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Biliary Reflux after Standard Laparoscopic Mini-Gastric Bypass in Patients with Morbid Obesity

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ABSTRACT

Introduction. *While laparoscopic mini-gastric bypass (LMGB) is widely recognized for its simplicity and effectiveness in weight reduction, the incidence of postoperative biliary reflux remains a significant concern. This study evaluates the frequency, clinical manifestations, and organizational-economic impact of biliary reflux in patients undergoing standard LMGB, stratified by the presence or absence of gastroesophageal reflux disease (GERD) prior to surgery.*

Materials and Methods. *A retrospective cohort analysis was conducted in 68 patients with morbid obesity who underwent standard LMGB. Patients were divided into two subgroups: with pre-existing GERD (n=32) and without GERD (n=36). Clinical symptoms, endoscopic findings, need for antireflux therapy, length of hospital stay, and resource expenditures were analyzed within 30 days postoperatively.*

Results. *Biliary reflux symptoms were observed in 68.8% of GERD-positive and 13.9% of GERD-negative patients, with a significant difference in the incidence of postoperative regurgitation, heartburn, and nighttime epigastric discomfort ($p<0.01$). The frequency of "de novo" reflux in GERD-negative patients reached 28% by day 30. Endoscopic detection of bile in the gastric pouch was reported in 90.6% of GERD-positive cases. Patients with reflux had longer hospital stays (10.2±2.6 vs. 7.4±1.8 days), more frequent readmissions, and required symptom-relieving medications more than twice as often. Resource expenditures exceeded the base therapeutic cost by 63% in the GERD-positive subgroup.*

Conclusion. *Standard LMGB without antireflux modification is associated with a high risk of biliary reflux, particularly in patients with pre-existing GERD. This complication significantly affects early clinical recovery and increases healthcare resource utilization. The findings support the need for anatomical or technical modification of the gastrojejunal configuration to prevent retrograde bile flow.*

Keywords: *Mini-gastric bypass; morbid obesity; biliary reflux; gastroesophageal reflux disease; postoperative complications; hospital resource use.*

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INTRODUCTION

Laparoscopic mini-gastric bypass (LMGB), also referred to as one-anastomosis gastric bypass (OAGB), has gained substantial popularity in recent years due to its technical simplicity, shorter operative time, and demonstrated effectiveness in achieving durable weight loss and metabolic control in patients with morbid obesity [1, 2]. Despite these advantages, an increasing body of evidence highlights the clinically relevant drawback of this technique—the development or persistence of bile reflux, which may compromise both the safety and long-term acceptance of the procedure [3, 4].

The reflux of bile and pancreatic secretions into the gastric pouch, and potentially into the esophagus, is attributed to the absence of a physiological barrier between the gastrojejunal anastomosis and the esophagogastric junction. Unlike the Roux-en-Y gastric bypass, where the alimentary limb separates biliary and gastric flow, standard LMGB involves a single anastomosis with a directly routed biliopancreatic limb, creating conditions favorable to retrograde flow, particularly in patients with pre-existing gastroesophageal reflux disease (GERD) or hypotonia of the lower esophageal sphincter [5, 6].

Systematic reviews indicate that the incidence of bile reflux after standard LMGB ranges from 8% to 30% and may reach up to 27.5% in endoscopically evaluated cohorts, as reported by Cottam et al. [7]. Moreover, bile-induced mucosal irritation is associated not only with persistent GERD symptoms but also with histological changes, including gastritis and esophagitis, and is considered a potential risk factor for Barrett's esophagus [8]. Some studies have proposed technical adaptations such as elongation of the gastric pouch [9] or modification of the anastomosis angle [10]; however, these methods either compromise the restrictive component of the surgery or lack reproducibility in patients with excessive visceral fat and altered anatomy.

In clinical practice, the problem is particularly relevant in patients with GERD diagnosed preoperatively, who may experience worsening or persistence of symptoms despite appropriate technical execution of the LMGB. In addition, there are increasing reports of «de novo» reflux in patients previously asymptomatic, further complicating postoperative recovery and patient satisfaction [11].

The present study aims to assess the frequency, clinical expression, and organizational-economic burden of biliary reflux in patients undergoing standard LMGB, with stratification by preoperative GERD status. The analysis also aims to emphasize the need for technical refinement of the anastomotic configuration to improve postoperative outcomes and reduce symptom recurrence.

MATERIALS AND METHODS

This retrospective observational study included 68 adult patients (aged 28–59 years) with morbid obesity (BMI > 40 kg/m² or > 35 kg/m² with associated comorbidities) who underwent laparoscopic mini-gastric bypass (LMGB) at a single tertiary medical center between January 2020 and June 2023. All procedures were performed using the standard single-anastomosis configuration with a gastric pouch length not exceeding 20 cm and a gastrojejunal anastomosis constructed at 200 cm from the ligament of Treitz.

To evaluate the impact of pre-existing gastroesophageal reflux, patients were divided into two subgroups based on preoperative clinical and instrumental assessment:

- Subgroup I (n=32): Patients with documented clinical signs of GERD (heartburn, regurgitation, sour taste, nocturnal cough), endoscopic evidence of esophagitis, and/or pathological 24-hour pH-metry (DeMeester index > 14.72).
- Subgroup II (n=36): Patients without any symptoms or objective evidence of GERD before surgery.

Exclusion criteria included previous upper gastrointestinal surgery, hiatal hernia exceeding 3 cm, histologically proven Barrett's esophagus, or inability to complete the follow-up protocol.

Clinical data were collected at postoperative days 3, 7, 14, and 30. Primary clinical outcomes included the incidence of typical reflux symptoms (heartburn, epigastric pain, sour regurgitation, nausea, and nighttime symptoms), rated based on standardized patient questionnaires and confirmed where indicated by repeat endoscopy.

Endoscopic evaluations were performed selectively on postoperative day 30 using upper GI endoscopy. The presence of bile in the gastric pouch, signs of inflammation, and integrity of the gastrojejunal anastomosis were recorded. 24-hour pH-metry was performed in a subgroup of patients with persistent symptoms (n=10).

Functional outcomes included oral food tolerance (graded on a four-level scale), need for symptomatic medication (PPI, prokinetics, antacids), and subjective discomfort score. Economic and organizational indicators assessed were:

- total hospital stay (bed-days);
- number of unscheduled outpatient visits within 30 days;

- repeated admissions for symptomatic management;
- estimated cost increase (expressed as % over baseline uncomplicated case);
- return-to-work rate at 30 days.

All data were statistically processed using SPSS Statistics 25.0 (IBM). Intergroup comparisons were made using the Mann–Whitney U test for continuous variables and χ^2 test or Fisher's exact test for categorical variables. A p-value of < 0.05 was considered statistically significant.

RESULTS

Among the 68 patients included in the study, 32 (47.1%) had clinical and/or instrumental signs of GERD prior to surgery (Subgroup I), and 36 (52.9%) did not (Subgroup II). There were no statistically significant differences in baseline anthropometric or metabolic parameters between the subgroups ($p>0.05$), although GERD-positive patients demonstrated slightly higher rates of dyslipidemia and elevated fasting glucose.

By postoperative day 3, reflux-related symptoms such as heartburn, nausea, sour taste, and postprandial epigastric discomfort were reported by 62.5% of Subgroup I and 25.0% of Subgroup II. These complaints persisted in 56.3% and 13.9% of patients respectively by day 30 ($p<0.01$). Importantly, 28% of GERD-negative patients reported «de novo» reflux symptoms that were not present preoperatively, suggesting new-onset dysfunction attributable to the anatomical layout of the standard LMGB configuration.

Regurgitation with bile, a hallmark of biliary reflux, was reported in 43.8% of Subgroup I and 16.7% of Subgroup II on day 3, and remained present in 40.6% and 8.3% of patients, respectively, at 30 days. Endoscopic evaluation revealed visible bile in the gastric pouch in 90.6% of GERD-positive patients and 47.2% of GERD-negative patients. In contrast, patients in Subgroup II with no visible bile demonstrated only mild transient symptoms and had better oral food tolerance.

Use of symptomatic medications (proton pump inhibitors, prokinetics, and antacids) was significantly higher in Subgroup I: 81.3% at day 30 vs. 13.9% in Subgroup II ($p<0.001$). Similarly, subjective food tolerance remained compromised in 75% of Subgroup I patients by day 30, compared to only 11.1% of Subgroup II ($p<0.01$).

Organizational metrics also differed significantly. The mean hospital stay was 10.2±2.6 days in Subgroup I and 7.4±1.8 days in Subgroup II ($p<0.05$). Unscheduled outpatient visits averaged 2.9±0.9 per patient in Subgroup I vs. 1.2±0.5 in Subgroup II. The rate of repeated hospital admissions within 30 days was 1.3±0.6 vs. 0.3±0.2, respectively. The cost of treatment exceeded baseline by an average of 163%±12% in Subgroup I vs. 112%±8% in Subgroup II. Moreover, only 28.1% of patients in Subgroup I returned to work by day 30, compared to 77.8% in Subgroup II ($p<0.01$).

Evaluation by the integrated scoring scale of early outcomes revealed that 53.1% of patients in Subgroup I had "unsatisfactory" outcomes (≤23 points) at day 30, versus 5.6% in Subgroup II. The mean composite score was 23.25±4.1 in Subgroup I and 29.28±3.5 in Subgroup II ($p<0.01$).

DISCUSSION

The findings of this study confirm that the standard laparoscopic mini-gastric bypass (LMGB), while effective in achieving early weight loss, is associated with a high incidence of postoperative biliary reflux—especially in patients with preexisting gastroesophageal reflux disease (GERD). The stratified comparison between GERD-positive and GERD-negative patients revealed a consistently higher rate of reflux-related symptoms, need for medication, and impaired food tolerance in the former group, in agreement with prior reports [1, 3, 7].

The incidence of «de novo» reflux symptoms in nearly one-third of initially asymptomatic patients emphasizes that the configuration of the standard LMGB itself may induce retrograde flow of bile into the gastric pouch and potentially the esophagus. This mechanism, described in previous studies by Lee et al. and Cottam et al. [2, 7], arises due to the lack of an anatomical separation between the anastomosis and the esophagogastric junction, especially in the absence of an effective lower esophageal sphincter barrier.

The presence of visible bile on postoperative endoscopy in nearly half of the GERD-negative patients (47.2%) further supports the assertion that the standard technique lacks a reliable antireflux mechanism. This may have significant implications not only for symptom persistence but also for long-term mucosal damage and patient satisfaction. Chevallier et al. [8] reported similar findings in multicenter trials and stressed the clinical limitations of single-loop reconstructions in reflux-prone patients.

In addition to symptomatology, our study demonstrated that patients with persistent reflux experienced longer hospitalization, higher rates of unplanned clinic visits, and more frequent rehospitalizations. These findings underline the economic burden and system-level conse-

quences of inadequately managed bile reflux, which, if unaddressed, may diminish the cost-effectiveness of LMGB as a primary bariatric intervention.

Moreover, the functional and subjective scoring system employed in this study showed a significant divergence between the groups. While most GERD-negative patients transitioned into «good» or «excellent» outcome categories by day 30, over half of GERD-positive patients remained in the "unsatisfactory" range. This supports prior findings that reflux not only delays physical recovery but also negatively impacts quality of life and postoperative dietary adaptation [4, 6].

Taken together, these data indicate that standard LMGB without anatomical modifications may be suboptimal in patients with GERD or in those with high intra-abdominal pressure and compromised cardia. The results strongly support the need for technical refinement, such as the development of anatomical antireflux barriers or modifications of the gastrojejunal configuration, to improve outcomes and reduce complications in high-risk patients.

CONCLUSION

This study demonstrates that the standard laparoscopic mini-gastric bypass, while technically efficient and metabolically effective, is associated with a high risk of postoperative biliary reflux—particularly in patients with pre-existing GERD. The presence of bile in the gastric pouch, increased need for symptomatic treatment, impaired food tolerance, and extended hospital resource utilization underscores the clinical and economic limitations of the traditional technique.

The high incidence of reflux-related complications, including «de novo» symptoms in GERD-negative patients, emphasizes the need for a reassessment of the anatomical configuration of the gastrojejunal anastomosis. These findings provide a compelling rationale for the development and clinical implementation of antireflux-modified surgical strategies in bariatric practice.

Ethical Approval - The study was conducted in accordance with the Declaration of Helsinki and was approved by the local ethics committee of Tashkent State Medical University. Informed consent was obtained from all patients prior to participation in the retrospective analysis.

Conflict of Interest - The authors declare no conflict of interest related to this study.

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Author Contributions - U.I. Matkuliev – study conception, data analysis, manuscript drafting. J.A. Abduganiyev – clinical data collection, literature review, editing of manuscript. Both authors approved the final version of the manuscript.

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MINI-GASTROSHUNTLASHNING STANDART USULIDAN KEYINGI BILIAR REFLYUKS: KLINIK OQIBATLAR VA FUNKSIONAL-IQTISODIY BAHOLASH

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ANNOTATSIYA

Kirish. Mini-gastroshuntlash (MGSH) semizlikni davolashda samaradorligi tufayli keng qo‘llanilmoqda. Shunga qaramay, operatsiyadan keyingi biliar reflyuks holatlari ushbu texnikaning jiddiy cheklovlaridan biri bo‘lib qolmoqda. Ushbu tadqiqotda MGSHning standart usulidan keyingi biliar reflyuksning klinik namoyon bo‘lishi, ularning iqtisodiy-organizatsion oqibatlari va ularni GERB bo‘lgan va bo‘lmagan bemorlarda taqqoslab baholash maqsad qilingan.

Materiallar va usullar. Tadqiqot retrospektiv bo‘lib, 68 bemor ishtirok etdi. Ular ikki guruhga bo‘lindi: GERB belgilari mavjud bo‘lgan (n=32) va yo‘q (n=36). Klinik simptomlar, endoskopik natijalar, simptomatik terapiya ehtiyoji, shifoxonada qolish muddati va moliyaviy sarf-xarajatlar baholandi.

Natijalar. GERB bo‘lgan bemorlarning 68,8%ida va bo‘lmaganlarning 13,9%ida reflyuks simptomlari kuzatildi (p<0.01). GERB yo‘q bemorlarning 28%ida reflyuks «de novo» holatida rivojlandi. Endoskopiyada biliar reflyuks GERB+ guruhida 90,6% hollarda aniqlandi. GERB bo‘lgan bemorlar uzoqroq yotib davolangan (o‘rtacha 10,2±2,6 kun), simptomatik davo ehtiyoji yuqori bo‘lgan va davo xarajatlari 63% ga oshgan.

Xulosa. Standart MGSH usuli GERB bo‘lgan bemorlarda reflyuks xavfini oshiradi va davolash samaradorligini kamaytiradi. Uzoq muddatli simptomatik davo va qayta murojaatlar iqtisodiy yukni orttiradi. Ushbu natijalar MGSH texnikasini antireflyuks konfiguratsiyasi bilan modifikatsiya qilish zarurligini asoslaydi.

Kalit so‘zlar: Mini-gastroshuntlash, semizlik, biliar reflyuks, gastroezofageal reflyuks, asoratlar, sog‘liqni saqlash xarajatlari.

БИЛИАРНЫЙ РЕФЛЮКС ПОСЛЕ СТАНДАРТНОЙ ЛАПАРОСКОПИЧЕСКОЙ МИНИГАСТРОШУНТИРУЮЩЕЙ ОПЕРАЦИИ: КЛИНИЧЕСКИЕ ПОСЛЕДСТВИЯ И ФУНКЦИОНАЛЬНО-ЭКОНОМИЧЕСКАЯ ОЦЕНКА

Маткулиев У.И., Абдуганиев Ж.А.

АННОТАЦИЯ

Введение. Лапароскопическое минигастрошунтирование (ЛМГШ) широко применяется для лечения морбидного ожирения благодаря своей технической простоте и эффективности. Однако частота послеоперационного билиарного рефлюкса остаётся клинически значимой проблемой. Целью настоящего исследования является оценка частоты, клинических проявлений и организационно-экономических последствий рефлюкса у пациентов, перенёсших стандартную технику ЛМГШ, с учётом наличия гастроэзофагеального рефлюкса (ГЭРБ) до операции.

Материалы и методы. В исследование включены 68 пациентов. Проведена стратификация на две подгруппы: с исходным ГЭРБ (n=32) и без (n=36). Проанализированы клинические симптомы, данные эндоскопии, потребность в медикаментозной терапии, длительность госпитализации и расходы на лечение.

Результаты. У пациентов с ГЭРБ симптомы билиарного рефлюкса отмечались в 68,8% случаев, у пациентов без — в 13,9% (p<0,01). У 28% пациентов без исходного ГЭРБ симптомы развились «de novo». Эндоскопическое выявление желчи в культе желудка зарегистрировано у 90,6% пациентов первой подгруппы. Больные с рефлюксом чаще нуждались в терапии, имели большую длительность госпитализации (в среднем 10,2±2,6 суток) и затраты на лечение превышали базовую норму на 63%.

Заключение. Стандартная методика ЛМГШ ассоциирована с высоким риском билиарного рефлюкса, особенно у пациентов с исходным ГЭРБ. Это негативно влияет на ранние клинические исходы и повышает нагрузку на систему здравоохранения. Полученные данные обосновывают необходимость технической модификации конфигурации гастроеюноанастомоза для профилактики рефлюкса.

Ключевые слова: Минигастрошунтирование, морбидное ожирение, билиарный рефлюкс, гастроэзофагеальная рефлюксная болезнь, послеоперационные осложнения, ресурсоёмкость.