Scale used as reference)

Fig. 2 Proposed hypothesis-generating stepwise clinical algorithm for the evaluation and management of persistent abdominal pain after ESG *This algorithm represents expert opinion derived from this case series findings and should be considered hypothesis-generating. Prospective validation is required

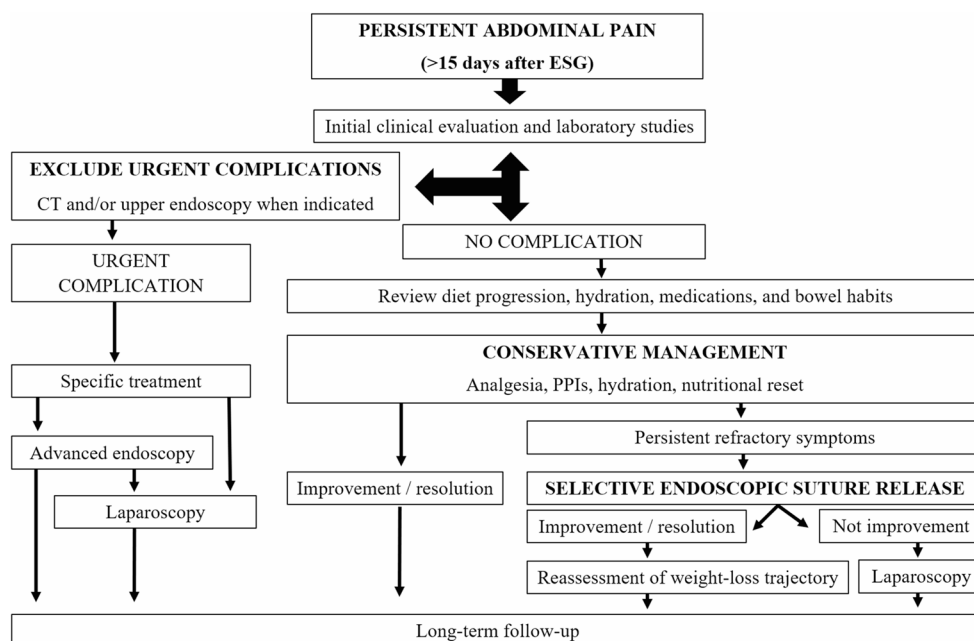


Table 3 Diagnostic evaluation, treatment strategies, and clinical outcomes

Variables	n (%)	
Diagnostic evaluation	Performed	Normal
	n (%)	n (%)
Clinical evaluation	9 (100%)	9
Laboratory tests	9 (100%)	(100%)
CT scan	7 (77.8%)	9
UGI series	2 (22.2%)	(100%)
UGI Endoscopy	7 (77.8%)	6
		(85.7%)
		2
		(100%)
		7
		(100%)
Treatment strategies		
Conservative treatment	7 (77.8%)	
- Complete resolution of abdominal pain	- 3 (42.9%)	
- Mild improvement in abdominal pain	- 4 (57.1%)	
Endoscopic suture release	2 (22.2%)	
- Complete resolution of abdominal pain	- 1 (50.0%)	
- Partial improvement in abdominal pain	- 1 (50.0%)	
Needs for laparoscopy	0 (0.0%)	
Clinical outcomes		
Numerical pain score at baseline and 3-month follow-up (mean ± SD):		
- Baseline	4.9 ± 1.8	
- Final	1.2 ± 1.2	
Weight evolution:		
- Weight loss (>5% TWL)	7 (77.8%)	
- Weight plateau (0–5% TWL)	1 (11.1%)	
- Recurrent weight gain	1 (11.1%)	

cases they included a complete blood count, C-reactive protein, electrolytes, liver enzymes and pancreatic enzymes as routine tests.

UGI series were performed in two patients and showed no abnormality. CT was performed in seven patients and identified one posterior gastric wall hematoma (11.1%). Upper endoscopy was performed in seven patients and excluded leaks, obstruction, ulceration, and mucosal ischemia. The expert endoscopists considered excessive plication tension as the suspected mechanism in five patients (55.6%) and possible extra-gastric tissue capture or adhesions in three patients (33.3%). These were hypotheses based on expert interpretation rather than established diagnoses. No patient needed diagnostic or therapeutic laparoscopy.

Suspected Etiologies

The suspected mechanisms were based mostly on expert endoscopist and bariatric team interpretation of the available clinical and procedural findings:

- Excessive plication tension or traction-related pain, considered the most likely explanation in 5 patients (55.6%) based on endoscopist's expert interpretation.
- Possible extra-gastric tissue capture or adhesion, expert-suggested in 3 patients (33.3%).
- A posterior gastric wall hematoma, diagnosed by CT in 1 patient (11.1%). This was the only case with an objective structural diagnosis.

Non-adherence to postoperative dietary or pharmacologic protocols was identified in three patients (33.3%) as a potential contributor to symptom persistence (Table 4, patients 7, 8 and 9). These patients were treated mainly with dietary

Table 4 Individual diagnostic findings, suspected mechanisms, treatments, and outcomes

Case	Analytics	CT scan	UGI series	Endoscopy	Suspected mechanism	Treatment	Pain score* Initial / final ¹	Weight ³
1	Normal	Normal	-	Normal	Excessive plication tension	Analgesic + Complete suture release	7 / 0	RWG
2	Normal	Normal	-	Normal	Excessive plication tension	Analgesic + Partial suture release	6 / 3	WP
3	Normal	Normal	-	Normal	Extra-gastric tissue capture / adhesion	Analgesic	3 / 2	WL
4	Normal	Normal	-	Normal	Extra-gastric tissue capture / adhesion	Analgesic	3 / 2	WL
5	Normal	Normal	-	Normal	Extra-gastric tissue capture / adhesion	Analgesic	3 / 2	WL
6	Normal	Normal	-	Normal	Excessive plication tension	Analgesic	3 / 2	WL
7	Normal	-	Normal	-	Excessive plication tension ²	Dietary + Analgesic	6 / 0	WL
8	Normal	Gastric wall hematoma	Normal	Normal	Gastric wall hematoma	Dietary + Analgesic	7 / 0	WL
9	Normal	-	-	-	Excessive plication tension ²	Dietary + Analgesic	6 / 0	WL

*Pain score: numerical pain score on a 0-10 scale (Visual Analog Scale used as reference)

¹Initial/Final, baseline / 3 month after treatment for abdominal pain. ²Suspected mechanism based on the ESG procedure report. ³Weight: WL, weight loss (>5% TWL); WP, weight plateau (0-5% TWL); RWG, recurrent weight gain. No OMMs were used during the follow-up

modification, nutritional reset, hydration, bowel regulation, and low-dose medications, including PPIs and analgesics.

Management and Outcomes (Fig. 2; Tables 3 and 4)

Conservative management was the first-line strategy in all nine cases. This included dietary reassessment and nutritional reset according to the immediate post-procedural protocol when indicated, hydration, bowel regulation, acid suppression, and optimization of non-opioid analgesia.

Analgesic regimens varied by center and included paracetamol and hyoscine butylbromide/scopolamine, with dextropropofen, ketorolac, metamizole, tramadol, and/or aprepitant used selectively. No patient needed antibiotics or corticosteroids. Numerical pain score decreased from 4.9 ± 1.8 at baseline to 1.2 ± 1.2 at 3-month follow-up. The mean change was -3.67 ± 2.78 points (95% CI: Wilcoxon signed-rank test, $W=0$, exact two-sided $p=0.0039$).

Seven patients ultimately remained on conservative management; three of these patients achieved complete documented symptom resolution (42.9%), while four experienced mild improvement (57.1%). The two patients with persistent symptoms underwent endoscopy with sedation and suture release. One patient underwent complete suture release (4/4) at 180 days after ESG and had complete symptom resolution; the other patient underwent selective

suture release (2/4) judged to be the more tense at 60 days after ESG and had partial symptom improvement. No patient needed radiologic drainage or surgery. No mortality occurred.

The seven conservatively managed patients continued to lose weight (%TWL > 5%). Weight trajectories differed after suture release: the patient who underwent complete suture release had recurrent weight gain, whereas the patient who underwent partial suture release had continued weight loss with a lower subsequent trajectory (weight plateau). OMMs were not used during follow-up.

Overall, final standard diagnostic evaluations did not identify any major complication. Seven patients had events classified as AGREE grade I, whereas the two patients who required endoscopic suture release had events classified as AGREE grade IIIa.

The proposed management framework represents an authors' synthesis of the clinical experience across the participating centers and should be regarded as hypothesis-generating expert guidance (Fig. 2; Table 5). The framework prioritizes clinical reassessment and exclusion of urgent complications, evaluation of modifiable postoperative factors, conservative treatment, and consideration of selective endoscopic suture release in selected refractory cases or diagnostic laparoscopy if persistent or worsening symptoms remain unexplained.

Table 5 Proposed stepwise management framework

Step	Action	Rationale / escalation
1	Clinical reassessment	History, physical examination, vital signs, and laboratory testing. Identify red flags and assess oral intake, hydration, bowel function, diet progression, and medication adherence.
2	Exclude urgent complications	Consider CT abdomen/pelvis with contrast and/or upper endoscopy when clinically indicated. To assess bleeding, leak, perforation, abscess, obstruction, ulceration, ischemia, or other acute pathology.
3	Optimize conservative management	Dietary reassessment/reset, hydration, bowel regimen, acid suppression, antiemetics when needed, and appropriate analgesia. Close clinical reassessment rather than nonspecific prolonged watchful waiting.
4	Refractory symptoms	Consider selective endoscopic suture release or modification in carefully selected patients after other important causes have been excluded. Complete reversal should not be routine and requires discussion of potential effects on anatomy and weight trajectory. Consider laparoscopy if refractory symptoms persist.
5	Consider diagnostic laparoscopy	If persistent or worsening symptoms remain unexplained after appropriate noninvasive evaluation. When adjacent-organ injury, extra-gastric suture capture, adhesions, or another surgically correctable process remains clinically suspected.
6	Long-term follow-up	Monitor symptoms and weight trajectory. Consider obesity management medications (OMMs) when clinically appropriate.

This framework is hypothesis-generating and synthesized retrospectively from the experience of the six participating endoscopists. No formal Delphi methodology, voting process, or predefined agreement threshold was used. Prospective validation is required

Discussion

This multicenter case series describes the clinical presentation, diagnostic evaluation, management strategies, and outcomes of nine patients identified with persistent abdominal pain after ESG across six bariatric expert centers. The observed estimated frequency was low (0.21% of the 4,350 procedures in the case series), suggesting that this event is uncommon but clinically meaningful. This should be regarded as a lower-bound estimate because case ascertainment and complete follow-up of the entire denominator were not prospectively standardized. The study therefore provides descriptive information about patients who came to clinical attention rather than a reliable population incidence. Available literature predominantly reports overall adverse events

and early post-procedural symptoms, so the 0.21% figure should not be compared directly with, rather than a standardized incidence of pain persisting beyond 15 days post-ESG. Therefore, a direct comparison with a published incidence of persistent post-ESG pain is not currently possible.

Although transient abdominal discomfort, nausea, and vomiting are expected during the early post-ESG period, persistent abdominal pain remains poorly characterized. In this study, the predefined threshold of more than 15 days was exploratory and was based on clinical experience. The investigators considered that postoperative symptoms and the need for analgesics would generally be expected to have substantially resolved by this time; however, this investigator-derived threshold should be considered a working hypothesis requiring further validation.

From a technical standpoint, prevention is essential. Previous technical reports have emphasized the importance of appropriate suture placement, adequate tissue acquisition, appropriate bite depth, and avoidance of excessive plication tension to reduce the risk of traction-related discomfort and other ESG-related adverse events [25–26].

The diagnostic work-up was intentionally pragmatic rather than standardized. Diagnostic evaluations excluded major complications. Specialist assessment and laboratory tests were normal in all patients, while CT and upper endoscopy mainly ruled out clinically significant events such as leaks, obstruction, mucosal injury, or ischemia. Similar to other endoscopic bariatric procedures, early recognition and exclusion of SAEs remain essential for patient safety [2–3]. Although diagnostic evaluation was not uniform across centers, the favorable clinical evolution with pain improvement or resolution in all cases suggests that major complications were unlikely to have been missed. Diagnostic laparoscopy therefore deserves consideration in patients with persistent or worsening symptoms when noninvasive evaluation is nondiagnostic and a surgically correctable process remains clinically suspected.

The mechanisms underlying persistent abdominal pain remain uncertain and are probably multifactorial. Technical factors such as the learning curve, full-thickness tissue capture, excessive traction, plication tension, serosal irritation, inflammatory response, and individual patient-related factors may contribute [27–29]. The number of sutures showed a positive but non-significant correlation with pain score, whereas the number of stitches showed a negative but non-significant correlation. Given the very small sample size, limited variability in the number of sutures, and exploratory nature of the study, these observations are considered only hypothesis-generating. There was no statistically significant association, and the direction of these correlations should not be interpreted as evidence of causation. The observed trend should therefore be interpreted cautiously.

An important finding of this study was the apparent benefit of a conservative-first approach after exclusion of major adverse events. Structured postoperative dietary education and close follow-up may also help identify patients with symptoms related to premature dietary progression, overeating, dehydration, or altered bowel habits. Most patients improved with conservative measures including dietary reassessment, nutritional reset, hydration, bowel regulation, acid suppression, and optimized non-opioid analgesia [19–21, 30]. In this cohort, analgesic regimens varied by center but predominantly relied on non-opioid strategies, with opioids used selectively rather than as routine therapy. Thus, after exclusion of clinically significant adverse events, a conservative approach incorporating dietary and hydration measures together with non-opioid analgesia appears reasonable as an initial management strategy. Persistent symptoms may generate patient dissatisfaction, anxiety, repeated healthcare utilization, requests for reversal, and financial impact [19–23]; therefore, reassurance and a structured evaluation pathway are essential.

Endoscopic suture release was required in only two refractory cases. Revisional strategies after endoscopic bariatric therapies should carefully balance symptom resolution with preservation of weight-loss efficacy [31]. Selective rather than complete suture release may theoretically preserve part of the gastric tubular sleeve effect and could be considered when focal traction-related pain is suspected. In our opinion, complete reversal should not be routinely performed because of its potential impact on weight-loss durability. In selected patients, partial release combined with obesity management medications (OMMs) could be considered as an alternative strategy, although this approach was not evaluated in the present cohort.

The proposed algorithm is intended as a practical, hypothesis-generating framework rather than a validated clinical guideline. It was synthesized retrospectively from the experience of the six participating endoscopists; no formal consensus methodology was used. Prospective studies should validate standardized definitions, case ascertainment, diagnostic pathways, pain measurement, and treatment thresholds.

Limitations

This study has several limitations, including its retrospective design, small sample size, potential under-reporting, heterogeneity in diagnostic evaluation and clinical management, inability to establish a causal relationship between technical variables and abdominal pain, and absence of an asymptomatic comparator group. Although some pain scores were documented prospectively, other patients required direct contact or retrospective estimation based on

the medical history, limiting the validity and comparability of the pain measurements. In addition, all patients had BMI values between 32 and 36 kg/m², so the findings may not generalize to patients with higher BMI, in whom gastric anatomy and suture tension may differ.

Prospective validation of the management algorithm is required before clinical adoption. Nevertheless, given the scarcity of available evidence, these data provide clinically relevant insights into a rare but meaningful post-ESG symptom and support a pragmatic management pathway. Prospective multicenter studies with standardized definitions, systematic follow-up, and longer-term outcomes are required to validate these findings and establish evidence-based recommendations.

Conclusion

Persistent or delayed abdominal pain after ESG is uncommon among patients identified in this retrospective case series but warrants structured clinical assessment. A stepwise approach that excludes serious complications, optimizes conservative treatment, and considers selective endoscopic intervention in refractory cases may provide a rational management strategy. The conservative approach may help balance patient safety with preservation of ESG-related weight-loss outcomes, but prospective validation in larger cohorts is necessary.

Author contributions All authors have done substantial contributions to conception, design, acquisition, analysis and/or interpretation of data. All authors participate in drafting the article or revising it critically for important intellectual content; and all authors give final approval of the version to be submitted and any revised version to be published.

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Data Availability No datasets were generated or analysed during the current study.

Declarations

Ethics Approval and Consent to Participate The study was conducted in accordance with the Declaration of Helsinki and local institutional ethical regulations. Data were anonymized before analysis. All procedures were performed after informed consent.

Informed Consent Written informed consent was obtained from all patients before the ESG procedure. The study was conducted in accordance with local institutional requirements; for the retrospective use of anonymized case series clinical data, Informed Consent was not applicable.

Competing Interests The authors declare no competing interests.

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