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## THE TREATMENT OF METABOLIC SYNDROME IN PATIENTS WITH MORBID OBESITY

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## СОВЕРШЕНСТВОВАНИЕ МЕТОДОВ ЛЕЧЕНИЯ МЕТАБОЛИЧЕСКОГО СИНДРОМА НА ФОНЕ МОРБИДНОГО ОЖИРЕНИЯ

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The prospective study of 35 patients aged 28 to 59 years with MO was performed. Patients underwent laparoscopic gastroplication according to the original method. The QOL of patients was studied by comparing the questionnaire results and special research methods. The achieved decrease in body weight as a result of laparoscopic gastric plication, correction of concomitant disorders in dependent organs and systems, and normalization of metabolic process indices allows us to

consider the selected methods of interventions effective, and the results obtained are good. In conclusion, a laparoscopic gastroplication performed by the proposed method can improve long-term outcomes and the QOL in patients with MO after surgery.

*Keywords: bariatric surgery, gastroplication, obesity, dietology, quality of life*

Проведено проспективное исследование 35 пациентов в возрасте от 28 до 59 лет с морбидным ожирением (МО), которым была выполнена гастропликация по оригинальной методике. Изучалось качество жизни больных (КЖ), перенесших лапароскопическую гастропликацию, путем сопоставления результатов анкетирования и специальных методов исследования. Проведенная оценка параметров КЖ больных свидетельствует о том, что после бариатрических вмешательств положительные изменения в большей мере касаются физических показателей КЖ. Снижение массы тела, которое достигается в результате проведенной лапароскопической гастропликации, коррекция сопутствующих нарушений в зависимых органах и системах и нормализация показателей обменных процессов позволяют считать предложенный вариант вмешательства эффективным, а полученные результаты хорошими. Таким образом, проведение гастропликации по предложенной методике с последующим подбором режима и структуры питания улучшают отдаленные результаты, а также повышают КЖ у больных с МО.

*Ключевые слова: бариатрическая хирургия, гастропликация, ожирение, диетология, качество жизни*

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BMI – body mass index

QOL – quality of life

LH – laparoscopic gastroplication

MO – morbid obesity

WHO – World Health Organization

**O**besity is a serious problem and a threat to the health of the world's population. Since 1975, obesity has nearly tripled worldwide [1, 2]. According to some current data, about 250 million people are obese, which is approximately 7 % of the adult population globally. At the same time, according to WHO, in developed countries, about a third (33.3 %) of the population is overweight [2]. Most of the world's population today lives in countries where overweight and obesity kill more people than lack of food. In 2019, 38 million children under the age of 5 were overweight or obese. The consequences of the metabolic syndrome, as a complication of obesity, lead to a significant reduction in life expectancy and a decrease in quality. This significantly increases the risk of developing severe metabolic disorders in type 2 diabetes mellitus, coronary heart disease, and arterial hypertension, which leads to a 12-fold increase in mortality rates in patients under the age of 40 years. Most researchers now recognize that the conservative treatment of extreme degrees of obesity is a complicated task and impossible for 90–95 % of patients [3].

Assessing the rapid growth in the number of obese patients, as well as a significant increase in the economic costs of their treatment, many authors justify the need to use a powerful resource of various surgical methods to correct pathological changes inherent in obesity [4]. Lifestyle modification, including vigorous exercise and a diet low in fat and calories, is fundamental to treating obese patients [5–7]. The use of surgical treatment methods is the most effective way to combat morbid obesity (MO), especially against the background of complications of the disease, which requires a special approach, both in preoperative preparation and intra- and postoperative management, which is associated with the presence of concomitant pathology of vital organs that is invariably detected in them and body systems [8–10].

The work aimed to study the quality of life (QOL) and highlight nutritional characteristics in patients who underwent laparoscopic gastroplication for MO using the original method.

**Material and Methods.** The Surgical Diseases Clinic of the Bashkir State Medical University has been working on surgically treating morbid obesity and metabolic syndrome since 2003. Throughout the journey, many universally recognized methods were applied, as well as the development of their original treatments. Various invasive bariatric procedures were performed for 186 patients whose BMI exceeded 35 kg/m<sup>2</sup>. In recent years, preference was given to the use of restrictive techniques, particularly «sleeve» resection of the stomach, mainly performed in the laparoscopic version.

An alternative to sleeve gastric resection aimed at reducing the organ volume is gastric absorption (gastroplication). We propose a new method of laparoscopic gastroplication (LH) in the surgical treatment of patients with morbid obesity (Patent for the invention of the Russian Federation 2654572). The essence of the technique is to reduce the volume of the stomach due to screwing (invasion) into its lumen with the help of special tools of the part of the stomach wall (creating a fold due to corrugating sero-muscle seams) along the entire stomach. In this case, the volume of the stomach is significantly reduced, and the patient begins to feel saturated when eating much faster than it was before the operation. The technical result is achieved in that the stomach, after being mobilized along a large curvature, is turned into a tube in the form of a «roll», using a specially developed tool. The stomach volume is reduced to 50 ml [11] using a special gastric gauge probe.

Many authors, noting the obvious benefits of gastroplication in the treatment of obesity (ease of execution, economic efficiency), at the same time highlight the risks and uncertainties associated with the morpho-physiological state of the gastric wall in the field of LH [12–14].

To assess changes in the histological picture of the invasive part of the stomach, we have conducted experimental studies on animals that have proved that changes occurring in the mucosa. The muscle layer of the stomach wall after LH are adaptive and not accompanied by morphological disturbances.

In our study, we used the standardized form SF-36, developed based on the English-language MOS 36-Item Short-Form Health Survey (MOS SF-36) (Boston, USA), as a questionnaire. The short form of the questionnaire includes 36 questions that form scales combined into two main summary measures. The first one represents the physical component of health, consisting of the following indications: pain (P), general health (GH), physical functioning (PF) and role functioning (RP). The second one represents the psycho-emotional component of health: emotional functioning (RE), vitality (VT), psychological health (MH), and social functioning (SF). The results were derived by assigning points on the listed eight scales from 0 to 100 points, where a higher score corresponds to a higher level of QOL.

Patients admitted to the clinic as part of this study completed a standard questionnaire form SF-36. A second survey was conducted 24 months later on 35 main group patients after undergoing bariatric surgery. By analogy with the main group by sex, age, and the presence of concomitant pathology, a control group (45 people) was created who voluntarily agreed to participate in the survey. BMI in this group did not exceed 29 kg/m<sup>2</sup>. This made it possible to obtain more homogeneous data and level out gender differences in response to the questionnaire. In the control group, patients did not have chronic diseases in the stage of exacerbation and decompensation, as factors that directly affect the results of assessing the QOL, while not related to the objectives of the study

The statistical study was carried out using Statistica 10.0 (StatSoft Inc., USA). The normality of distribution was assessed using the Shapiro – Wilk test. If the distribution was normal, Student's t-test was used. In case of abnormal distribution of values, the Mann – Whitney test was used in a pairwise comparison of groups of animals. Differences between groups were considered significant at  $p < 0.05$ .

**Results and Discussion.** In the postoperative period, hospital mortality and the development of any complications were not observed. In most cases, 30 (85.7 %) achieved a stable weight loss. It should be noted that in 5 (14.3 %) patients, it was not possible to achieve a long-lasting result. After a decrease in body weight for three months, a negative trend was noted, and the patients began to gain body weight again. Long-term outcomes were monitored in all patients for up to 2 years. A year after the operation, the BMI averaged 32.7±5.5 kg/m<sup>2</sup>, while the loss of excess body weight was 47.9±6.5 %; after 24 months, the BMI was 32.0±5.6 kg/m<sup>2</sup>, loss of excess body weight – 54.4±6.5 %. Weight loss and stabilization at values acceptable to the patient were noted in 2 cases. In three cases, after weight loss, weight gain was again noted, corrected by patients with therapeutic methods. During the control examination, patients underwent additional instrumental examination methods to monitor the condition of the gastroplication tube (fibrogastroduodenoscopy, radiography of the stomach with contrast, if necessary, computed tomography). There were no abnormalities in the area of the operated stomach or complications associated with the functioning of the digestive organs.

A critical factor in the effectiveness of MO treatment is the patient's motivation and cooperation. LH was chosen for patients with continuous dieting and physical activity after surgery. During the first six postoperative weeks, the patient ate soft-liquid (first two weeks), semi-liquid (next two weeks), and semi-solid (next two weeks). On the first day, patients received intravenous infusions. After 24 hours after the operation, it was allowed to take liquids such as water, milk, sweet tea, and fruit juice. The average amount of painless drinking after LH was about 50 ml. If the patient had taken more than 50 ml, epigastric pain or esophageal reflux (especially during the first six months) would occur. These are two inhibiting mechanisms that prevent changes in consumption. If the amount of consumption was in the allowed dose, reflux or pain did not appear. The diet was calculated at 800 kilocalories per day in the first six months after the operation. During the third and fourth weeks, liquid broth from boiled meat and vegetables was added to the diet; milk was replaced with soft yogurt and juice with fruit pulp (apple, orange) with the same volume (50 ml). This rehabilitation phase aimed to develop new dietary habits, stop sugar consumption and start supplying prepared foods, mainly proteins and vitamins. The next stage of the diet was about two weeks and included regular yogurt, whole meals of cooked meat and vegetables, regular fruits and at least 1 liter of water per day. The strategy of taking 50 ml each time lasted at least six months. It was believed that after 1.5–3 months, there was the formation of «new» food habits – a single meal did not exceed 75–100 ml and included bread, boiled meat and salad, and boiled vegetables. After the operation, patients' appetite decreased due to the general limitation of stomach volume. They described this sensation as stomach fullness after eating more than usual. Walking exercises for 1 hour were performed every day from the second week after the surgery.

In current conditions, the QOL is an assessed indicator that can reliably characterize and assess the well-being of patients and apply the data obtained to stratify the effectiveness of the treatment and the dynamics of the course of the pathological process. In the medical classification for this type of information obtained using a questionnaire, the term «health-related QOL» has become widespread [15, 16].

Comparative characteristics of the indicators before and after the operation with the control group are presented in Table and Figure 1. After processing the survey results, a positive effect of the transferred bariatric correction on the physical component of health and a significant increase in the number of points for social functioning, compared with preoperative indicators, were statistically significantly revealed. These data indicate the solution to physical problems limiting a patient's life with MO. Correlation analysis, when comparing preoperative and postoperative indicators, showed significant differences in the scales of physical functioning ( $p=0.0014$ ), health assessment ( $p=0.003$ ) and the physical component of QOL ( $p=0.015$ ). There was a higher assessment in the postoperative period of the level of social activity (emotional and physical ability to communicate with representatives of the general population), indicators of the general perception of health and the ability to engage in professional work. On other scales of the psycho-emotional component of health, the difference was not significant. When comparing the data obtained in the main group after 24 months with the data of the control group, no significant differences were noted.

*Table*  
**The results of questioning patients with the SF-36 questionnaire before surgery and 2 years after it, in comparison with the control group (Score  $\pm\sigma$ )**

Questionnaire scales	Main group		Control group
	Before treatment	Two years after surgery	
Physical operation (PF)	55.8 $\pm$ 8.05	71.8 $\pm$ 4.93	77.6 $\pm$ 4.03
Role (physical) operation (RP)	42.3 $\pm$ 7.7	69.5 $\pm$ 11.3	81.2 $\pm$ 5.9
Pain (P)	51.9 $\pm$ 9.02	62.1 $\pm$ 4.30	54.7 $\pm$ 6.94
General health (GH)	57.2 $\pm$ 3.03	74.2 $\pm$ 7.90	73.2 $\pm$ 4.17
Viability (VT)	45.1 $\pm$ 7.2	66.3 $\pm$ 3.04	63.4 $\pm$ 12.9
Social functioning (SF)	63.8 $\pm$ 4.80	79.1 $\pm$ 8.05	78.2 $\pm$ 9.08
Emotional operation (RE)	73.5 $\pm$ 7.17	72.7 $\pm$ 12.8	72.4 $\pm$ 10.5
Mental health (MH)	71.3 $\pm$ 4.80	74.6 $\pm$ 2.62	81.2 $\pm$ 5.60

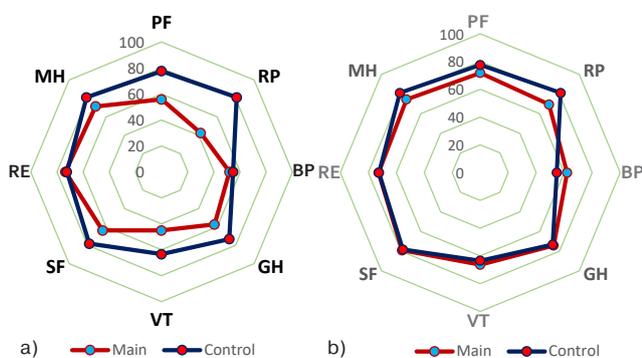


Fig. 1. Comparison of QoL in patients (a) before surgery and (b) after surgery with the control group

The obtained information about the level of daily physical activity made it possible to identify the emerging vicious circle in patients with MO. Increasing body weight leads to a decrease in exercise tolerance and leads to a reduction in daily physical activity. This, due to cultural and social factors, leads to even greater development and progression of obesity.

A high correlation of BMI indicators with scales related to physical functioning and health assessment was noted ( $R=-0.31$ ,  $p=0.0051$ ), but no correlation was found with the psychological component of health. There was also a high correlation between the physical component of the QOL with waist circumference ( $R=-0.29$ ,  $p=0.0021$ ), while such a correlation was not detected with the mental part.

Reliable differences in the groups compared were noted in the assessment of overall health, which we believe was influenced by factors related to age and the presence of an obesity-related pathology. In general, patients with morbidity obesity performed worse on other scales of the questionnaire, but no reliable differences were found. The abdominal fat distribution was consistent with the worst quality of life indicators. At the same time, the subjective character of assessment of mental components of quality of life, in the stage of compensation of metabolic disorders, did not depend on patients' body mass but was correlated with social status in society and personal characteristics. Some patients even had better indicators of the mental component of the quality of life due to higher income and societal

position, despite the decrease in the physical component against a heavyweight.

As already noted, a credible distinction was made in pre-operation and control groups on 16 of the 36 issues related to physical functioning, health assessment, pain, role physical, and emotional functioning. When asked whether the physical condition limits the performance of certain loads, 29 (82.8 %) respondents of the main group before the operation noted a limitation when performing heavy physical loads (running, lifting weights) and 27 (77.1 %) moderate (cleaning the apartment). The corresponding figures for the reference group were 20 (44.4 percent) and 17 (37.8 percent) observations (Fig. 2, Fig. 3).

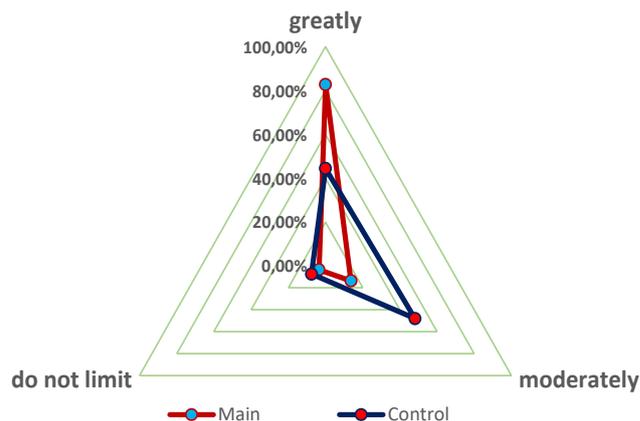


Fig. 2. Indicators of limitation of heavy physical activity in patients of the compared groups

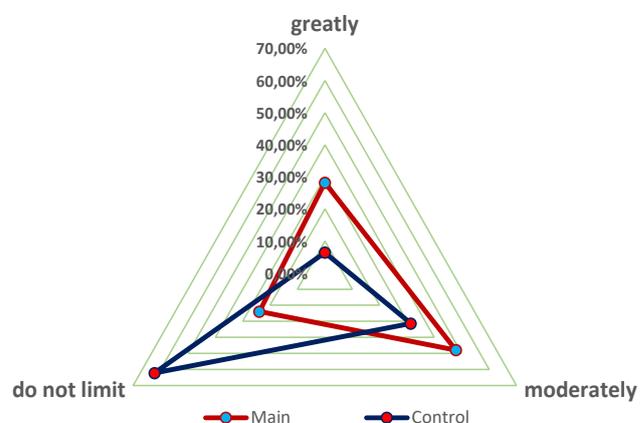


Fig. 3. Indicators of limitation of moderate physical activity in patients of the compared groups

When asked about performing light loads (lifting and carrying a bag of groceries), the answers in the compared groups did not differ significantly. The absence of obesity did not limit climbing one flight of stairs in 34 (75.5 %) patients, while the presence of obesity correlated with moderate limitation in 21 (60 %) patients. The MO made it difficult for 33 (94.2 %) patients to bend over and squat ( $p=0.02$ ), while 17 (48.6 %) of them noted significant difficulty. Almost none of the patients in the control group experienced such difficulties. ( $p<0.0001$ ). «General health» was assessed as mediocre by most of the respondents in the comparison groups, while 11 (31.4 %) patients of the main group rated it as poor ( $p=0.022$ ) (Fig. 4). When answering the question about a greater propensity to disease, 20 (57.1 %) patients of the main group characterized it as correct; in the control group, a positive answer was received only in 8 (17.7 %) patients (Fig. 5).

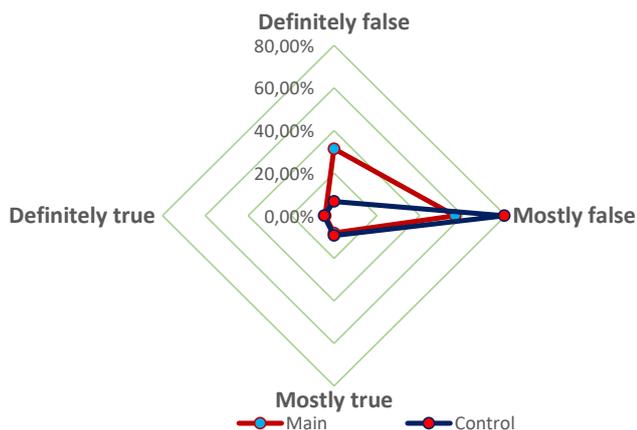


Fig. 4. The indicator of evaluation of the criterion «general health» in the compared groups

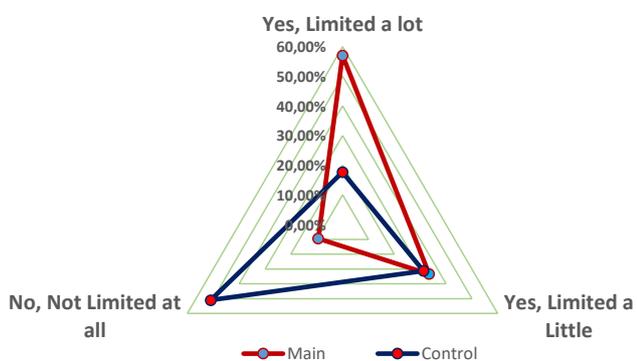


Fig. 5. Fairness of the statement about a greater propensity to disease in patients of the main and control groups

Thus, the study of QOL of patients with morbid obesity, with the help of the standardized SF-36 questionnaire, has been able to identify significant decreases in physical functioning and health assessment statistically. However, this difference with the monitoring group was leveled 24 months after the operation. It was statistically unreliable, i.e., the implementation of bariatric interventions reliably improves the quality of life by increasing self-esteem and restoring an active attitude in society.

The level of daily physical activity is also significantly affected in MOD patients, which is confirmed by correlation analysis, but no correlation was found with the mental component. This happens due to the influence of social factors in people's lives, which are determined by higher social status and income, despite the physical limitations caused by being overweight. A reliable difference in the personal assessment of general health indicates the influence of factors related to age and obesity associated with obesity on the quality of life of MOD patients.

**Conclusions.** As a result of bariatric interventions, patients with morbid obesity achieve a reduction in body weight and a correction of associated metabolic disorders. The type of surgical intervention should be based on the fact that patients need a potential trigger for weight loss, which is gastroplication, which, as our observations show, is effective for maintaining a diet for several years. The essence of the technique is to reduce the volume of the stomach by screwing into its lumen with the help of special tools part of the stomach wall due to corrugating serous-muscle sutures. The study of the clinical results of the proposed method and the assessment of the quality of life within two years after the intervention allows us to consider it sufficiently effective, simple and able to improve treatment outcomes.

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## EVALUATING THE EFFECTIVENESS OF GLUCOCORTICOSTEROID MONOTHERAPY FOR THE TREATMENT OF KELOID AND HYPERTROPHIC SCARS

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## ОЦЕНКА ЭФФЕКТИВНОСТИ ПРИМЕНЕНИЯ МОНОТЕРАПИИ ГЛЮКОКОРТИКОСТЕРОИДОМ ГИПЕРТРОФИЧЕСКИХ И КЕЛОИДНЫХ РУБЦОВ

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Treatment of pathological excess scars is one of the urgent problems in rehabilitating patients after injuries and operations. A comparative analysis of the treatment results of 260 patients who developed pathological scars after injuries using glucocorticosteroid hormone (triamcinolone acetonide) was carried out. Stable remission in all patients with keloid scars was achieved. Monotherapy with triamcinolone in patients with hypertrophic scars did not show high efficiency. A good but short-term effect was conducted, including a reduction in connective tissue and scar size with a noticeable analgesic and antipruritic effect. However, later hyperplasia of the scar was noted. Thus, the analysis of the data obtained indicates a greater pathognomonic and expediency of monotherapy with triamcinolone for the treatment of keloid scars. In contrast, its use in hypertrophic scars is possible only as part of combined anti-scar therapy.

*Keywords:* keloid scar, hypertrophic scar, triamcinolone acetonide, treatment