

Management of rare complications in obese patients after laparoscopic gastric bypass

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The complications resulting from laparoscopic gastric bypass can be categorised into two main groups: early (within 30 days after surgery) and late (after 30 days following surgery). Bleeding, marginal ulcers, and failure of the suture line occur most often. Stenosis of the anastomotic areas, adhesive small bowel obstruction, incarceration of Petersen's space hernia, gastrogastic fistula, and hemobezoar-induced small bowel obstruction are less often observed.

OBJECTIVE — to improve the management of rare complications in obese patients after laparoscopic gastric bypass.

MATERIALS AND METHODS. The study includes a retrospective analysis of patients who underwent laparoscopic gastric bypass in the Department of General Surgery No. 2 at Bogomolets National Medical University from 2011 to 2023. Patients aged 25 to 59 who met the IFSO criteria for obesity participated in the research. The minimum observation period was 12 months. All patients underwent a laparoscopic Roux-en-Y Gastric Bypass.

RESULTS. The study included a cohort of 348 patients who underwent laparoscopic gastric bypass. The majority of them were female, including 189 individuals (54.3%). A total of 6 patients (1.72%) were identified with rare problems, consisting of 2 women and 4 men. Two patients were diagnosed with acute small bowel obstruction caused by a hemobezoar, one patient with gastrogastic fistula, one patient with acute adhesive small bowel obstruction, one patient with a marginal ulcer of the «large» stomach complicated by perforation, and one patient with a pinched Petersen's space hernia. All complications were class IIIb, according to the Clavien-Dindo classification, and required surgical treatment. In the early period, 3 (50%) cases were diagnosed: acute adhesive small bowel obstruction (2 days postoperatively) and acute small bowel obstruction caused by a hemobezoar (2–3 days postoperatively).

CONCLUSIONS. We found that the incidence of rare complications among obese individuals after laparoscopic gastric bypass was 1.72%. Specifically, 1.14% of patients experienced small bowel obstruction, 0.29% had a marginal ulcer of the «large» stomach complicated by perforation, and 0.29% had a pinched Petersen's space hernia. Each case of a rare complication requires an individual approach to its management.

KEYWORDS

rare complication, gastric bypass, hemobezoar, marginal ulcer, gastrogastic fistula, Petersen's space hernia, bleeding,

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Laparoscopic gastric bypass (LGB) is considered the «gold standard» of surgical treatment for obesity due to its long-term effect and lower level of complications compared to other methods [22].

The complications resulting from laparoscopic gastric bypass can be categorised into two main groups: early (within 30 days after surgery) and late (after 30 days). Bleeding, marginal ulcers, and failure of the suture line occur most often. Stenosis of the anastomotic areas, adhesive small bowel obstruction, incarceration of Petersen's space hernia, gastrogastic fistula, and hemobezoar-induced small bowel obstruction are less often observed.

Petersen's space hernia is a late, rare complication of laparoscopic gastric bypass, with an incidence of 1–5% [17,11]. It occurs on average 3 months after surgery. Risk factors include a significant decrease in body weight, male gender, and the extraduodenal location of the alimentary loop [3].

Gastrogastic fistula is the formation of an unnatural connection between the «small» and «large» stomachs, occurring in 1.5–6.0% of patients. The main reasons are incomplete transection of the stomach, ingress of fatty tissue during transection of the stomach between the branches, insufficiency of gastroenteroanastomosis, displacement of the

stomach after surgery, formation of marginal ulcers, and complications of their penetration [6].

Hemobezoar-induced small bowel obstruction is a very rare complication after laparoscopic gastric bypass, occurring in 0–0.5 %, most often 2–5 days after surgery, as a result of bleeding from the suture line of the large stomach [13].

OBJECTIVE – to improve the management of rare complications in obese patients after laparoscopic gastric bypass.

Materials and methods

The study includes a retrospective analysis of 348 patients who underwent laparoscopic gastric bypass in the Department of General Surgery No. 2 at Bogomolets National Medical University from 2011 to 2023. Patients aged 25 to 59 who met the IFSO (International Federation for the Surgery of Obesity and Metabolic Disorders) criteria participated in the research. The majority of them were female, including 189 individuals (54.3 %). The average age was 44.81 years (25–59 years), and the average body mass index was 45.43 kg/m² (41.21–59.41 kg/m²). The minimum observation period was 12 months.

Preoperative examination included: complete blood count, complete urinalysis, biochemical blood count (total protein, alaninaminotransferase, aspartataminotransferase, total bilirubin with fractions, urea, creatinine), coagulogram, blood group and rhesus, electrocardiography, video esophagogastroduodenoscopy, echocardiography, chest X-ray cavity, ultrasound of the abdominal cavity organs, consultation of a cardiologist and pulmonologist, spirometry, ultrasound of the vessels of the lower extremities, glycosylated hemoglobin (Hb1Ac), blood C-peptide, blood thyroid-stimulating hormone test, adrenocorticotrophic hormone blood test, cortisol blood test, acid-base blood test, blood analysis for electrolytes (K, Na, Cl, Ca).

All patients underwent a laparoscopic Roux-en-Y Gastric Bypass. Until 2019, the small intestine was transected with a stapling-cutting device with a staple height of 3.6 mm to perform laparoscopic gastric bypass, but it has since been switched to the Tri Staple technology using the EGIA60AVM (staple heights: 2 mm, 2.5 mm, 3 mm) at a distance of 50 cm from the ligament of Treitz. Until 2019, a stapling-cutting device with a staple height of 4.1 mm was used to construct a «small» stomach with a volume of 20–30 ml, but it has since been switched to Tri Staple technology using EGIA60AMT (staple heights: 3 mm, 3.5 mm, and 4 mm).

A side-to-side antero-colic gastroenteroanastomosis was performed between the «small» stomach

and the alimentary loop of the small intestine. Until 2019, the back lip of the anastomosis was formed with the help of a stapling-cutting device with a staple height of 3.6 mm. It has since been switched to Tri Staple technology using EGIA60AVM (staple heights: 2 mm, 2.5 mm, 3 mm). The anterior lip of the anastomosis was formed with the help of a continuous suture using an atraumatic suture material (Vicril 3/0). After applying the anastomoses, a pneumatic test was performed to determine their tightness. The length of the alimentary loop was 150 cm, and the biliopancreatic loop was 50 cm. Petersen's space was not sutured. Statistical analysis was performed using SPSS 18.0.

Results

A total of 6 patients (1.72 %) were identified with rare problems, consisting of 2 women and 4 men. Two patients were diagnosed with acute small bowel obstruction caused by a hemobezoar, one patient with gastrogastic fistula, one patient with acute adhesive small bowel obstruction, one patient with a marginal ulcer of the «large» stomach complicated by perforation, and one patient with a pinched Petersen's space hernia. All complications were class IIIb, according to the Clavien-Dindo classification, and required surgical treatment. In the early period, 3 (50 %) cases were diagnosed: acute adhesive small bowel obstruction (7 days postoperatively) and acute small bowel obstruction caused by a hemobezoar (2–3 days postoperatively).

Among the 6 cases of complications, 4 (1.14 %) had a clinical pattern of small bowel obstruction and were manifested by nausea, vomiting, abdominal distension, and a lack of bowel movements. In all cases, we performed a computer tomography of the abdominal cavity with intravenous enhancement for diagnostic purposes. Treatment included urgent surgical intervention. Patients with acute small bowel obstruction caused by a hemobezoar underwent relaparoscopy with enterotomy and removal of a blood clot, mandatory gastrotomy of the «large» stomach with mechanical stopping of bleeding, and removal of a blood clot from the «large» stomach, which filled the entire lumen. The period of stay in the hospital after surgery was 4–5 days. In the case of acute adhesion or small bowel obstruction, relaparoscopy with viscerolysis was performed. Strangulation of Petersen's space hernia occurred six months after laparoscopic gastric bypass. A relaparoscopy was performed with a resection of the necrotic intestine and the imposition of an entero-enteroanastomosis. The period of stay in the hospital was 7 days.

A marginal ulcer of the «large» stomach complicated by perforation occurred six months after laparoscopic gastric bypass. A laparotomy was performed with the removal of the «large» stomach. Hospital stay was 7 days.

A gastrogastric fistula developed in the patient 18 months after laparoscopic gastric bypass on the background of a marginal ulcer complicated by penetration, which led to the formation of a common mouth between the «large» and «small» stomachs. Clinically, it was accompanied by an increase in body weight, nausea, and pain in the epigastric area. The patient underwent laparoscopic intervention with resection of the «large» and «small» stomachs with gastroenteroanastomosis, and the formation of a new gastroenteroanastomosis. The postoperative period in the hospital was 5 days.

Discussion

The study confirmed the low frequency of detection of the indicated complications, which, due to the severity of the condition (Clavien-Dindo III), required rapid diagnosis and urgent surgical treatment.

Strangulation of Petersen's space hernia was diagnosed in one patient (0.28%), which is statistically lower than the world data. For comparison, in the study of A. Iannelli, Petersen hernia entrapment was diagnosed in 2.51–4.75% of cases, and the average follow-up time was 24.19 months after laparoscopic gastric bypass [15]. According to V. Ende et al., this rate was 4.8%, but the mean follow-up time was 36.1 months [12]. All 348 operated patients did not have suturing of the mesenteric defect. This did not cause an increase in the number of pinched Petersen's space hernias. Compared to other studies, D. Muir et al. found that with the closure of mesenteric defects, the rate of pinched Petersen's space hernias was 2.0% [18]. A meta-analysis by Q.-L. Wu et al. found no difference in the occurrence of small bowel obstruction due to Petersen's space hernia entrapment between groups with and without closure of mesenteric defects [23].

In our study, the alimentary loop was located in the antecolic position in all patients, which had a significant impact on the occurrence of internal hernias. The postcolic location of the alimentary loop has a worse prognosis due to the formation of an additional mesenteric defect. In a study by A. B. Al Harakeh et al., in the group with an antecolic location of the alimentary loop, entrapment of Petersen's space hernia occurred in 1.4% of cases, and with a postcolic location of the alimentary loop in 5.2% [1]. According to a study by F. Nuytens et al., the closure of the mesenteric defect in the antecolic

location of the alimentary loop compared to not-closure does not affect the occurrence of a pinched internal Petersen's space hernia (4.8% and 5.5%), but at the same time significantly increases the number of small bowel obstructions due to adhesions (4.8% and 1.7%). Therefore, the optimal option is the antecolic location of the alimentary loop without closing the mesenteric defect [20].

Acute small bowel obstruction caused by a hemobezoar is a very rare complication resulting from laparoscopic gastric bypass. From 2011 to 2019, 2 (1.12%) of 179 patients experienced bleeding from the suture line of the «large» stomach. According to global data, this indicator ranges from 0.05% to 1.9% [5]. All cases reported up to 2019 used the stapling-cutting device with a staple height of 3.6 mm for gastric transection. After starting to use the Tri Staple stapling device in 2019 (staple heights: 3 mm, 3.5 mm, 4 mm), no new cases of «large» stomach bleeding complicated by acute hemobezoar-induced small bowel obstruction have been recorded. Based on single cases found, or a small series of cases, D. T. Hess et al. (2021) described 38 patients with hemobezoar-induced small bowel obstruction [14]. Treatment tactics included relaparoscopy with enterotomy and removal of a blood clot from the area of the entero-enteroanastomosis, and gastrotomy of the «large» stomach with removal of a blood clot that filled the entire lumen, because in all cases the source was bleeding from the suture line of the large stomach. An intraoperative inspection of the anastomotic suture lines was mandatory due to the high risk of their failure, as an increase in intraluminal pressure occurs due to the presence of an obstruction in the form of a blood clot. Recurrences of bleeding after surgery, infectious complications, and failures of anastomotic suture lines were not detected. In other research, nine patients underwent resection of an entero-enteroanastomosis and gastrotomy for decompression. However, due to a high complication rate of 44.4%, compared to enterotomy and removal of a blood clot and gastrotomy with hemostasis, where this indicator is 27.2%, such approach is not recommended [5].

Marginal ulcers occur in 3–35% of patients after laparoscopic gastric bypass [8]. Marginal ulcers of the «large» stomach complicated by perforations occur quite rarely, up to 0.3% [16]. According to O. Bacoer-Ouzillou et al., in 71.4% of cases, marginal ulcers occur in the area of gastroenteroanastomosis. [4] In the study of D. E. Azagury et al., 50% of marginal ulcers occur in the area of the gastroenteroanastomosis, 40% in the alimentary loop, and 10% in the area of the «small» stomach [2]. G. Plitzko et al.'s review from 2021 details 54 cases of gastric

and duodenal ulcers, with a perforation in the gastric region complicating 34 % of these cases [21]. Gastrogastric fistula was diagnosed in one (0.28 %) patient, although according to global data, the frequency of occurrence is up to 6 % [19]. The term of occurrence was 18 months. According to global data, the average time of occurrence is 28 months (22–62) [7]. The cause is a marginal ulcer, which is complicated by penetration and the formation of a joint between the «large» and «small» stomachs. According to various data, about 60 % of patients with gastrogastric fistulas have a history of marginal ulcers or incompetence [7]. Since 28–61 % of marginal ulcers are asymptomatic [10], we recommend performing prophylactic VEGS 6, 12, and 24 months after laparoscopic gastric bypass to cover the period during which the development of marginal ulcers and their complications are possible. One of the first manifestations of the occurrence of gastrogastric fistula is an increase in body weight. Therefore, gastroscopy should be performed in the absence of a decrease in body weight or its increase after laparoscopic gastric bypass. Marginal ulcers of the «large» stomach complicated by perforation and marginal ulcers complicated by penetration with the formation of a gastrogastric fistula were recorded in the period 2011–2019, when patients were prescribed a regimen of proton pump inhibitors at a dose of 20 mg twice a day for 30 days. Due to the emergence of studies on the increase in the entry of hydrochloric acid into the lumen of the small intestine and the activation of pepsin in the lumen of the small intestine within 6 months after laparoscopic gastric bypass [9]. Since 2019, we have been prescribing proton pump inhibitors at a dose of 20 mg twice a day for 6 months. No new cases of marginal ulcers were recorded. The observation period was 12 months.

Conclusions

We found that the incidence of rare complications among obese individuals after laparoscopic gastric bypass was 1.72 %. Specifically, 1.14 % of patients experienced small bowel obstruction, 0.29 % had a marginal ulcer of the «large» stomach complicated by perforation, and 0.29 % had a pinched Petersen's space hernia.

Each case of a rare complication requires an individual approach to its management, and their prevention includes the use of stapling devices with Tri Staple technology and proton pump inhibitors at a dose of 20 mg twice times a day for 6 months.

The influence of non-closure of the mesenteric defect and the antecolic location of the alimentary loop on the occurrence of an incarcerated Petersen's space hernia requires further study.

DECLARATION OF INTERESTS

The author declares that they have no conflicts of interest.

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ETHICS APPROVAL AND WRITTEN INFORMED CONSENTS STATEMENTS

In this study, the authors adhered to the Ethical Principles for Medical Research Involving Human Subjects outlined in the WMA Declaration of Helsinki and current Ukrainian regulations. The study protocol was approved by the ethics committee of Bogomolets National Medical University. Written informed consent was obtained from all the patients.

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Менеджмент маргінальних виразок у пацієнтів з ожирінням після лапароскопічного шунтування шлунка

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Виділяють дві групи ускладнень унаслідок лапароскопічного шунтування шлунка — ранні (упродовж 30 днів після операції) та пізні (пізніше 30-ї доби). Найчастіше виникають кровотечі, маргінальні виразки та неспроможності лінії швів, рідше — стеноз ділянок анастомозів, спайкова кишкова непрохідність, защемлення грижі Петерсена, гастро-гастро нориця, кишкова непрохідність гемобезоаром.

Мета — поліпшити менеджмент рідкісних ускладнень після лапароскопічного шунтування шлунка у пацієнтів з ожирінням.

Матеріали та методи. Проведено ретроспективний аналіз даних 348 пацієнтів з ожирінням відповідно до критеріїв IFSO, яким виконано лапароскопічне шунтування шлунка в період з 2011 до 2023 р. на базі кафедри загальної хірургії № 2 Національного медичного університету імені О. О. Богомольця. Вік пацієнтів — від 25 до 59 років, середній вік — 44,81 року. Серед пацієнтів переважали жінки (189 (54,3 %)). Середня величина індексу маси тіла — 45,43 кг/м² (41,21—59,41 кг/м²). Мінімальний період спостереження — 12 міс.

Результати. Рідкісні ускладнення діагностовано у 6 (1,72 %) пацієнтів (у 2 жінок, та 4 чоловіків): у 2 — гостру тонкокишкову непрохідність гемобезоаром, по одному випадку гастро-гастро нориці, гострої спайкової непрохідності, маргінальної виразки «великого» шлунка, ускладненої перфорацією, та защемленої грижі Петерсена.

Висновки. У пацієнтів з ожирінням після лапароскопічного шунтування шлунка частота рідкісних ускладнень становила 1,72 %: кишкової непрохідності — 1,14 %, маргінальної виразки «великого» шлунка, ускладненої перфорацією, — 0,29 %, защемленої грижі Петерсена — 0,29 %. Кожен випадок рідкісного ускладнення потребує індивідуального підходу до його менеджменту.

Ключові слова: рідкісне ускладнення, шунтування шлунка, гемобезоар, маргінальна виразка, гастро-гастро нориця, грижа Петерсена, кровотеча.

FOR CITATION

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