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ASSESSMENT OF THE EFFECTIVENESS OF SLEEVE GASTRECTOMY ON COMORBIDITIES IN PATIENTS WITH MORBID OBESITY

Resume. *The aim of the research was to study the effectiveness of longitudinal gastrectomy in patients with morbid obesity (MO). This scientific work is based on the results of a comprehensive examination and treatment of 187 patients with MO who were treated in our clinical bases from 2021 to 2023. Of these, 13 (14%) were men and 79 (86%) were women. The age of the operated patients ranged from 21 to 60 years (average 36.3 ± 5.2 years). Data analysis shows that grade III obesity prevails in patients with MO (49 (53.2%)). Analysis of comorbid pathology in patients with morbid obesity shows that 133 (70.1%) patients had one or more concomitant diseases. Longitudinal gastrectomy is a very promising and highly effective operation used in the treatment of patients with MO. When analyzing the dynamics of concomitant diseases in combination with existing morbid obesity in patients 18 months after the procedure of Laparoscopic longitudinal resection of the stomach - in the control group arterial hypertension 46.8%, arthralgia 45.2%, dyslipidemia - 43%, ischemic heart disease -36%, prediabetes - 68%, depressive state - 65%, sleep apnea syndrome - 73%, decreased libido - 55%, GERD - 68%, and in patients of the main group - arterial hypertension 58%, arthralgia 50%, dyslipidemia - 48%, ischemic heart disease - 38%, prediabetes - 71%, depressive state - 71%, sleep apnea syndrome - 78%, decreased libido in 58%, GERD - in 73% of cases show complete remission. Possible complications after PRZH are anemia, hypoproteinemia and vitamin deficiency, which can be easily replenished by conservative methods.*

Key words: *obesity, morbid obesity, sleeve gastrectomy, bariatric surgery*

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ОЦЕНКА ЭФФЕКТИВНОСТИ ПРОДОЛЬНОЙ РЕЗЕКЦИИ ЖЕЛУДКА НА СОПУТСТВУЮЩИЕ ПАТОЛОГИИ У БОЛЬНЫХ С МОРБИДНЫМ ОЖИРЕНИЕМ

Резюме. *Целью исследований явилось изучение эффективности продольной резекции желудка у больных с морбидным ожирением (МО). Данная научная работа основана на результатах комплексного обследования и лечения 187 больных с МО, находившихся на лечении в наших клинических базах с 2021 по 2023 год. Из них 13 (14%) мужчин и 79 (86%) женщин. Возраст оперированных больных составил от 21 до 60 лет (в среднем 36,3±5,2 года). Анализ данных показывает, что превалирует с III степени 49 (53,2%) ожирение у больных с МО. Анализ коморбидной патологии у больных морбидным ожирением показывает, что у 133 (70,1%) больных имелось одно и более сопутствующих заболеваний. Продольная резекция желудка служит очень перспективной и весьма эффективной операцией, применяемой при лечении пациентов с МО. При анализе*

динамики сопутствующих заболеваний в сочетании с имеющимся морбидным ожирением у больных через 18 месяцев после процедуры ЛПРЖ - в контрольной группе артериальная гипертензия 46,8%, артралгии 45,2%, дислипидемия - 43%, ИБС -36%, предиабет - 68. %, депрессивное состояние - 65%, синдром апноэ во сне - 73%, снижение либидо - 55%, ГЭРБ - 68%, а у больных основной группы - артериальная гипертензия 58%, артралгия 50%, дислипидемия - 48%, ВМС - 38%, предиабет - 71%, депрессивное состояние - 71%, синдром апноэ во сне - 78%, снижение либидо в 58%, ГЭРБ –в 73% случаев наблюдается полная ремиссия. Возможными осложнениями после ПРЖ являются анемия, гипопротеинемия и дефицит витаминов, где можно легко восполнять консервативными способами.

Ключевые слова: *ожирение, морбидное ожирение, продольная резекция желудка, бариатрическая хирургия*

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MORBID SEMIZLIK BILAN OG'RIGAN BEMORLARDA HAMROH KASALLIKLARGA OSHQOZON BO'YLAMA REZEKSIYASINING SAMARADORLIGINI BAHOLASH

Rezyme. *Tadqiqotning maqsadi morbid semizlik (SM) bilan og'rigan bemorlarda me'daning bo'ylama rezeksiyasi samaradorligini o'rganishdan iborat. Ushbu ilmiy ish 2021-yildan 2023-yilgacha klinik bazalarimizda davolangan MO bilan kasallangan 187 nafar bemorni kompleks tekshirish va davolash natijalariga asoslangan. Ulardan 13 nafari (14%) erkaklar va 79 nafari (86%) ayollardir. Operatsiya qilingan bemorlarning yoshi 21 yoshdan 60 yoshgacha bo'lgan (o'rtacha 36,3±5,2 yosh). Ma'lumotlar tahlili shuni ko'rsatadiki, MO bilan og'rigan bemorlarda semizlikning III darajasi 49 (53,2%) ustunlik qiladi. Morbid semizlik bilan og'rigan bemorlarda komorbid patologiyani tahlil qilish shuni ko'rsatadiki, 133 (70,1%) bemorda bir yoki undan ortiq yondosh kasalliklar mavjud. Me'daning bo'ylama rezeksiyasi MO bilan og'rigan bemorlarni davolashda qo'llaniladigan juda istiqbolli va juda samarali operatsiya bo'lib xizmat qiladi. LOBR muolajasidan 18 oy o'tgach, bemorlarda mavjud morbid semizlik bilan birga yondosh kasalliklar dinamikasini tahlil qilganda, nazorat guruhida arterial gipertenziya 46,8%, artralgiya 45,2%, dislipidemiya - 43%, YUIK -36%, prediabet - 68 ni tashkil etdi. %, depressiv holat - 65%, uyqu apnoesi sindromi - 73%, libido pasayishi - 55%, GERK - 68% va asosiy guruhdagi bemorlarda - arterial gipertenziya 58%, artralgiya 50%, dislipidemiya - 48%, YUIK - 38%, prediabet - 71%, depressiv holat - 71%, uyqu apnoesi sindromi - 78%, libido pasayishi 58%, GERK - 73% holatlarda to'liq remissiya kuzatiladi. Oshqozon osti bezi rezeksiyasidan keyin yuzaga kelishi mumkin bo'lgan asoratlar anemiya, gipoproteinemiya va vitaminlar yetishmovchiligi bo'lib, ularni konservativ usullar bilan osongina to'ldirish mumkin.*

Kalit so'zlar: *semizlik, morbid semizlik, oshqozonning bo'ylama rezeksiyasi, bariatrik jarrohlik.*

Relevance.

Obesity, as defined by the World Health Organization (WHO), has been declared a "global epidemic" due to the alarming rise in its prevalence. According to WHO and the International Federation for the Surgery of Obesity and Metabolic Disorders (IFSO), obesity continued to grow on a global scale in 2023. Currently, approximately 24% of the world's population is affected by obesity. Furthermore, by 2035, this figure could reach 50% if preventive measures and treatment methods

are not significantly improved. Obesity among children and adolescents has also quadrupled, affecting 8% of individuals aged 5 to 19. Among adults, obesity rates have doubled from 1990 to 2022 and now stand at 16% [1,2,4,6,7,8,9].

Additionally, overweight and obesity are responsible for 44% of diabetes cases, 23% of cardiovascular diseases, and between 7% and 41% of cancer cases. An increase in body weight by 1 kg raises the risk of cardiovascular disease by 3.1% and type 2 diabetes by 4.5–9%. In patients with chronic obesity, life expectancy is on average reduced by 12 years compared to individuals with a normal body weight. Among this group, the risk of mortality increases by 20–40% for those who are overweight, and in cases of morbid obesity, the risk increases by 2 to 3 times [13].

Currently, numerous studies have shown that diet therapy combined with pharmacological agents, psychological support, and physical exercise is generally ineffective for the long-term treatment of morbid obesity. The range of surgical treatment options for obesity is quite broad — from endoscopic intragastric balloon placement to gastric bypass surgery [14].

According to the XVI World Congress on Obesity Surgery of the International Federation for the Surgery of Obesity and Metabolic Disorders (IFSO), it was reported that by 2015 in European countries, sleeve gastrectomy accounted for 27.8% of all bariatric surgeries performed [16,17].

Sleeve gastrectomy, also known as longitudinal or vertical sleeve gastrectomy, is rapidly gaining popularity and currently ranks as one of the most commonly performed surgeries worldwide [3,5,10,11]. It is a restrictive procedure in which a gastric tube with a volume of 100–150 ml is formed, preserving the antral part of the stomach. The weight loss mechanism is based on the restrictive component as well as a hormonal mechanism, due to a sharp decrease in ghrelin levels [4,12, 13,16,17].

Despite the ongoing discussions about sleeve gastrectomy for treating patients with excess body weight, many issues regarding the indications for this surgery and postoperative management remain unresolved and debatable. In view of the above, we decided to evaluate the outcomes of the operations we have performed.

Objective of the Study — To evaluate the outcomes of surgical treatment in patients with morbid obesity.

Materials and Methods.

For diagnosis and assessment of patient condition, all patients underwent laboratory testing at the pre-hospital stage. These laboratory tests included blood tests (general clinical, tests for hepatitis B and C, RW [Wassermann reaction], coagulation profile, and biochemical blood analysis) and a general urine test. The general clinical blood test measured hemoglobin, hematocrit, erythrocytes, platelets, leukocytes, leukocyte formula, and ESR. Blood coagulation indicators were checked, and blood type and Rh factor were determined. In the biochemical blood test, levels of total protein, albumin, bilirubin, potassium, sodium, chloride, aspartate and alanine aminotransferases, calcium, and iron were measured. Additionally, to rule out an endocrine cause of obesity, patients underwent a diagnostic evaluation of the endocrine glands (thyroid gland, pancreas, and adrenal glands) in accordance with standard protocols. When assessing the psychological and social consequences of significant and rapid weight loss due to morbid obesity, the average postoperative follow-up period was 18 months.

Results and Discussion.

According to statistical data, metabolic and bariatric surgery in our country began developing in 2016 and gained particular popularity after 2018. In the initial years, surgery was mainly sought by patients with diabetes mellitus, but since 2020, the majority of patients have been those with morbid obesity (MO). Initially, the number of mini-gastric bypass (MGB) surgeries was significantly higher,

but later, sleeve gastrectomy (SG) became the predominant procedure for treating obesity.

Our research was conducted based on the comprehensive examination and treatment results of 187 patients with morbid obesity between 2021 and 2023 at the clinical bases of the Department of Surgical Diseases and Family Medicine of the Tashkent Medical Academy. For our study, the main group consisted of 95 patients, and the control group included 92 patients aged from 18 to 63 years. In the control group (92 patients), traditional sleeve gastrectomy was performed. The main group (95 patients) included those who underwent our proposed modified sleeve gastrectomy (No. IAP 07203).

The main criteria for indications for bariatric surgery in these patients are:

- A body mass index (BMI) over 40 kg/m^2;
- Cases where the BMI exceeds 35 kg/m^2 and there are accompanying diseases and metabolic disorders associated with obesity.

General guiding criteria in bariatric practice also include:

- Patients aged over 18 and under 63 years;
- When one or another form of conservative treatment (both non-pharmacological and pharmacological) has proven ineffective due to a history of morbid obesity;
- The wishes and demands of the patient with morbid obesity;
- The combination of prediabetes with obesity.

When studying the age and gender distribution of the comparison groups, it was found that the majority of patients were women of young and middle age.

Table 1.

Distribution of patients with morbid obesity by age

Age of patients	Control group, *n*=92	Main group, *n*=95	Total *n* (%)
From 18 to 44 years	83	70	153(81,8%)
From 45 to 59 years	7	22	29(15,5%)
From 60 to 74 years	2	3	5(2,7%)
75 and older	-	-	

In our research groups, a total of 187 patients with varying body mass index (BMI) and morbid obesity underwent surgery. Among them, 153 patients (81.8%) were aged between 18 and 44 years, 29 patients (15.5%) were aged between 45 and 59 years, and 5 patients (2.7%) were aged between 60 and 74 years.

Gender analysis showed that in the control group, women accounted for 92.4% and men for 8%. In the main group, women also constituted the majority — 79% and men 21%, respectively.

Data analysis showed that most patients with morbid obesity had Class III obesity (77% in the main group and 59% in the control group) and Class II obesity (23% in the main group and 41% in the control group), based on their body mass index (BMI).

An analysis of the preoperative body weight of patients with morbid obesity who underwent LSG (laparoscopic sleeve gastrectomy) revealed that in the control group, the maximum weight was 186 kg, the minimum weight was 85 kg, and the average weight was 115 kg. In the main group, these figures were 209 kg (maximum), 85 kg (minimum), and 116 kg (average), respectively (Fig. 1).

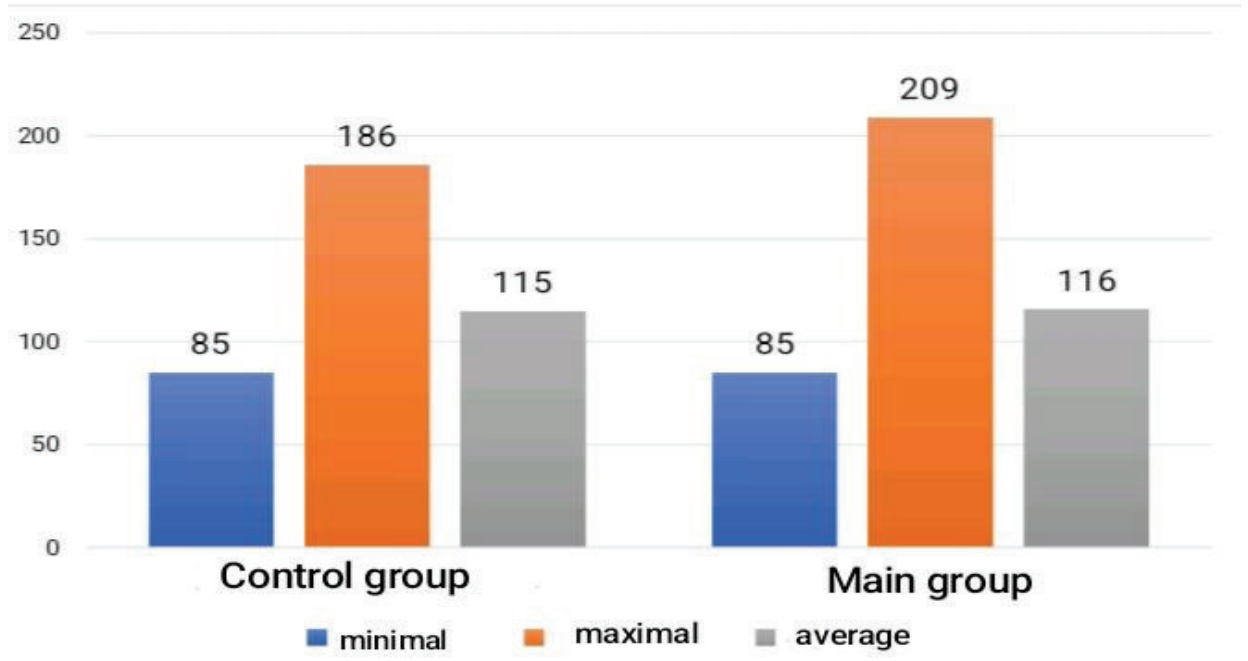


Figure 1. **Analysis of body mass index indicators in patients with morbid obesity in the study groups before BPD (biliopancreatic diversion)**

According to the medical history, 117 patients (63%) had a genetic predisposition to obesity, and 109 patients (58.5%) had received various types of conservative treatment (Figure 2).

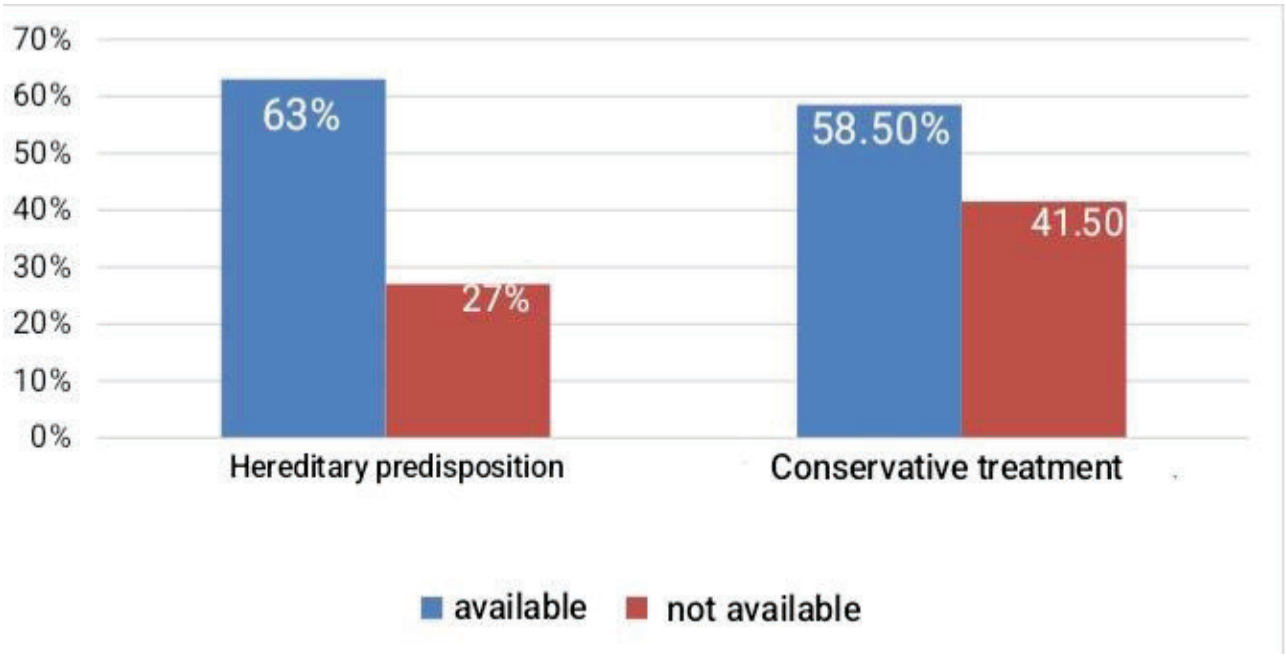


Figure 2. **Analysis of important anamnestic data of patients with morbid obesity in the studied groups**

When analyzing the anamnestic data of patients with morbid obesity, the majority were found to have had obesity for a duration of 10 years (47.6% in the main group, 43.9% in the control group), up to 5 years (28.6% in the main group, 32.9% in the control group), and up to 15 years (23.8% in the main group, 23.2% in the control group) (Figure 3).

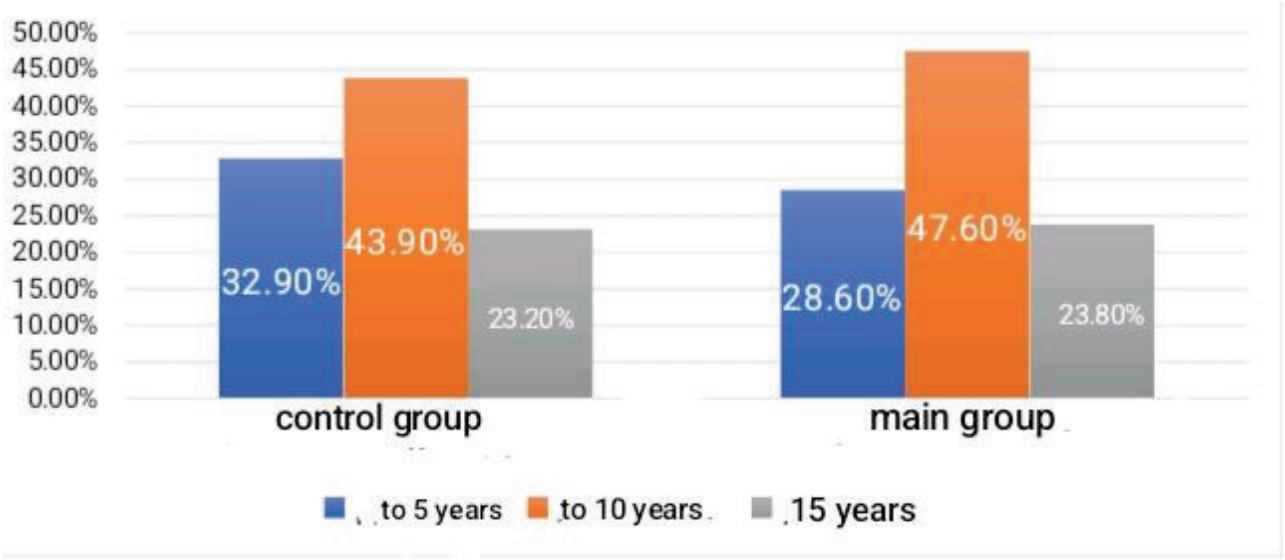


Figure 3. **Analysis of Obesity History in Patients with Morbid Obesity in the Control Groups**

An analysis of comorbid conditions in patients with morbid obesity shows that 133 patients (70.1%) had one or more associated diseases (see Table 2). The structure of these comorbidities includes the following diagnoses: Arterial hypertension – 108 patients (57.7%), Musculoskeletal system disorders – 81 patients (43.3%), Depressive disorders – 63 patients (33.7%), Gastroesophageal reflux disease (GERD) – 32 patients (17.1%), Gallstone disease – 19 patients (10.1%), Hiatal hernia – 17 patients (9.1%), Diabetes mellitus – 9 patients (4.8%).

№	Comorbidities diseases	Total, *n(%)*
1	Arterial hypertension	108(57,7%)
2	CAD. Angina.	27(14,4%)
3	Musculoskeletal disorders (arthralgia and vertebralgia)	81(43,3%)
4	Impaired glucose tolerance (pre-diabetes)	17(9,1%)
5	Gastroesophageal reflux	32(17,1%)
6	GSD. Chronic calculous cholecystitis	19(10,1%)
7	Hiatal hernia	17(9,1%)
8	Depressive state	63(33,7%)
9	Sleep apnea syndrome	22(11,7%)
10	Decreased libido	23(12,3%)
11	Ovarian cyst	8(4,2%)
12	Varicose veins of the legs	28(14,9%)
13	Shortness of breath (with moderate exertion)	38(20,3%)
14	Hernia of the anterior abdominal wall	7(3,7%)

The physical condition of the patients in our study was classified according to the scale proposed by the American Society of Anesthesiologists (ASA I–VI). In the control groups, 18 patients (15.2%) from the control group and 20 patients (18.4%) from the main group had ASA Class I physical status (healthy patients). ASA II – the second category of physical status (patients with mild systemic disease) – was observed in 64 patients (69.5%) and 67 patients (70.5%) respectively. ASA III – the third category (patients with severe systemic dis-

ease that is not life-threatening) – was observed in 10 patients (10.8%) and 8 patients (8.4%) respectively. There were no patients in our study groups who belonged to the fourth or fifth ASA categories.

Results.

The modified LSG (laparoscopic sleeve gastrectomy) method proposed in our work primarily improves the course of the early postoperative period. The development of certain pathological conditions after surgery largely depends on the early postoperative course. In turn, a smoother early postoperative period improves the long-term outcomes of the surgery and contributes to overall improvement.

The outcomes of LSG surgery in patients with morbid obesity were evaluated based on weight loss, changes in comorbidities, and the dynamics of metabolic disorders. In our study groups, changes in these indicators were examined at 3, 6, 12, 18, and 24 months after LSG surgery.

In our study groups, changes in BMI were consistent with body weight dynamics observed in similar types of surgeries in comparable groups. Thus, a significant reduction in BMI was observed in patients after surgery. The most intensive BMI reduction was seen during the first 6 months. In the control group, the preoperative BMI averaged 43 kg/m^2, with a maximum of 63 kg/m^2 and a minimum of 32 kg/m^2. During follow-up, the BMI was 37.5±4.8 kg/m^2 at 3 months and 30.5±3.9 kg/m^2 at 12 months.

In the main group, the following results were obtained: the average preoperative BMI was 46.87 kg/m^2, with a maximum of 74.90 kg/m^2 and a minimum of 35.0 kg/m^2. At 3 months post-op, the BMI was 36.6±4.6 kg/m^2, and at 12 months – 29.0±3.5 kg/m^2. It was noted that by this point, patients were overweight but no longer suffered from morbid obesity. Indicators at 18 and 24 months in our groups became relatively moderate and continued to decline (see Table 3).

Table 3.

Indicators of Weight Loss in the Groups After LSG Surgery

Models / groups	Control group	Main group
BMI before surgery	44,5±5,4	46,8±5,8
BMI after 3 months	37,5±4,8	36,6±4,6
BMI after 6 months	34,8±4,5	33,2±4,2
BMI after 12 months	30,5±3,9	29,0±3,5
BMI after 18 months	29,4±3,4	28,8±3,3
BMI after 24 months	29,2±2,4	28,2±2,6
% TWL after 3 months	12,5	14,0
% TWL after 6 months	17,3	15,4
% TWL after 12 months	29,5	28,9
% TWL after 18 months	33,3	31,6
% TWL after 24 months	34,2	33,0
% EWL after 3 months	32,5	36,5
% EWL after 6 months	42,5	56,1
% EWL after 12 months	69,2	75,5
% EWL after 18 months	75,8	80,5
% EWL after 24 months	78,9	84,9

After surgery, the percentage of total weight loss (%TWL) was 16.5%, 24.3%, 33.9%, 37.9%, and 37.9% respectively. In the control group, it was 3%, 38.2%, while in our main group it was 19.0%, 25.4%, 34.9%, 38.1%, and 39.6%. This indicator was better in the main group by 2.5%, 1.1%, 3%, 1.3%, and 1.4%, respectively, compared to the control group. This shows that in the main group of patients, due to improved early postoperative outcomes in the first 3 months, the percentage of weight loss was maximized com-

pared to the control group, and in the following months, this indicator remained relatively better in our main group of patients.

When analyzing the percentage of excess weight loss (%EWL) after sleeve gastrectomy, excess weight decreased intensively during the first 3–6 months in the control group and reached its maximum at 12 months: 69.2% in the control group versus 75.5% in the main group, showing a better result in the main group by 6.3%. At 18 and 24 months of follow-up, the "percentage of excess weight loss" slightly stabilized and was 75.8% and 78.9% in the control group, and 80.5% and 84.9% in the main group, respectively.

It was noted that weight indicators decreased more significantly after the improved longitudinal sleeve gastrectomy due to consideration of factors such as optimal selection criteria for surgery, assessment of comorbidities and existing anesthetic risk, and individualized resection of the antral part of the stomach for each patient based on BMI.

When analyzing the dynamics of comorbidities associated with morbid obesity 18 months after sleeve gastrectomy, in the control group the prevalence was: arterial hypertension – 46.8%, arthralgia – 45.2%, dyslipidemia – 43%, coronary heart disease – 36%, prediabetes – 68%, depressive state – 65%, sleep apnea syndrome – 73%, decreased libido – 55%, GERD – 68%. In the main group, the rates were: arterial hypertension – 58%, arthralgia – 50%, dyslipidemia – 48%, coronary heart disease – 38%, prediabetes – 71%, depressive state – 71%, sleep apnea syndrome – 78%, decreased libido – 58%, GERD – in 73% of cases full remission was observed (Table 4).

Table 4.

Dynamics of comorbidities associated with existing morbid obesity in patients after LSG surgery

№	Comorbidities after 18 months	Complete remission		Improvement		Without change		Deterioration	
		H	A	H	A	H	A	H	A
1	Arterial hypertension	46,8 %	58%	49 %	39,9 %	3,2 %	2,1 %	-	-
2	Arthralgia and vertebralgia	45,2 %	49,2%	44. 4%	48 %	10,4 %	2,8 %	-	-
3	Dyslipidemia	43%	48%	57 %	52 %	-	-	-	-
4	CAD. Angina	36%	38%	58 %	60 %	6%	2%	-	-
5	Prediabetes	68%	71%	32 %	29 %	-	-	-	-
7	Depression	65%	71%	35 %	29 %	-	-	-	-
8	Sleep apnea syndrome	73%	78%	27 %	22 %	-	-	-	-
9	Decreased libido	55%	58%	38 %	37 %	7%	5%	-	-
10	GERD	68%	73%	26, 8%	27 %	5,2 %	4,2	-	-

LPRSG (Laparoscopic Proximal Roux-en-Y Gastric Sleeve), performed based on these indications—especially the modified procedure—effectively corrected obesity-related comorbidities in patients and reduced potential complications associated with obesity.

After bariatric surgery, the most important thing for patients is proper, balanced nutrition. It is essential to clearly communicate to the patient the importance of this stage and strictly explain the need to limit the portion size per meal, the details and frequency of food intake, and the rules for transitioning from liquid to puréed, and then to solid food.

An analysis of early specific complications of LPRSG in patients with morbid obesity showed that dyspeptic disorders occurred in 38.5% of the control group and 24.6% of the main group (Table 5). Vomiting occurred in 31.5% and 24.2% respectively, furuncles in 22.8% and 13.7%, wound infections in 5.4% and 2.1%, bleeding from the stapler in 3.2% and 1.1%, and stapler failure was observed only in the control group in 1.1% of cases (Table 5).

Table 5.

Specific early complications after LPRSG

№	Specific complications	Study groups	
		Control group (n=92)	Main group (n=95)
1	Nausea, vomiting	31,5%	24,2%
2	Heartburn	22,8%	13,7%
3	Metabolic acidosis	5,4%	2,1%
4	Purulent-inflammatory complications of the wound	5,4%	3,1%
5	Bleeding	3,2%	1,1%
6	Stapler line failure	2,2%	-
7	Mesenteric venous thrombosis	1,1%	-
8	Pulmonary embolism	2,2%	-
9	Anemia	14%	11,5%
10	Hypoproteinemia	13%	11,5%
11	Hypovitaminosis	19,5%	17,9%
12	Micronutrient defiency	10,5%	10,9%

The results obtained in our study groups show that the use of preoperative preventive measures proposed in our main group, along with the application of the modified LSG (Laparoscopic Sleeve Gastrectomy) method, led to a significant reduction in the likelihood of early specific postoperative complications in patients.

In our research groups, early surgical complications that occurred after the operation were promptly managed. Postoperative bleeding in the control group occurred in 3 patients (3.2%); in 1 patient (1.1%) it was stopped with conservative treatment, while in 2 patients (2.1%) it required surgical intervention (Table 4). In our main group, hemostasis was achieved in 1 patient (1.1%) after intensive hemostatic therapy.

Staple line leakage following LSG is a serious complication that can lead to severe consequences if not addressed in time. In our control group, staple line leakage occurred in 2 patients (2.2%). One patient underwent stenting of the newly formed gastric sleeve. After 28 days of observation, the stent was removed endoscopically, and the patient's condition gradually improved. The second patient underwent relaparoscopy, during which a microperforation along the staple line was discovered, and drainage via a gastric tube was performed (Table 6).

Table 6.

Repeat surgical interventions performed due to complications observed after LSG

Volume of repeated operations		Control group	Main group
1	Relaparoscopy, stopped bleeding	2(2,2%)	-
2	Relaparoscopy, suturing of the stapler line	1(1,1%)	-
3	Relaparoscopy, drainage	1(1,1%)	1(1,1%)
4	Diagnostic laparoscopy	-	-
	Total	4(4,4%)	1(1,1%)

Drainage of the abdominal cavity in the patient was removed 7 days after the CT scan of the stomach with contrast.

In our main group, no complications in the form of staple line leakage were observed after the modified LSG procedure.

It is evident that the modified LSG method we proposed and applied increased the strength of the gastric staple line and significantly reduced complications such as suture failure and bleeding, which can have serious consequences after surgery.

The Clavien-Dindo classification was used to assess the severity of postoperative complications observed after the LSG procedure (Table 7).

Table 7.

Severity of complications after LSG surgery (according to Clavien-Dindo)

Severity of postoperative complications		Control group	Main group
1	I degree	2,9 %	1,5%
2	II degree	6,6%	4,4%
3	IIIa degree	1,1%	
4	IIIb degree	3,3%	1,1%
5	IVa degree	-	-
6	IVb degree	-	-
7	V degree	-	-
8	Total	13,9%	7%

As a result of the analysis, Grade I complications after LSG accounted for 2.9% in the control group and 1.5% in the main group. Grade II complications were observed in 6.6% of the control group and 4.4% of the main group. Grade IIIa complications occurred in 1.1% of the control group only. Grade IIIb complications were observed in 3.3% of the control group and 1.1% of the main group. Overall, the main group had 6.9% fewer complications compared to the control group.

At the same time, among the comorbid conditions requiring surgical intervention in our study groups, the following pathologies were observed (Table 8): gallstone disease in 19 patients (10.1%), hiatal hernia in 17 patients (9.1%), ovarian cyst in 6 patients (3.9%), and anterior abdominal wall hernia in 9 patients (4.8%). In these cases, simul-taneous surgical procedures were performed based on patient consent and medical recommendations.

Table 8.

Description of Simultaneous Surgeries Performed in the Study Groups

Simultaneous operations		Control group (n=92), (%)	Main group (n=95), *n (%)*
1	Cholecystectomy	16(17,4%)	15(15,7%)
2	Posterior crurorаphy	4(4,3%)	6(6,3%)
3	Cystectomy	3(3,2%)	4(4,2%)
4	Hernia repair	2(2,1%)	3(3,1%)
5	Total	25(27,1%)	28(29,4%)

The obtained results showed that 25 patients (27.1%) in the control group and 24 patients (25.6%) in our main group underwent a successful simultaneous surgery. The performed simultaneous surgical procedures reduce the psychological stress caused by undergoing multiple separate surgeries. Several surgical interventions are carried out in a single operation and by a familiar surgeon, which shortens the duration of patients' disability, helps preserve their condition, personal life, and budget.

Conclusion.

1. It was found that 70.1% of patients with morbid obesity have one or more comorbid conditions associated with obesity, accompanied by profound metabolic changes. This, in turn, worsens the course of obesity, increases treatment costs, raises anesthetic risks before surgery, and leads to a decrease in patients' quality of life.

2. Despite the advances in modern medicine, the level of early and late, as well as specific and nonspecific, complications remains high in patients with morbid obesity after surgery.

3. In patients with morbid obesity, the proposed modification for performing laparoscopic sleeve gastrectomy improves the handling of the cardioesophageal zone and reinforces the staple line of the gastric sleeve. This led to a reduction in complications related to staple line failure—from 2.2% in the group with the traditional surgical technique to a complete absence of such complications in the group with the modification. Moreover, the modification reduced symptoms of gastroesophageal reflux from 14% to 6.1%.

4. In patients with morbid obesity, taking into account clinical and anamnestic data, the determination of surgical indications and the extent of antral resection using the modified LSG technique, along with the proposed therapeutic algorithm that considers anesthetic and metabolic changes, improved treatment effectiveness. This resulted in a 3.3% reduction in the number of repeat surgeries and a 6.9% improvement in complication severity.

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