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EFFICACY OF LAPAROSCOPIC LONGITUDINAL GASTRECTOMY FOR CORRECTION OF OBSTRUCTIVE SLEEP APNEA SYNDROME IN PATIENTS WITH MORBID OBESITY

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ABSTRACT

Studying the effectiveness of longitudinal gastrectomy on obstructive sleep apnea syndrome 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 the our clinical bases from 2021 to 2023.

The analysis of comorbidities in the compared groups showed that one or more comorbidities were detected in 52% of the control group, 57.5% of the main group, and 22.2% of the patients in the main group had sleep apnea syndrome. The main part of these patients was made up of patients with obesity of the III degree

We studied BMI, waist and neck circumference in patients with morbid obesity after laparoscopic longitudinal gastrectomy. Three months after laparoscopic longitudinal gastrectomy, patients' BMI decreased significantly by 21.0 ± 2.5%, as well as waist circumference by 14.0 ± 1.9%. Also, a significant decrease in neck circumference was found after the surgery, which was 12.0±2.5%. These indicators show that after longitudinal gastric resection in patients with morbid obesity, the above indicators, corresponding to the patient's body weight and BMI improved, leading to a significant reduction in the symptoms of obstructive sleep apnea syndrome in patients.

Key words: obstructive sleep apnea; morbid obesity; bariatric surgery; laparoscopic longitudinal gastrectomy.

INTRODUCTION

Obesity is a major global health problem, with an estimated 650 million cases worldwide[21]. In recent years, the increasing prevalence of obesity in both developed and developing countries is one of the most serious public health problems and has led to a global epidemic [20,22]. Epidemiological studies have shown that obesity is associated with comorbidities such as cardiovascular diseases [9, 8], metabolic diseases (diabetes mellitus and others) [14, 15], chronic kidney disease, immunological disorders [5] and obstructive sleep apnea [13.2].

Obesity is considered one of the most significant and independent risk factors for the development of obstructive sleep apnea syndrome (OSA). Obesity is the most important, best documented and one of the few modifiable risk factors for obstructive sleep apnea, which is common in obese patients, mainly due to the accumulation of fat tissue in the upper chest and neck, and abdominal obesity reduces the ability of the lungs to fully expand, which causes a deterioration in ventilation of the lungs up to a restrictive type of breathing. Obese patients (body mass index (BMI) more than 29 kg/m2) are 8–12 times more likely to have OSA than nonobese individuals[4, 16, 11].

Obstructive sleep apnea syndrome is a respiratory disorder characterized by periodic pauses in breathing during sleep. Sleep fragmentation can lead to effective sleep deprivation, severe daytime sleepiness, decreased physical activity and persistent heavy snoring. Sleep apnea is a potentially life-threatening condition accompanied by hemodynamic disorders and unstable cardiac activity [12].

The incidence of respiratory sleep disorders in patients with morbid obesity is 12-30 times higher than in the general population [1].

The incidence of OSA in the population ranges from 5 to 10%. Among them, severe forms account for approximately 2% of cases. OSA occurs in 2-4% of middle-aged men and 1-2% of middle-aged women, and the incidence increases with age and body mass index. Among obese patients, the prevalence of OSA is more than 30%, and according to some data - 50-98%. In third degree obesity (BMI ≥ 40 kg/m2), a severe form of OSA is observed in more than 60% of cases [3, 13, 19, 6].

OSA itself can contribute to weight gain due to ineffective sleep, impaired glucose metabolism, and imbalances in leptin, ghrelin and orexin levels[13].

According to the American Academy of Sleep Medicine [18], obstructive apnea is an episode of respiratory arrest with a ≥90% reduction in airflow for ≥10 s, followed by efforts of the respiratory muscles to restore breathing. Hypopnea is an episode of incomplete cessation of breathing lasting at least 10 s with a decrease in air flow of ≥30% with an associated drop in blood oxygen saturation ≥3% (desaturation)

or activation/awakening reactions recorded on the electroencephalogram, which are necessary to increase muscle tone - dilators of the pharynx and opening the lumen of the upper respiratory tract to allow air to enter the lungs.

Untreated OSA is often accompanied by decreased quality of life, the development of multiple comorbid cardiovascular diseases, an increased risk of motor vehicle accidents, and premature mortality [7].

Today, obstructive sleep apnea syndrome still remains a pressing problem in modern medicine. Despite the widespread use of many drug and hardware methods for treating this syndrome, weight loss also remains an extremely important component of an integrated approach to the correction of obesity and obstructive sleep apnea syndrome.

Today, bariatric surgery is one of the effective and modern methods of treating morbid obesity, including obstructive sleep apnea syndrome.

Purpose of the study: to study the effectiveness of longitudinal gastrectomy on the course of obstructive sleep apnea syndrome in patients with morbid obesity.

Materials and methods: This scientific work is based on the results of a comprehensive examination and treatment of 187 patients with morbid obesity (MO) who were treated in the Department of Surgery of the 1st City Clinical Hospital and the clinical bases of the Department of Surgical Diseases in Family Medicine of TMA from 2021 to 2023. Depending on the treatment, the patients were conditionally divided into 2 groups: the 1st (control group) included 92 patients who underwent the traditional method of laparoscopic longitudinal gastrectomy (LPRG); in group 2 (main group) there were 95 patients who underwent our proposed modified longitudinal gastrectomy [10,17]. When the distribution of the patients of our research group by age was studied, it was found that the main group of patients are young and middle-aged women(table 1).

Table 1.

Distribution of patients by age.

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

Our research group consisted of 187 patients aged 18 to 63 years who underwent surgery with morbid obesity with different body mass indices. The average age of patients was 36±0.92 years in the control group, 34±0.7 years in the

main group. 81.8% of patients aged 18 to 44, 15.5% from 45 to 59 years, 2.7% from 60 to 74 years. The analysis shows that the patients who underwent surgery are mostly under 45 years old, which is considered to be the working age. When studying the distribution of patients by gender, there were 85 (92.4%) women in the control group, 7 (7.6%) men in the main group, 75 (79%) women and 20 (21%) men in the main group (Fig.1).

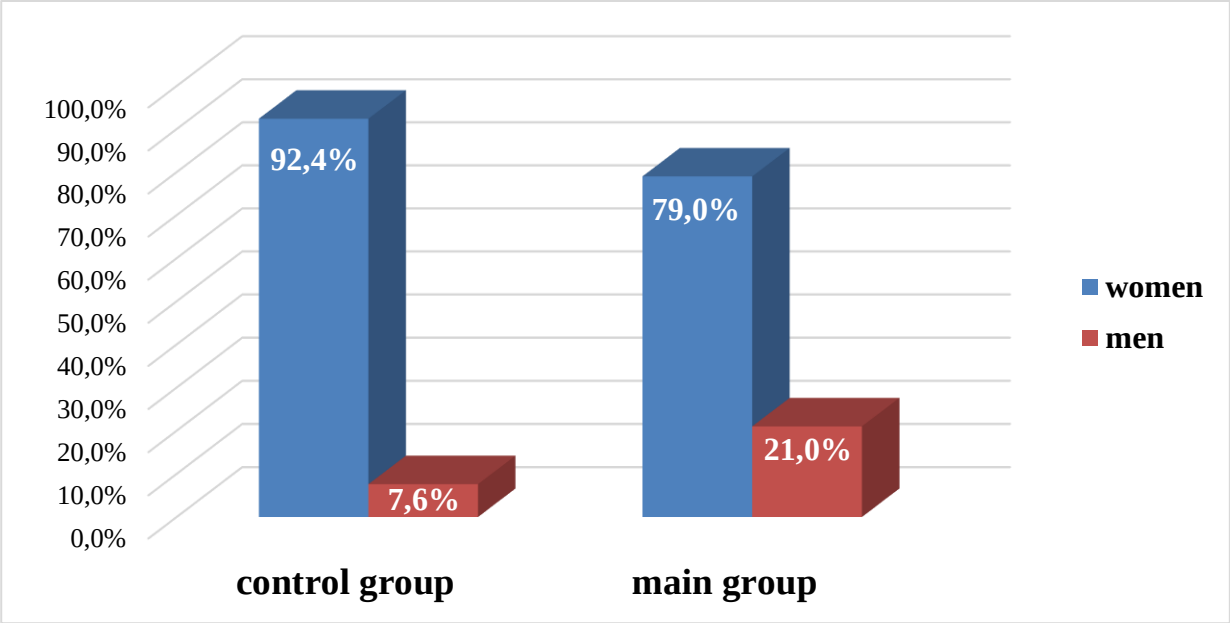

Fig.1. Distribution of patients in the study groups by gender.

Analysis of the preoperative weight of morbidly obese patients showed that the minimum weight in the control group was 85 kg and the maximum weight was 186 kg, in the main group this indicator was 85 kg and 209 kg, and the average weight in the comparison groups was 115±1.0 kg, respectively(Fig.2).

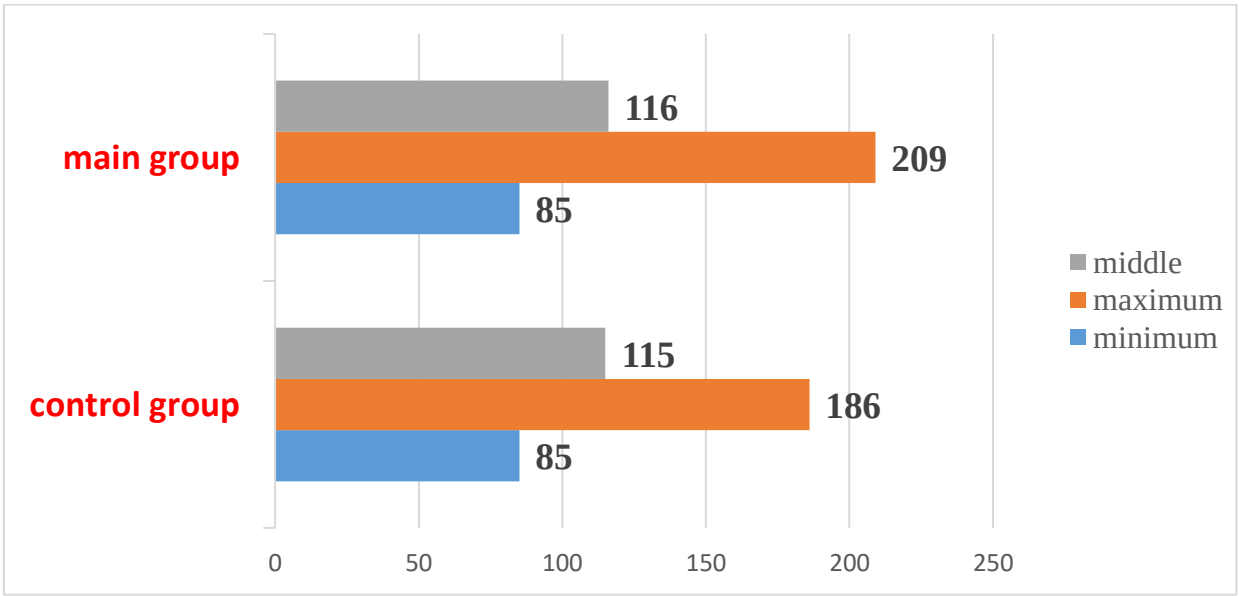

Fig.2. Distribution of patients in groups according to body mass.

The data analysis shows that in patients with morbid obesity, when their body mass index (BMI) was studied, it was noted that mainly III-degree (%) and II-degree (%) obesity applied for bariatric practice (Fig.3).

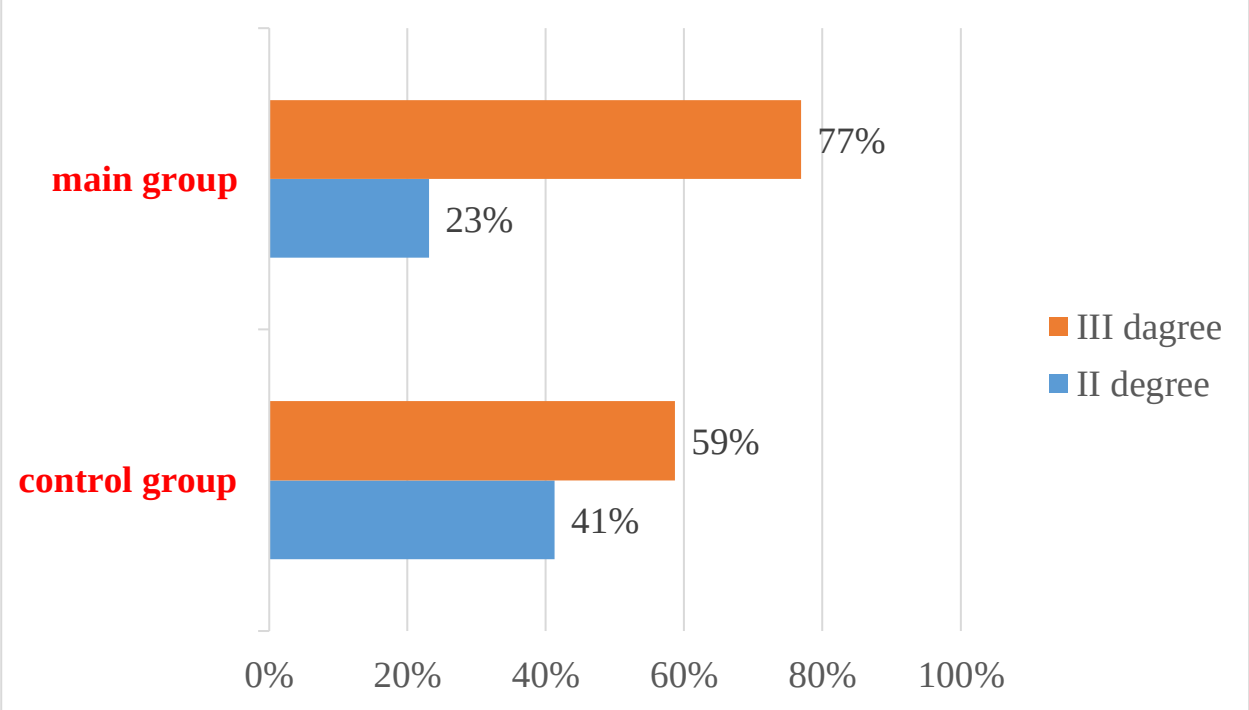

Fig.3. Distribution of patients with MO in comparison groups by level of obesity (WHO, 1997)

As we mentioned above, morbid obesity is accompanied by comorbidities. They mainly include arterial hypertension, ischemic heart disease, osteoarthrosis (arthralgias) and reflux esophagitis. Of course, they can influence the course of morbid obesity, biochemical and hemostasiological indicators, and curative surgery. Therefore, our next task was to study the effect of comorbidities observed in morbid obesity. To do this, we divided the patients from the control and main groups into subgroups with comorbidities and those without.

Only 22 (24.1%) of the 92 patients in the control group did not have the above-mentioned comorbidities, and the remaining 70 (75.9%) patients had comorbidities (see table). 11 (32.3%) of patients in the group without accompanying diseases had 2nd degree obesity, 6 (10.3%) had 3rd degree obesity. 23 (67.7%) of the remaining 70 patients with comorbidities of the control group had the 2nd degree of obesity, and 52 (89.7%) had the 3rd degree of obesity.

Similar changes were also observed in the main group. In particular, 29 (31.5%) of those who did not have comorbidities, 66 (69.5%) of those who had comorbidities(table 2).

Table 2.

Distribution of patients in the control and main groups according to the presence of comorbidities and degree of obesity

Groups	Total		Obesity Rate			
			2nd		3rd	
	n	%	n	%	n	%
control group, n=92						
Comorbidities-no	22	24,1	11	32,3	6	10,3
Comorbidities-yes	70	75,9	23	67,7	52	89,7
main group, n=95						
Comorbidities-no	29	31,5	11	28,2	7	12,5
Comorbidities-yes	66	69,5	28	71,8	49	87,5

In the group of patients without accompanying diseases, 2nd degree obesity was detected in 11 (28.2%) patients, while 3rd degree obesity was observed in 7 (12.5%) patients. In the group with concomitant diseases, 2nd degree obesity was detected in 28 (71.8%) patients, and 3rd degree obesity was detected in the remaining 49 (87.5%) patients.

When the MS patients in the control groups were analyzed according to TMI, there were 3 patients with TMI <35 in the control group, and 39 patients with TMI between 35 and 40 in the control group. In the main group, the number of patients from 45 to 50 was 31(table 3).

Table 3.

Description of patients with morbid obesity in comparison groups according to the BMI index.

BMI	**Number of patients (n, %)**		
	control group	**main group**	**Total**
< 35	3 (%)	-	3(%)
35–40	39(%)	20(%)	59(%)
40–45	21(%)	23(%)	34(%)
45–50	17(%)	31(%)	48(%)
>50	12(%)	23(%)	35(%)
Total	**92**	**95**	**187**

In the analysis of anamnestic data of patients with morbid obesity, it was found that genetic predisposition was noted in 53% of patients of the control group and in 63% of patients of the main group. According to the duration of obesity, the majority of patients in the control and main groups were found to be between 5 and 10 years, 43.5% and 48.9%, respectively. When examining the medical history of the patients, it was found that 47.8% of the control group and 52.5% of the patients of the main group received both types of conservative treatment.

Most patients with morbid obesity have MS-related comorbidities and MS-related gross pathognomonic symptoms, which aggravate the course of the disease and cause complications. The analysis of comorbidities in the compared groups showed that one or more comorbidities were detected in 52% of the control group, 57.5% of the main group, and 22.2% of the patients in the main group had sleep apnea syndrome. The main part of these patients was made up of patients with obesity of the III degree(table 4).

Table 4.

Preoperative and postoperative dynamics of obstructive sleep apnea syndrome in patients with morbid obesity

Comorbidities	**before surgery**		**after surgery**			
	control group (n=92)	**main group (n=95)**	**after 6 months**		**after 12 months**	
			control group	**main group**	**control group**	**main group**
Obstructive sleep apnea syndrome (OSA)	22,7%	22,2%	9,7%	3,1%	6,2%	2,3%

The results obtained: Longitudinal gastric resection is considered an effective treatment method for patients with morbid obesity and obstructive sleep apnea syndrome. Currently, bariatric is not only a method of treating obesity, but also a method of correcting metabolic diseases, especially diabetes.

When the results of operative practice were analyzed after 12 months after the performed LGR , it was found that 7% of the patients of the main group decreased from the pre-operative index to 53.1%, and after 24 months it decreased to 73.8%,

which was found in 3.9% of the patients. In these patients, it was observed that after the procedure, along with weight loss, metabolic indicators were improved, and existing comorbidities were significantly corrected. This condition not only improved the patient's quality of life, but also caused a sharp decrease in the rate of severe complications and death due to morbid obesity.

As we noted above, the main pathognomic complications caused by obesity are high and lead to a decrease in the quality of life of patients. Indeed, in the control group without comorbidities, apnea occurred in 9% of patients and persisted in 3.1% of patients after the procedure. In morbid obesity, co-morbid apnea was found in 22.7% of patients, and after surgery, it decreased by 2.49 times and remained in 9.1% of patients(table 5).

Table 5.

The effect of surgery on the main pathognomonic symptoms caused by obesity (%).

Comorbidities	**Obstructive sleep apnea syndrome (OSA)**
control group, n=92	
no, n=22	9,3 3,1
yes, n=70	22,7 9,1
main group, n=95	
no, n=29	15,8 5,3
yes, n=66	22,2 3,7

Note: the picture shows the results before the treatment, the denominator shows the results 6 months after the operative treatment.

In the group without comorbidities of the main group, apnea was observed in 15.8% of patients. As a result of the proposed surgical procedure, the obstructive sleep apnea syndrome decreased 3 times and remained in 5.3% of patients. In the group with concomitant diseases in morbid obesity, apnea was detected in 22.2% of patients, and after surgery, it decreased 6 times and remained in 3.7% of patients. The proposed surgical procedure effectively alleviated the pathognomonic symptoms of obesity in obstructive sleep apnea compared to the control group.

We studied BMI, waist and neck circumference in patients with morbid obesity after laparoscopic longitudinal gastrectomy. Three months after laparoscopic longitudinal gastrectomy, patients' BMI decreased significantly by

21.0 ± 2.5%, as well as waist circumference by 14.0 ± 1.9%. Also, a significant decrease in neck circumference was found after the surgery, which was 12.0±2.5%. These indicators show that after longitudinal gastric resection in patients with morbid obesity, the above indicators, corresponding to the patient's body weight and BMI improved, leading to a significant reduction in the symptoms of obstructive sleep apnea syndrome in patients.

Conclusions:

1. After longitudinal gastric resection in morbidly obese patients, TMI, waist and neck circumference indicators. Three months after the procedure, TMI of patients increased by 21.0 ± 2.5%, waist circumference by 14.0 ± 1.9%, neck circumference a decrease of 12.0±2.5% was detected.
2. Longitudinal gastric resection effectively reduces neck and waist circumference, increases maximum ventilatory pressure, improves sleep architecture and reduces respiratory sleep disorders, particularly obstructive sleep apnea, in severely obese patients.
3. In our main group, in the group with concomitant diseases in morbid obesity, apnea was detected in 22.2% of patients, and after 6 months after surgery, it decreased 6 times, and only 3.7% of patients had mild apnea.

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