CLINICAL OUTCOMES OF CONCOMITANT LAPAROSCOPIC SLEEVE GASTRECTOMY AND POSTERIOR CRUROPLASTY IN PATIENTS WITH MORBID OBESITY AND HIATAL HERNIA

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Abstract. Background. *Morbid obesity is frequently accompanied by hiatal hernia (HH) as a consequence of chronically elevated intra-abdominal pressure and progressive weakening of the esophageal hiatus. Laparoscopic sleeve gastrectomy (LSG) is the most widely performed bariatric procedure worldwide, yet it carries a recognised risk of provoking or aggravating gastroesophageal reflux disease (GERD) when an underlying HH is left uncorrected. Concurrent hiatal repair has therefore been advocated, although the optimal strategy and its durability remain debated.*

Objective. *To evaluate the 12-month clinical efficacy, safety profile and reflux-control of simultaneous LSG and posterior cruroplasty in patients with morbid obesity and concomitant HH.*

Methods. *A retrospective cohort study was conducted on 43 consecutive patients with morbid obesity and radiologically or intraoperatively confirmed HH who underwent LSG with posterior cruroplasty between 2023 and 2024 at the clinical base of Tashkent State Medical University. Postoperative surveillance followed a structured schedule with clinical and instrumental assessment at 1, 3, 6 and 12 months. Paired categorical data (presence versus absence of GERD symptoms) were analysed with the McNemar test; a threshold of $p < 0.05$ was considered significant.*

Results. *At the one-month assessment, 41 of 43 patients (95.3%) demonstrated complete resolution or marked mitigation of GERD symptoms, representing a highly significant improvement over the preoperative state (McNemar $\chi^2 = 39.0$, $p < 0.001$). Transient dysphagia occurred in 4 patients (9.3%) during the early postoperative period and resolved with conservative and dietary management within 14 days in every case. Instrumental imaging at 12 months identified minor HH recurrence in 3 patients (6.9%), all of whom remained clinically stable. No staple-line leak, major intraoperative complication, reoperation or mortality was recorded, and the mean postoperative length of stay was 3 ± 1 days.*

Conclusions. *Concomitant LSG and posterior cruroplasty is a safe and highly effective strategy for the morbidly obese patient with hiatal hernia. The approach delivers excellent GERD symptom control (95.3%) with a low anatomical recurrence rate (6.9%) at one year, supporting its role as a preferred surgical paradigm to enhance postoperative quality of life. Longer-term objective follow-up is warranted.*

Keywords: *Sleeve gastrectomy; Hiatal hernia; Posterior cruroplasty; Gastroesophageal reflux disease; Bariatric surgery; Morbid obesity*

1. Introduction.

Obesity has become one of the defining public-health challenges of the present era, and metabolic and bariatric surgery is currently the most durable and effective treatment for severe obesity and its associated metabolic disease. Among the available operations, laparoscopic sleeve gastrectomy (LSG) has been the most frequently performed primary bariatric procedure worldwide for more than a decade, owing to its relative technical simplicity, favourable weight-loss profile and comparatively low early morbidity. [1, 2] Successive international registry reports and consensus statements confirm that the sleeve now accounts for the majority of primary metabolic operations across most national chapters, and the 2022 revision of the joint indications broadened the population eligible for surgical treatment. [2, 3]

Hiatal hernia (HH) is disproportionately common in the population presenting for bariatric surgery. Cross-sectional studies using preoperative contrast radiography have identified a hiatal defect in approximately 37–40% of morbidly obese candidates, and endoscopic series report even higher figures. [4, 5] The mechanistic link is well established: central adiposity generates a sustained increase in intra-abdominal pressure and an augmented abdomino-thoracic pressure gradient, which both promote herniation of the gastric cardia through a progressively patulous hiatus and impair the competence of the esophagogastric junction. [4, 5] A hiatal hernia in turn aggravates reflux by reducing lower-esophageal-sphincter pressure and by creating an acid reservoir above the diaphragm that is difficult to clear, and a direct correlation between hernia size and reflux severity has been described.

The relationship between the sleeve and gastroesophageal reflux disease (GERD) is more complex and remains a subject of active debate. While the operation reliably induces weight loss and can reduce reflux in some patients, a substantial body of evidence indicates that LSG may aggravate pre-existing reflux or provoke de novo GERD. [6, 7, 8] Proposed mechanisms include resection of the gastric fundus and the sling fibres that contribute to the antireflux barrier, disruption of the angle of His, reduced gastric compliance with a consequent rise in intragastric pressure, and, over time, neo-fundus formation and sleeve dilatation. [6, 10, 11] Systematic reviews with objective testing have shown that the distal esophagus can be exposed to increased acid after sleeve, and national analyses have reported worsening reflux in a meaningful proportion of patients with pre-existing GERD. [7, 9] For this reason, several groups have historically regarded significant GERD or a sizeable hiatal hernia as a relative contraindication to the sleeve, favouring Roux-en-Y gastric bypass in such circumstances. [9]

Against this background, concurrent hiatal hernia repair at the time of sleeve gastrectomy has been advocated as a means of restoring the antireflux anatomy and mitigating postoperative reflux. [12, 13] The rationale is intuitive — reduction of the herniated cardia, circumferential mobilisation of the esophagogastric junction and re-approximation of the diaphragmatic crura should re-establish an adequate segment of intra-abdominal esophagus and reduce the pressure gradient across the junction. However, the clinical evidence has been heterogeneous. Some series report meaningful symptomatic and endoscopic improvement after concomitant repair, [13, 14, 16, 17] whereas others have found that repair resolves reflux in only a minority of symptomatic patients and does not reliably prevent de novo symptoms. [15] A contemporary systematic review and meta-analysis of eighteen studies concluded that the addition of hiatal repair to the sleeve is associated with a significant reduction in reflux symptoms and esophagitis and is superior to the sleeve alone for reflux remission, while acknowledging persisting uncertainty around de novo reflux and anatomical recurrence. [20]

A further point of technical controversy concerns the method of crural closure. Posterior cruroplasty by simple interrupted suture is the most widely applied technique, but reinforcement of the repair with absorbable or synthetic mesh has been proposed for larger defects in an attempt to reduce recurrence, with prospective comparative work suggesting that reinforcement may improve reflux control in selected patients at the cost of a potential increase in dysphagia. [21, 22, 25] Long-term data indicate that a posterior cruroplasty combined with a correctly constructed sleeve can achieve durable results, albeit with an anatomical recurrence rate in the region of ten per cent at five years. [23, 24] Because the sleeve is associated with a measurable long-term risk of erosive esophagitis and Barrett’s esophagus, the ability of concomitant repair to control reflux carries importance beyond symptom relief alone. [26]

Robust, prospectively collected outcome data from bariatric centres in Central Asia remain limited, and locally generated evidence is valuable for informing regional practice. The present study was therefore designed to evaluate the twelve-month clinical efficacy, safety and reflux-control of simultaneous laparoscopic sleeve gastrectomy and posterior cruroplasty in a consecutive cohort of morbidly obese patients with concomitant hiatal hernia treated at the clinical base of Tashkent State Medical University.

2. Materials and Methods.

2.1 Study design and setting

This was a single-centre, retrospective observational cohort study conducted at the clinical base of Tashkent State Medical University, Tashkent, Uzbekistan. Consecutive patients with morbid obesity and concomitant hiatal hernia who underwent laparoscopic sleeve gastrectomy with posterior cruroplasty between 2023 and 2024 were identified from a prospectively maintained surgical database, and their records were reviewed for the present analysis. The study was reported in accordance with recognised guidance for observational studies.

2.2 Patient population

Adults aged 18 years or older with a body mass index (BMI) of at least 35 kg/m² who fulfilled accepted indications for metabolic surgery and in whom a hiatal hernia of up to 3 cm was demonstrated preoperatively on contrast radiography or upper endoscopy, or was confirmed at operation, were considered eligible. [3] Patients were excluded if they had a previous foregut or antireflux operation, a hiatal hernia larger than 3 cm or a complex paraesophageal hernia requiring an alternative reconstruction, a BMI below 35 kg/m², severe or long-standing gastroesophageal reflux symptoms, type 2 diabetes mellitus, an established diagnosis of Barrett's esophagus or esophageal dysmotility, or if follow-up data were incomplete. Application of these criteria yielded a final analytic cohort of 43 patients. The selection pathway is summarised in Figure 1.

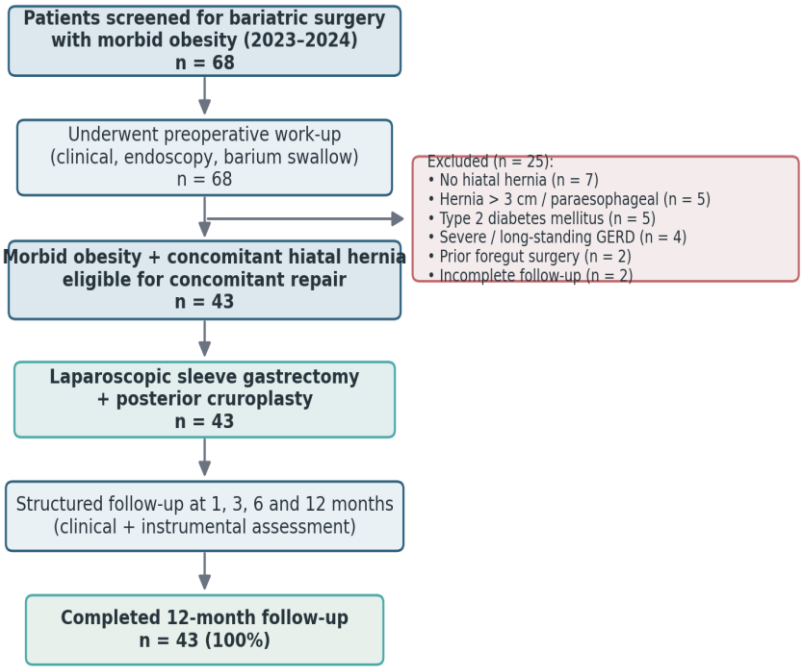


Figure 1. **Patient selection and study flow. Of 68 morbidly obese candidates screened, 43 with concomitant hiatal hernia underwent simultaneous laparoscopic sleeve gastrectomy and posterior cruroplasty and completed 12-month follow-up.**

2.3 Preoperative evaluation

All patients underwent a standardised multidisciplinary work-up comprising anthropometric assessment, biochemical and nutritional screening, and evaluation of obesity-related comorbidity. Foregut assessment included symptom-directed history using a structured reflux questionnaire, upper gastrointestinal endoscopy, and barium contrast study to document the presence and size of a hiatal hernia and any erosive esophagitis, graded by the Savary-Miller classification. The severity of reflux-

related quality-of-life impairment was quantified with the Gastroesophageal Reflux Disease Health-Related Quality of Life (GERD-HRQL) instrument, and daily proton-pump-inhibitor (PPI) requirement was recorded. The final decision to perform a concomitant hiatal repair was confirmed intraoperatively on direct assessment of the crura and the hiatal defect area.

2.4 Surgical technique

Operations were performed laparoscopically under general anaesthesia with the patient in the reverse-Trendelenburg (French) position. After establishment of pneumoperitoneum and placement of the working ports, dissection of the greater curvature was begun approximately 4-6 cm proximal to the pylorus and continued cephalad to the angle of His using an advanced energy device, with complete mobilisation of the gastric fundus and full exposure of the left crus. [12] The hiatus was then addressed: the hernia sac was reduced, the esophagogastric junction was circumferentially dissected within the posterior mediastinum, and an adequate length (≥ 2–3 cm) of intra-abdominal esophagus was restored while preserving, where feasible, the phrenoesophageal attachments. [21]

Posterior cruroplasty was carried out in all patients by approximation of the right and left diaphragmatic crura behind the esophagus with interrupted non-absorbable sutures; a simple suture repair was used throughout and no patient required mesh or other reinforcement, consistent with the exclusion of large hiatal defects. [21] The sleeve was then constructed over a 36–38-French orogastric bougie, with sequential firing of the linear stapler from the antrum to the angle of His and the final staple line kept approximately 1 cm lateral to the angle of His to avoid narrowing of the esophagogastric junction. [12] The staple line was inspected and, where indicated, reinforced, and integrity was confirmed with an intraoperative methylene-blue leak test before completion.

2.5 Postoperative care and follow-up

A standardised enhanced-recovery pathway was applied, with early mobilisation, staged reintroduction of a graduated diet and routine antiemetic and antithrombotic prophylaxis. Structured follow-up was undertaken at 1, 3, 6 and 12 months. At each visit patients were assessed clinically for reflux symptoms (heartburn and regurgitation) and dysphagia, the GERD-HRQL score and PPI requirement were recorded, and weight and BMI were documented. Instrumental assessment by barium swallow and/or upper endoscopy was performed to evaluate the anatomical result and to detect hiatal hernia recurrence, with imaging at 12 months forming the reference point for the recurrence analysis.

2.6 Outcome measures

The primary outcome was control of GERD, defined as complete resolution or clinically significant mitigation of reflux symptoms relative to the preoperative state. Secondary outcomes comprised perioperative safety (operative time, conversion, length of stay, complications and mortality), the incidence of transient dysphagia, radiologically or endoscopically confirmed hiatal hernia recurrence at 12 months, the trajectory of weight loss expressed as BMI and percentage total weight loss (%TWL), and the change in GERD-HRQL score.

2.7 Statistical analysis

Continuous variables are presented as mean ± standard deviation and categorical variables as absolute frequencies and percentages. The primary comparison — the presence versus absence of GERD symptoms before and after surgery in the same patients — constitutes paired categorical data and was analysed with the McNemar test applying a continuity correction. A two-sided p-value below 0.05 was considered statistically significant. Analyses were performed with standard statistical software.

2.8 Ethical considerations

The study was conducted in accordance with the principles of the Declaration of Helsinki. Institutional ethical approval was obtained, and all patients had provided written informed consent for the surgical procedure and for the anonymised use of their clinical data. Because of the retrospective design, no additional intervention was undertaken for the purposes of the study.

3. Results.

3.1 Baseline characteristics

Forty-three patients were included. The cohort had a mean age of 43.5 ± 9.8 years and was predominantly female (31 patients, 72.1%). The mean preoperative BMI was 44.8 ± 5.6 kg/m². A hiatal hernia was present in every patient by definition, most commonly small (< 2 cm) in 28 patients (65.1%), with a defect of 2–3 cm in the remaining 15 (34.9%). All 43 patients were symptomatic for reflux at baseline and the majority (88.4%) required daily PPI therapy, while erosive esophagitis was documented endoscopically in just under half of the cohort. Obesity-related comorbidity was frequent, including hypertension, dyslipidaemia and obstructive sleep apnoea. The baseline demographic and clinical profile is detailed in Table 1.

Table 1.

Baseline demographic and clinical characteristics of the cohort (n = 43)

Characteristic	Value
Age, years — mean ± SD	43.5 ± 9.8
Age range, years	24–61
Female sex, n (%)	31 (72.1)
Male sex, n (%)	12 (27.9)
Preoperative BMI, kg/m² — mean ± SD	44.8 ± 5.6
BMI range, kg/m²	36.2–58.4
Preoperative weight, kg — mean ± SD	123.7 ± 18.4
Hiatal hernia < 2 cm (small), n (%)	28 (65.1)
Hiatal hernia 2–3 cm, n (%)	15 (34.9)
GERD symptoms present, n (%)	43 (100)
Daily proton-pump-inhibitor use, n (%)	38 (88.4)
Erosive esophagitis, Savary–Miller grade I–II, n (%)	21 (48.8)
Hypertension, n (%)	19 (44.2)
Dyslipidaemia, n (%)	16 (37.2)
Obstructive sleep apnoea, n (%)	9 (20.9)

BMI, body mass index; GERD, gastroesophageal reflux disease; PPI, proton-pump inhibitor; SD, standard deviation.

3.2 Operative and perioperative outcomes

All 43 procedures were completed laparoscopically with no conversion to open surgery. The mean operative time was 88.4 ± 20.7 minutes. A simple posterior suture cruroplasty was performed in all 43 patients (100%); no mesh or other reinforcement was used. The intraoperative methylene-blue leak test was negative in every case, estimated blood loss was minimal, and the mean postoperative length of stay was 3 ± 1 days. There was a single 30-day readmission for dehydration that was managed medically. Perioperative details are presented in Table 2.

Table 2.

Operative and perioperative characteristics (n = 43)

Parameter	Value
Operative time, min — mean ± SD	88.4 ± 20.7
Simple posterior cruroplasty, n (%)	43 (100)
Number of crural sutures — median (range)	2 (2–4)
Bougie calibre, French	36–38

Intraoperative methylene-blue leak, n (%)	0 (0)
Conversion to open surgery, n (%)	0 (0)
Estimated blood loss, mL — mean ± SD	42 ± 18
Length of hospital stay, days — mean ± SD	3 ± 1
30-day readmission, n (%)	1 (2.3)

SD, standard deviation.

3.3 Gastroesophageal reflux outcomes

At the one-month assessment, 41 of the 43 patients (95.3%) had complete resolution or significant mitigation of reflux symptoms, with only 2 patients remaining symptomatic. Because all 43 patients were symptomatic before operation, the paired comparison yielded 41 discordant pairs in the direction of improvement and none in the direction of deterioration. The McNemar test with continuity correction gave $\chi^2 = 39.0$ ($p < 0.001$), confirming a highly significant reduction in symptomatic reflux relative to baseline. The pre- and postoperative distribution is shown in Figure 2 and the underlying contingency data in Table 3.

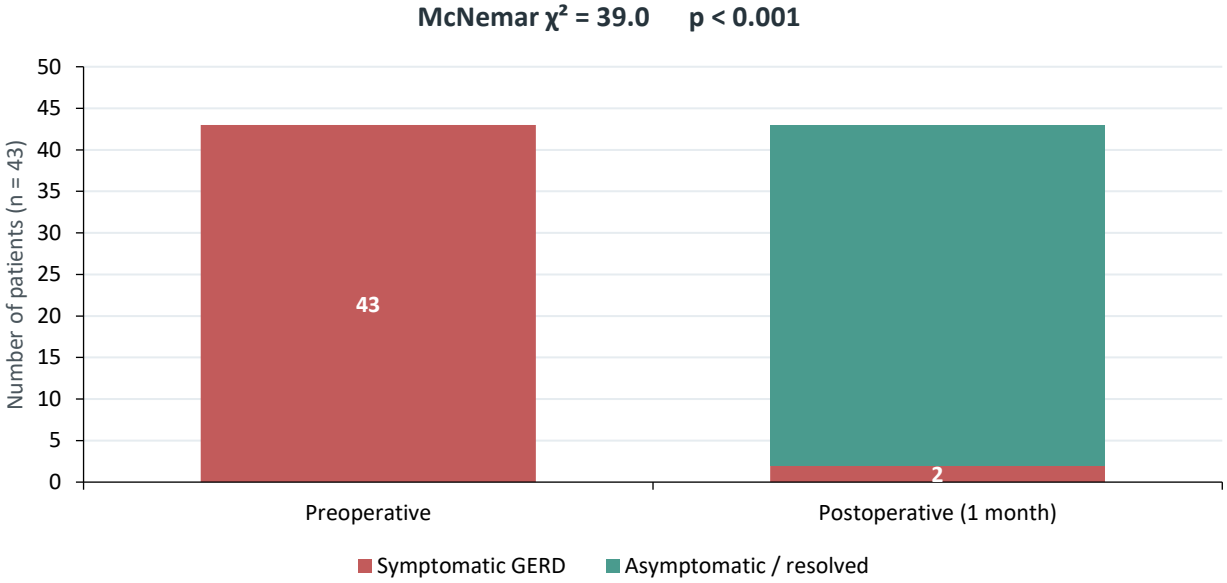


Figure 2. **Prevalence of symptomatic GERD before and one month after concomitant sleeve gastrectomy and posterior cruroplasty. Symptomatic reflux fell from 43/43 (100%) to 2/43 (4.7%); McNemar $\chi^2 = 39.0$, $p < 0.001$**

Table 3.

Paired distribution of GERD symptoms before and after surgery (McNemar analysis)

	Postop symptomatic	Postop asymptomatic	Total
Preop symptomatic	2	41	43
Preop asymptomatic	0	0	0
Total	2	41	43

Discordant pairs = 41 (all in the direction of improvement); McNemar $\chi^2 = 39.0$ with continuity correction, $p < 0.001$.

Reflux control was well maintained throughout the first postoperative year. The proportion of patients free of significant symptoms was 95.3% at one and three months and 93.0% at six months, declining modestly to 88.4% at twelve months in parallel with the small number of anatomical recurrences (Figure 3). The corresponding fall in daily PPI dependence mirrored the symptomatic improvement.

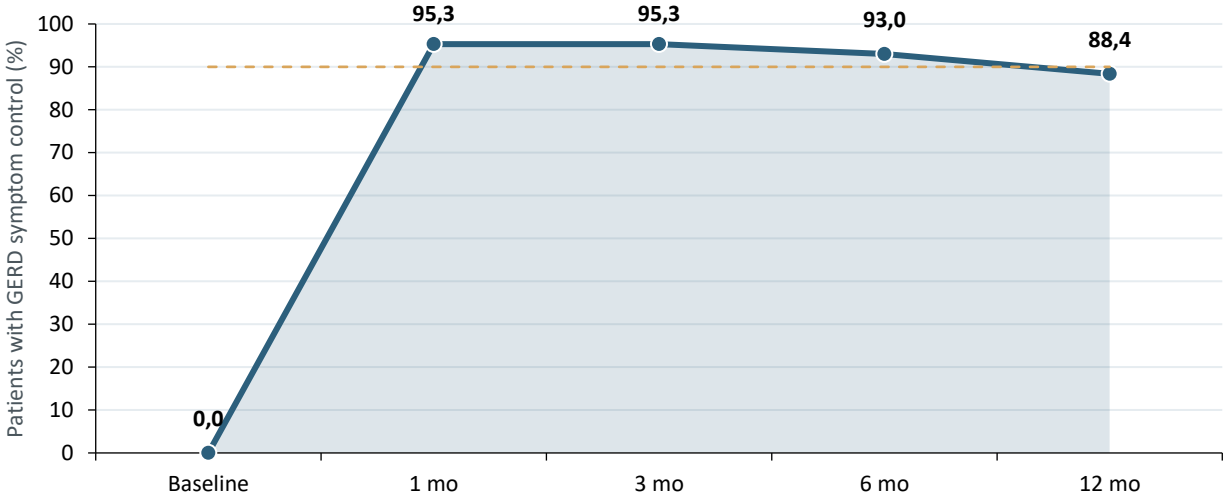


Figure 3. **Proportion of patients with sustained GERD symptom control across the 12-month follow-up. Control remained above 88% at every interval; the modest late decline coincided with the three anatomical recurrences**

3.4 Weight-loss outcomes

Weight loss followed the expected trajectory for sleeve gastrectomy. Mean BMI decreased from 44.8 ± 5.6 kg/m² at baseline to 38.5 ± 4.9 at three months, 34.2 ± 4.3 at six months and 30.6 ± 3.8 kg/m² at twelve months, corresponding to a mean percentage total weight loss of 31.8% at one year (Figure 4). The addition of the hiatal repair did not appear to compromise the weight-loss result.

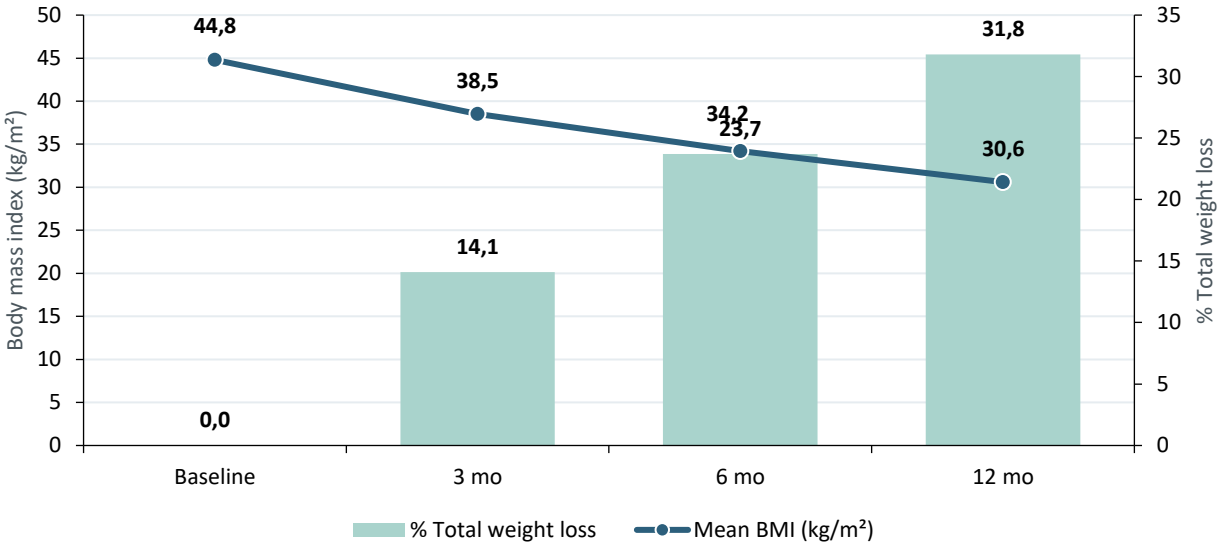


Figure 4. **Trajectory of mean body mass index (line, left axis) and percentage total weight loss (bars, right axis) over 12 months. Error bars denote standard deviation of BMI**

3.5 Quality of life

Reflux-related quality of life improved markedly and in step with symptomatic control. The mean GERD-HRQL score fell from 28.4 ± 6.2 at baseline to 6.8 ± 3.1 at one month and reached a nadir of 4.9 ± 2.6 at six months, before a small rise to 6.1 ± 3.4 at twelve months attributable to the recurrent cases — an overall reduction of approximately 78% relative to baseline (Figure 5).

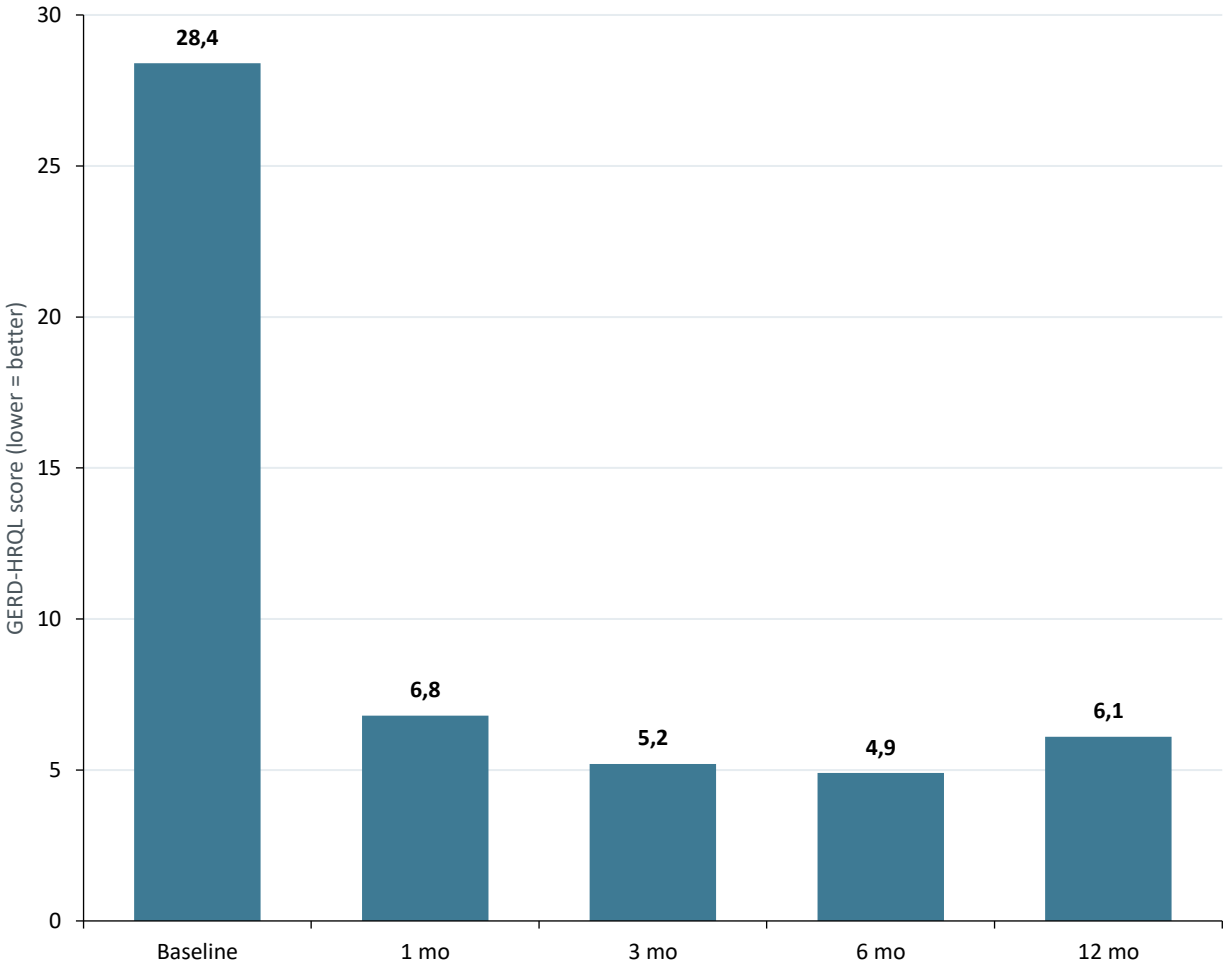


Figure 5. **Change in Gastroesophageal Reflux Disease Health-Related Quality of Life (GERD-HRQL) score across follow-up (lower scores indicate better reflux-related quality of life). Error bars denote standard deviation**

3.6 Complications and hiatal hernia recurrence

The safety profile was favourable. Transient dysphagia was the only early complication, occurring in 4 patients (9.3%); in every instance it resolved with conservative management and dietary modification within 14 days, and no patient developed persistent dysphagia, stricture or required endoscopic dilatation. There were no staple-line leaks, no postoperative haemorrhage, no surgical-site infection, no reoperation and no mortality. Instrumental imaging at twelve months demonstrated minor hiatal hernia recurrence in 3 patients (6.9%); all three remained clinically stable with minimal symptomatic impact and were managed non-operatively. The complication profile is summarised in Table 4 and displayed in Figure 6, and the integrated 12-month outcomes are collated in Table 5.

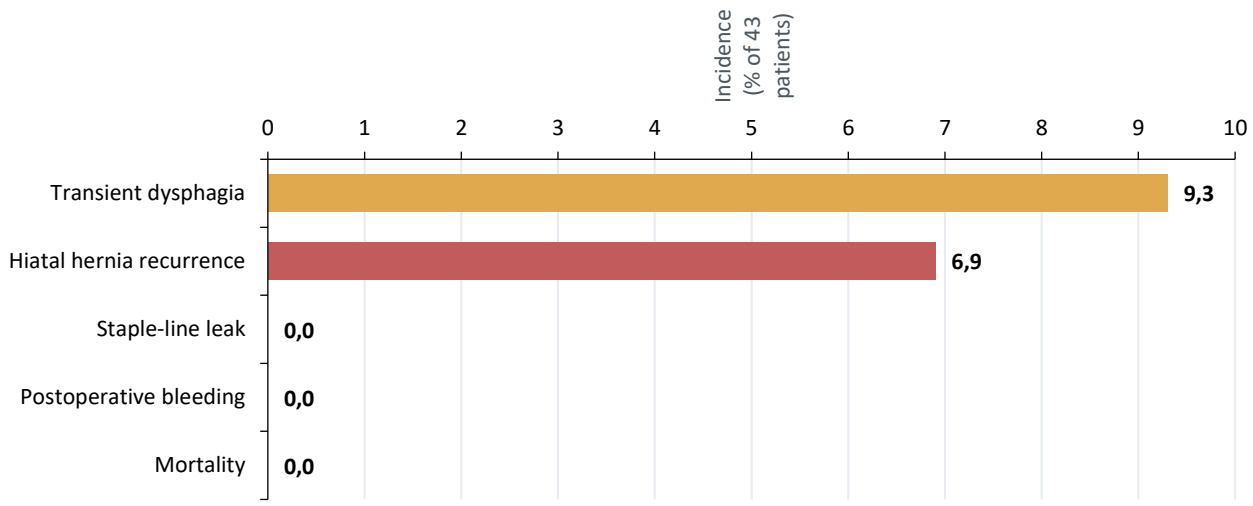


Figure 6. **Postoperative complications and 12-month anatomical recurrence, expressed as a proportion of the 43-patient cohort. No leak, reoperation or mortality occurred**

Table 4.

Postoperative complications and adverse events (n = 43)

Event	n (%)
Transient dysphagia (resolved ≤ 14 days)	4 (9.3)
Persistent dysphagia > 30 days	0 (0)
Staple-line leak	0 (0)
Postoperative haemorrhage	0 (0)
Surgical-site infection	0 (0)
Hiatal hernia recurrence at 12 months	3 (6.9)
Reoperation within 12 months	0 (0)
30-day mortality	0 (0)

All transient dysphagia resolved with conservative and dietary management; recurrences were clinically stable and managed non-operatively.

Table 5.

GERD symptom control, mean BMI, weight loss and quality of life across follow-up

Interval	GERD control, n (%)	Mean BMI (kg/m²)	%TWL	GERD-HRQL (mean ± SD)
Baseline	0 (0)	44.8	—	28.4 ± 6.2
1 month	41 (95.3)	—	—	6.8 ± 3.1
3 months	41 (95.3)	38.5	14.1	5.2 ± 2.8
6 months	40 (93.0)	34.2	23.7	4.9 ± 2.6
12 months	38 (88.4)	30.6	31.8	6.1 ± 3.4

BMI, body mass index; GERD-HRQL, Gastroesophageal Reflux Disease Health-Related Quality of Life; %TWL, percentage total weight loss; SD, standard deviation.

4. Discussion

In this consecutive series of 43 morbidly obese patients with concomitant hiatal hernia, simultaneous laparoscopic sleeve gastrectomy and posterior cruroplasty produced excellent reflux control at one year, with 95.3% of patients achieving symptom resolution or significant mitigation and a highly significant change on paired testing (McNemar $\chi^2 = 39.0$, $p < 0.001$). The procedure was safe: there were no leaks, reoperations or deaths, the only early morbidity was self-limiting dysphagia in fewer than one in ten patients, and anatomical recurrence at twelve months was low at 6.9%. These findings support concomitant repair as a rational default for the patient in whom a sleeve is planned and a hiatal defect is present.

4.1 Reflux control in the context of the literature

The rationale for addressing the hiatus at the time of sleeve gastrectomy rests on the observation that the operation, while metabolically effective, can unmask or worsen gastroesophageal reflux. [6, 7] Meta-analytic data confirm that concomitant repair improves reflux outcomes relative to the sleeve alone: a synthesis of eighteen studies reported a significant reduction in reflux symptoms and esophagitis after combined surgery and an odds ratio close to three in favour of the combined approach for reflux remission, although the pooled remission rate of roughly two-thirds and a de novo reflux rate of around twelve per cent underline that repair is not uniformly protective. [20] Earlier controlled work reached similar conclusions, with several groups documenting meaningful symptomatic and endoscopic gains after combined surgery. [13, 14, 16, 17, 18] The symptom-control rate observed in the present cohort sits at the favourable end of this reported spectrum. Part of this may reflect case selection — the exclusion of large paraesophageal hernias, severe long-standing reflux and established Barrett's esophagus — together with meticulous circumferential mobilisation of the esophagogastric junction and restoration of an adequate intra-abdominal esophageal segment, both of which are emphasised as determinants of success. [11, 21]

It is equally important to acknowledge the counter-evidence. Some investigators have found that hiatal repair resolves reflux in only a minority of symptomatic patients and does not reliably prevent de novo symptoms, a discrepancy attributable in part to differences in hernia size, repair technique, and — critically — the objectivity of the reflux endpoint. [15] The present study, like much of the published literature, relied predominantly on symptom-based and quality-of-life assessment rather than routine postoperative pH-impedance monitoring, and symptomatic remission is known to overestimate true physiological reflux control. This distinction is central to interpreting our headline figure and is revisited in the limitations.

4.2 Technique of crural closure

The optimal method of crural closure remains contested. In the present series a simple posterior suture cruroplasty was used in every patient, without mesh or other reinforcement. This reflects a deliberate, size-directed strategy: because hernias larger than 3 cm were excluded, all defects were small to moderate, and prospective comparative work indicates that a simple suture repair suffices in this setting while reinforcement offers advantage chiefly in larger hiatal defects. [21, 22] A randomised meta-analysis of suture versus prosthetic repair for large hiatal hernia found that mesh reduces short-term recurrence at the potential cost of increased dysphagia, and the long-term place of prosthetic reinforcement remains unresolved. [25] The complete absence of persistent dysphagia in our cohort is consistent with the use of a simple suture repair confined to small-to-moderate defects rather than routine mesh placement.

4.3 Anatomical recurrence and durability

The 6.9% recurrence rate at twelve months compares favourably with published mid- and long-term data. A five-year prospective evaluation of posterior cruroplasty combined with sleeve gastrectomy reported an anatomical failure rate of approximately 10.7%, and longer-term series similarly describe recurrence in the region of ten to eleven per cent. [23, 24, 20] Our shorter follow-up almost certainly explains the lower figure, and recurrence would be expected to rise with time; the

fact that all three recurrent hernias in our series were minor and clinically stable is consistent with the observation that radiological recurrence does not always translate into symptomatic failure. [23] Nonetheless, this tempers any claim of durable cure and reinforces the need for continued surveillance.

4.4 Long-term reflux risk and surveillance

Beyond the first year, the sleeve carries a recognised and cumulative risk of erosive esophagitis and Barrett's esophagus, which appears to increase with the duration of follow-up and may occur even in the absence of symptoms. [26] Long-term endoscopic studies have documented de novo esophagitis and metaplasia in a clinically meaningful minority of patients after sleeve gastrectomy, providing a strong argument for endoscopic surveillance irrespective of symptom status. [26] Whether the addition of a hiatal repair meaningfully reduces this long-term mucosal risk, as opposed to controlling symptoms, is not yet established and cannot be inferred from twelve-month symptomatic data. This uncertainty is one of the principal reasons that some surgeons continue to favour Roux-en-Y gastric bypass for patients with significant established reflux, and it identifies the most important direction for future work in this population. [9]

4.5 Weight loss

Weight-loss outcomes were consistent with those expected after sleeve gastrectomy, with a mean percentage total weight loss of approximately 32% at one year, and the concurrent hiatal repair did not appear to detract from the metabolic benefit of the operation. This accords with the wider literature, in which the addition of hiatal repair has not been shown to impair weight loss. [16, 20] The combined operation therefore offers reflux control without a discernible metabolic penalty over the period studied.

4.6 The combined sleeve versus Roux-en-Y gastric bypass

A recurring question in this clinical space is whether a patient with morbid obesity and a hiatal hernia is better served by a sleeve with concomitant repair or by a Roux-en-Y gastric bypass, which is widely regarded as the most reliable antireflux bariatric operation because it diverts acid and bile away from the esophagus and reduces the intragastric pressure that drives reflux. [9] National analyses have shown that patients with pre-existing reflux who undergo the sleeve are more likely to experience persistent or worsening symptoms than those who undergo bypass. [9] The counter-arguments in favour of the combined sleeve are practical and patient-centred: the sleeve is technically simpler and quicker, avoids an enteric anastomosis and its attendant risks of internal herniation and marginal ulceration, preserves endoscopic access to the entire foregut, and is often the operation preferred by patients and by health systems in which bypass expertise or long-term micronutrient surveillance is less readily available. In this context the present results are relevant to regional practice, because they demonstrate that in appropriately selected patients — those without a large paraesophageal hernia, severe long-standing reflux or established Barrett's esophagus — a well-executed sleeve with posterior cruroplasty can achieve a high rate of symptomatic reflux control at one year. The combined operation should not, however, be regarded as equivalent to bypass for the patient with severe, objectively documented reflux, in whom bypass remains the more secure choice. [9, 20]

4.7 Patient selection and technical determinants of success

The favourable outcome observed here is best understood as the product of disciplined patient selection combined with attention to the technical steps that govern the antireflux result. Selection matters because the benefit of a crural repair is greatest, and its durability most predictable, when the hiatal defect is small to moderate and the crural tissue is of good quality; larger defects carry a higher recurrence risk and may be better addressed by reinforcement or by an alternative operation. [21, 25] Technically, three elements are consistently emphasised as determinants of reflux control after the combined procedure: complete circumferential mobilisation of the esophagogastric junction with reduction of the hernia and restoration of an adequate intra-abdominal esophageal length;

construction of the sleeve over an appropriately sized bougie with the staple line kept clear of the angle of His to avoid a relative narrowing that promotes reflux; and a tension-free crural closure calibrated to the size of the defect. [11, 12, 21] Adherence to these principles, rather than the mere addition of sutures to the hiatus, is what distinguishes a durable repair from one likely to fail, and it is the plausible explanation for the strong symptomatic result and low early recurrence in the present cohort.

4.8 Strengths and limitations

The strengths of this study include a consecutive, well-characterised single-surgeon cohort with complete twelve-month follow-up, a standardised operative technique and structured instrumental surveillance, and the generation of outcome data from a Central Asian centre where such evidence is scarce. Several limitations must, however, be recognised. First, the retrospective, single-arm design without a comparator group (sleeve alone or gastric bypass) precludes any causal inference about the specific contribution of the cruroplasty. Second, the sample size of 43 is modest and the follow-up of twelve months is relatively short for an outcome — hiatal recurrence and de novo mucosal disease — that evolves over years. Third, the reflux endpoint was predominantly symptom- and questionnaire-based; without routine postoperative pH-impedance monitoring the reported control rate may overestimate true physiological remission, and this is the most significant methodological caveat. Fourth, several of the descriptive intermediate variables reported here are subject to the usual constraints of retrospective data capture. These limitations define a clear agenda for a prospective, comparative, objectively assessed study with extended follow-up, which the present findings are intended to motivate.

5. Conclusion

Concomitant laparoscopic sleeve gastrectomy and posterior cruroplasty was a safe and highly effective treatment for the morbidly obese patient with a concomitant hiatal hernia in this cohort. The approach delivered excellent control of reflux symptoms (95.3%) with a low rate of anatomical recurrence (6.9%) and no major morbidity or mortality at one year, while preserving the expected weight-loss benefit of the sleeve. On the strength of these results the combined procedure can be recommended as a preferred surgical paradigm for this patient group, with the important proviso that its durability and its effect on long-term mucosal disease require confirmation in prospective, comparative studies incorporating objective reflux testing and extended follow-up.

REFERENCES

1. Cohen RV, Kermansaravi M, Levinson R, Lakdawala M, Parmar C, Seki Y, Prager G, Salminen P; Global Consensus Group. International Federation for the Surgery of Obesity and Metabolic Disorders (IFSO) global consensus recommendations for optimizing outcomes after sleeve gastrectomy. Br J Surg. 2025;112(10):znaf188.

2. Brown WA, Liem R, Al-Sabah S, Anvari M, Boza C, Cohen RV, Ghaferi A, Våge V, Himpens J, Kow L, Morton J, Musella M, Pattou F, Sakran N, Clapp B, Prager G, Shikora S; IFSO Global Registry Collaboration. Metabolic bariatric surgery across the IFSO chapters: key insights from the Eighth IFSO Global Registry Report. Obes Surg. 2024. PMID: 38592648.

3. Eisenberg D, Shikora SA, Aarts E, Aminian A, Angrisani L, Cohen RV, et al. 2022 American Society for Metabolic and Bariatric Surgery (ASMBS) and International Federation for the Surgery of Obesity and Metabolic Disorders (IFSO): indications for metabolic and bariatric surgery. Surg Obes Relat Dis. 2022;18(12):1345–1356.

4. Che F, Nguyen B, Cohen A, Nguyen NT. Prevalence of hiatal hernia in the morbidly obese. Surg Obes Relat Dis. 2013;9(6):920–924.

5. Wilson LJ, Ma W, Hirschowitz BI. Association of obesity with hiatal hernia and esophagitis. Am J Gastroenterol. 1999;94(10):2840–2844.

6. Stenard F, Iannelli A. Laparoscopic sleeve gastrectomy and gastroesophageal reflux. World J Gastroenterol. 2015;21(36):10348–10357.

7. Yeung KTD, Penney N, Ashrafian L, Darzi A, Ashrafian H. Does sleeve gastrectomy expose the distal esophagus to severe reflux? A systematic review and meta-analysis. Ann Surg. 2020;271(2):257–265.

8. Oor JE, Roks DJ, Ünlü Ç, Hazebroek EJ. Laparoscopic sleeve gastrectomy and gastroesophageal reflux disease: a systematic review and meta-analysis. Am J Surg. 2016;211(1):250–267.

9. DuPree CE, Blair K, Steele SR, Martin MJ. Laparoscopic sleeve gastrectomy in patients with preexisting gastroesophageal reflux disease: a national analysis. JAMA Surg. 2014;149(4):328–334.

10. Rebecchi F, Allaix ME, Giaccone C, Ugliono E, Scozzari G, Morino M. Gastroesophageal reflux disease and laparoscopic sleeve gastrectomy: a physiopathologic evaluation. Ann Surg. 2014;260(5):909–914.

11. Daes J, Jimenez ME, Said N, Daza JC, Dennis R. Laparoscopic sleeve gastrectomy: symptoms of gastroesophageal reflux can be reduced by changes in surgical technique. Obes Surg. 2012;22(12):1874–1879.

12. Rosenthal RJ, Diaz AA, Arvidsson D, Baker RS, Basso N, Bellanger D, et al. International sleeve gastrectomy expert panel consensus statement: best practice guidelines based on experience of >12,000 cases. Surg Obes Relat Dis. 2012;8(1):8–19.

13. Soricelli E, Iossa A, Casella G, Abbatini F, Calì B, Basso N. Sleeve gastrectomy and crural repair in obese patients with gastroesophageal reflux disease and/or hiatal hernia. Surg Obes Relat Dis. 2013;9(3):356–361.

14. Santonicola A, Angrisani L, Cutolo P, Formisano G, Iovino P. The effect of laparoscopic sleeve gastrectomy with or without hiatal hernia repair on gastroesophageal reflux disease in obese patients. Surg Obes Relat Dis. 2014;10(2):250–255.

15. Samakar K, McKenzie TJ, Tavakkoli A, Vernon AH, Robinson MK, Shikora SA. The effect of laparoscopic sleeve gastrectomy with concomitant hiatal hernia repair on gastroesophageal reflux disease in the morbidly obese. Obes Surg. 2016;26(1):61–66.

16. El Chaar M, Ezeji G, Claros L, Miletics M, Stoltzfus J. Short-term results of laparoscopic sleeve gastrectomy in combination with hiatal hernia repair: experience in a single accredited center. Obes Surg. 2016;26(1):68–76.

17. Garg H, Vigneshwaran B, Aggarwal S, Ahuja V. Impact of concomitant laparoscopic sleeve gastrectomy and hiatal hernia repair on gastro-oesophageal reflux disease in morbidly obese patients. J Minim Access Surg. 2017;13(2):103–108.

18. Snyder B, Wilson E, Wilson T, Mehta S, Bajwa K, Klein C. A randomized trial comparing reflux symptoms in sleeve gastrectomy patients with or without hiatal hernia repair. Surg Obes Relat Dis. 2016;12(9):1681–1688.

19. Mahawar KK, Carr WR, Jennings N, Balupuri S, Small PK. Simultaneous sleeve gastrectomy and hiatus hernia repair: a systematic review. Obes Surg. 2015;25(1):159–166.

20. Chen W, Feng J, Wang C, Wang Y, Yang W, Dong Z; Chinese Obesity and Metabolic Surgery Collaborative. Effect of concomitant laparoscopic sleeve gastrectomy and hiatal hernia repair on gastroesophageal reflux disease in patients with obesity: a systematic review and meta-analysis. Obes Surg. 2021;31(9):3905–3918.

21. Ruscio S, Abdelgawad M, Badiali D, Iorio O, Rizzello M, Cavallaro G, Severi C, Silecchia G. Simple versus reinforced cruroplasty in patients submitted to concomitant laparoscopic sleeve gastrectomy: prospective evaluation in a bariatric center of excellence. Surg Endosc. 2016;30(6):2374–2381.

22. Balla A, Quaresima S, Ursi P, Seitaj A, Palmieri L, Badiali D, Paganini AM. Hiatoplasty with crura buttressing versus hiatoplasty alone during laparoscopic sleeve gastrectomy. Gastroenterol Res Pract. 2017;2017:6565403.

23. Boru CE, Coluzzi MG, de Angelis F, Silecchia G. Long-term results after laparoscopic sleeve gastrectomy with concomitant posterior cruroplasty: 5-year follow-up. J Gastrointest Surg. 2020;24(9):1962–1968.

24. Angrisani L, Santonicola A, Borrelli V, Iovino P. Sleeve gastrectomy with concomitant hiatal hernia repair in obese patients: long-term results on gastroesophageal reflux disease. Surg Obes Relat Dis. 2020;16(9):1171–1177.

25. Memon MA, Memon B, Yunus RM, Khan S. Suture cruroplasty versus prosthetic hiatal herniorrhaphy for large hiatal hernia: a meta-analysis and systematic review of randomized controlled trials. Ann Surg. 2016;263(2):258–266.

26. Felsenreich DM, Kefurt R, Schermann M, Beckerhinn P, Kristo I, Krebs M, Prager G, Langer FB. Reflux, sleeve dilation, and Barrett's esophagus after laparoscopic sleeve gastrectomy: long-term follow-up. Obes Surg. 2017;27(12):3092–3101.

27. Qumseya BJ, Qumsiyeh Y, Ponniah SA, Estores D, Yang D, Johnson-Mann C, et al. Barrett's esophagus after sleeve gastrectomy: a systematic review and meta-analysis. Gastrointest Endosc. 2021;93(2):343–352.e2.

28. El Nakeeb A, Aldossary H, Zaid A, Rashad AE, Balata M, Abdulrazek M, et al. Outcomes of concomitant laparoscopic sleeve gastrectomy and hiatal hernia repair on gastroesophageal reflux disease in patients with severe obesity: a propensity score-matched analysis. Obes Surg. 2025;35(5):1685–1692.