

BARIATRIC AND METABOLIC SURGERY: A MODERN APPROACH (REVIEW)

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Annotation

Bariatric surgery is the main method of treatment of obesity and associated pathological conditions, despite the large number of complications, recurrences of obesity, side effects, lifelong observation and taking various drugs that correct emerging metabolic disorders. The article analyzes the results of modern bariatric surgeries, considers an alternative view of the causes of obesity development and possible solutions to this chronic progressive disease.

Keywords: bariatric surgery, metabolic surgery, complications, obesity relapses, causes of metabolic disorders

BARIATRIK VA METABOLIK JARROHLIK: ZAMONAVIY YONDASHISH (SHARX)

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Аннотация

Bariatrik jarrohlik ko'p sonli asoratlar, takrorlanishlar, nojo'ya ta'sirlar, umr bo'yi kuzatish va paydo bo'lgan metabolik kasalliklarni tuzatuvchi turli dori-darmonlarni qabul qilishiga qaramay, semirish va unga bog'liq patologik sharoitlarni davolashning asosiy usuli hisoblanadi. Maqolada zamonaviy bariatrik jarrohlik operatsiyalari natijalari tahlil qilinadi, semirishning rivojlanishi sabablarining muqobil ko'rinishi va ushbu surunkali progressiv kasallikning mumkin bo'lgan echimlari ko'rib chiqiladi.

Kalit so'zlar: bariatrik jarrohlik, metabolik jarrohlik, asoratlar, semirishning qaytalanishi, metabolik kasalliklarning sabablari

БАРИАТРИЧЕСКАЯ И МЕТАБОЛИЧЕСКАЯ ХИРУРГИЯ: СОВРЕМЕННЫЙ ПОДХОД (ОБЗОР)

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Аннотация

Бариатрическая хирургия является основным методом лечения ожирения и связанных с ним патологических состояний, несмотря на большое количество осложнений, рецидивов ожирения, побочных эффектов, пожизненное наблюдение и прием различных препаратов, корригирующих возникающие метаболические нарушения. В статье анализируются результаты современных бариатрических операций, рассматривается альтернативный взгляд на причины развития ожирения и возможные пути решения этого хронического прогрессирующего заболевания.

Ключевые слова: бариатрическая хирургия, метаболическая хирургия, осложнения, рецидивы ожирения, причины метаболических нарушений.

Obesity is considered as a chronic progressive disease, heterogeneous in its etiology and clinical manifestations and characterized by excessive deposition of fat mass in the body [1]. With increasing body mass index (BMI), the risk of non-communicable diseases increases: cardiovascular diseases (mainly heart and brain diseases), diabetes, musculoskeletal disorders (especially osteoarthritis) [2]. According to statistics, in 2016, 16.6% of the population was diagnosed with obesity in Uzbekistan. In surgery, a section on the treatment of obesity and type II DM and its complications - bariatric and metabolic surgery - has stood out. Bariatric and metabolic surgery alters the patient's digestive system so that the body consumes significantly fewer calories. After bariatric and metabolic surgery, the patient's body expends more calories than it consumes, which results in permanent weight loss [4]. Attempts to use surgical methods of obesity treatment arose due to the increasing social importance of the obesity problem and the low effectiveness of conservative methods. The beginning of surgical treatment of obesity dates back to the 1950s, when V. Henriksson from Sweden carried out a surgical procedure for the treatment of obesity, he performed resection of a large part of the small intestine in an obese patient. Over the next 50 years, more than 50 different types of surgical procedures have been proposed for the treatment of obesity [2].

Obese patients face a long and thorny path to health that begins with conservative interventions, but not more than 10% of obese patients can achieve a meaningful and, most importantly, sustainable result in the struggle to reduce body weight and control obesity-associated diseases. Bariatric and metabolic surgery has become an alternative to conservative treatment [2, 5].

The classification of bariatric operations, which divided them into restrictive, malabsorptive and mixed, currently does not fully reflect all mechanisms of action and metabolic effects. The choice of operative benefit for specific metabolic disorders is still not clearly defined and is debatable. Often, the surgeon's personal experience and professional preferences are decisive in the choice of surgical aid [5, 6, 7].

Currently, numerous techniques of bariatric and metabolic surgeries are used, which indicates the lack of a unified approach to the solution of this pathology. Unresolved problems of modern general principles of bariatric and metabolic surgery selection necessitate the need to analyze the treatment of metabolic disorders [7].

Metabolic surgery is defined as "surgical intervention in a normal organ or organ system to achieve a biological outcome for potential health benefit". The evolution of metabolic/bariatric surgery can be viewed from several perspectives: (1) the realization that bariatric surgery always has been and always will be metabolic surgery; (2) lessons to be learned from the six major procedures; (3) a review of other proposed surgeries; (4) a discussion of mechanisms of action; (5) the physiology of energy metabolism; and (6) an introduction to the emerging concept of inflammation. This review concludes with thoughts on present and future outcomes based on the knowledge that clinicians have gained from metabolic/bariatric surgery [10].

Endoscopic intragastric balloon insertion dates back to 1982 when Ol. G. Nieben and H. Harboe first described this method for the treatment of obesity. As a result of the intervention, 10-20% of excess body weight is lost. Currently, it is not used independently, but is an integral part of conservative treatment of patients with a BMI up to 35 kg/m² or preoperative preparation methods for patients with a BMI over 50 kg/m² [1, 7, 8].

Adjustable gastric banding was the most popular bariatric intervention with an excess weight loss of up to 47.94%. Today, it is rarely performed due to the lack of stable long-term effect and weight regain in more than half of patients, as well as the high risk of complications, mainly band migration with the development of dysphagia and the formation of gastric wall decubitus.

Within 5-7 years after the installation of the adjustable gastric band, 28 to 40% of the structures are removed due to repeated weight gain in patients with an initial body mass index of more than 50 kg/m², the occurrence of complications in the form of displacement, mechanical damage, pressure sores, and the need for repeated bariatric interventions, not easy from a technical point of view. The inefficiency of adjustable gastric banding reaches 50% and more [6, 7].

Gastroplication is a variant of restrictive bariatric intervention based on suturing the edges of the fold of the mobilized greater curvature of the stomach and turning it inside the organ using a gastric probe-bougie. In the postoperative period there is often a complication in the form of suture failure, 38% of patients develop dysphagia in the cardioesophageal junction. Already after 3 months up to 20% of patients experience repeated weight gain, and in the distant period more than 82% of patients require repeated bariatric surgery [7].

Longitudinal gastric resection (LRG, Sleeve Gastrectomy), first described in 1988 as a restrictive stage of technically complex biliopancreatic bypass in patients with a BMI greater than 50 kg/m², which allows to achieve a persistent reduction in excess body weight in 42.7-81.5 % of patients with minimal side effects within 5 years after surgery. The surgical technique consists in the removal of a large part of the stomach in the longitudinal direction, located in the zone of the great curvature, with preservation of the cardiac sphincter and the gatekeeper and formation of a narrow gastric tube with the volume of 60-150 ml, located along the small curvature. The development in the postoperative period of gastric stump suture failure is 1.0-2.7 % of cases, iron deficiency anemia - up to 16.3 % due to the removal of parietal cells of the gastric mucosa and decreased secretion of hydrochloric acid. Some authors state 30-50% of obesity recurrence in the distant period [6, 8].

Laparoscopic proximal gastrectomy with double tract. Double gastric transit (transit bipartition) with longitudinal gastric resection (LPR) was developed by S. Santoro et al. and is based on the combined concepts of longitudinal gastric resection (LPG) with transit bipartition gastrojejunostomy [11,12]. In contrast to previously developed restrictive shunt surgeries, nutrient transport is maintained both in the created small intestinal shunt and in the duodenum, avoiding blind loops and minimizing malabsorption [11,13]. Accelerated evacuation from the gastric stump is also an important aspect of

this operation. This can potentially minimize the decrease in intragastric pressure and consequently reduce the pressure on the lower esophageal sphincter, preventing the risks of gastroesophageal reflux [13,14].

Laparoscopic longitudinal gastric resection with double transit is an effective and relatively simple operation for the treatment of patients with obesity, type II diabetes mellitus and gastroesophageal reflux. The pronounced antimetabolic result of the operation in combination with the anti-reflux effect gives encouraging results, but the small group of patients and the lack of long-term follow-up certainly determines the need for further study.

Gastric bypass has a restrictive-malabsorptive mechanism of action, is performed either as Roux-en-Y-Gastric Bypass or Mini-Gastric Bypass (Mini-Gastric Bypass, Omega-loop Gastric Bypass) and makes it possible to reduce 60-70% of excess body weight [7]. Roux-en-Y-Gastric Bypass involves the formation of a small stomach with a volume of up to 20-30 ml and an anastomosis between it and the small intestine, switched off according to Roux. A large part of the stomach, duodenum and the initial part of the jejunum are excluded from the food passage. This leads to an accelerated flow of food into the distal small intestine and the development of the incretin effect. High rates of excessive body weight reduction, relatively low percentage of weight regain (15-35%) in the long-term period, along with a high degree of control of metabolic disorders, primarily hyperglycemia in patients with type 2 diabetes mellitus (42-95%), allow many specialists to consider gastric bypass as the "gold standard" of bariatric surgery. Malabsorptive mechanism of action leads to impaired absorption of protein with the development of hypoalbuminemia in 5- 13 % of patients, vitamins and trace elements (12.5- 54.4 % of patients) and can lead to iron deficiency anemia and severe disorders of calcium-phosphorus metabolism [2, 7]. This fact requires careful control of micronutrients and, along with the inclusion of a high protein content in the diet (100-120 g per day), the intake of vitamins and trace elements throughout life. More than 60% of patients require additional prescription of one or more specific supplements [6, 7]. A number of patients may experience dumping syndrome with the development of diarrhea, hyperperistalsis, autonomic reactions. The use of gastric bypass with one anastomosis leads to the development of bile reflux as a manifestation of the afferent loop syndrome, ulceration of the anastomosis zone (up to 16 % of patients) with subsequent bleeding, perforations, malignization or stenosis of the gastroenteroanastomosis (up to 20 %) [2, 7]. In 25 % of cases, repeated

surgical operations are required to eliminate nutritional deficiency [6].

Biliopancreatic diversion surgery (BPD) is a bariatric intervention with a combined mechanism of action, combining all the effects of both restrictive surgical interventions and pronounced malabsorptive effects on carbohydrate and lipid metabolism, allowing to achieve a 75-90% reduction of excess body weight. Among various modifications, the most popular at present are BPD with duodenal switch (Biliopancreatic Diversion/ Duodenal Switch - BPD-DS) and BPD with Single anastomosis duodeno-ileal bypass with sleeve gastrectomy (SADI-S) [1, 7]. The BPD-DS operation includes LPR with a 100-300 ml gastric tube with preservation of the pyloric stomas and anastomosis between the duodenal bulb and the ileum with an alimentary loop 200-250 cm long and creation of an inter-intestinal anastomosis according to Roux with formation of a 50-120 cm loop common for digestion. The main part of the duodenum and practically the entire jejunum are excluded from the food passage. The SADI operation, in the course of which the LPR is supplemented with only one duodeno-ileal anastomosis between the initial part of the duodenum and the ileum 250-300 cm from the ileocecal angle, makes it possible to reduce the duration of the intervention and the number of complications [7]. A pronounced and persistent reduction in body weight, significant and stable metabolic effects, elimination of arterial hypertension allow us to consider BPD to be the most effective technique in the treatment of obesity and metabolic disorders. Removal of the ghrelin-producing zone, preservation of the functioning gatekeeper allows to avoid side effects, largely characteristic for gastric bypass, and further increase the popularity of this bariatric intervention. The technical complexity of the surgical procedure, the need for thorough preparation of both patients and the surgical and anesthesia team, and the higher number of postoperative complications limit the use of this operation [7]. Malabsorption in the late postoperative period leads to protein deficiency in 3-18% of patients and mineral and vitamin deficiency in 61-69% of patients, requiring daily intake of vitamin and mineral complexes, as well as biochemical control and efficiency of protein nutrition throughout life [2, 6].

Type 2 diabetes can be alleviated by bariatric surgery, achieve remission or reduce the dose of sugar-lowering drugs used. After bariatric surgery, the volume of food intake decreases, which is eventually converted into less glucose than before surgery, and therefore requires less insulin for its assimilation. The amount of insulin produced by the patient's β -cells becomes

sufficient to reduce blood sugar levels. Reducing the amount of adipose tissue and the vessels that feed it, reduces the workload on the heart, leads to lower blood pressure and a reduction in heart attacks and strokes, as well as other heart and vascular diseases. Reducing body weight contributes to a reduction in the load on joints, their deformation and destruction.

Patients with esophageal scar stenosis after chemical burns also lose weight, as well as patients after restrictive bariatric surgery. The more severe the dysphagia, the faster and more the patient loses weight, but there are also more pronounced metabolic disorders. In patients after restrictive bariatric surgeries there is also a directly proportional dependence of the remaining stomach volume on the severity of metabolic disorders, which requires repeated operations after gastroplication in 82% of patients [8]. Perhaps, the use of stents simulating dysphagia on semi-liquid food, as in the case of scar stenosis of the esophagus, will reduce body weight and will not require complex and dangerous surgeries, and will allow to preserve the integrity of the GI tract. At any moment, if complications develop, the stent can be removed and another stent with a larger internal diameter can be placed, allowing smooth normalization of metabolic disorders, but during this period the patient will form a "culture" of nutrition (volume, frequency of food intake, diet), which will improve the patient's quality of life.

The treatment of obesity is a challenging task that requires a comprehensive approach and the development of a unified strategy on the part of various specialists. Bariatric surgery is not a guarantee of sustained weight loss or relief from the complications of morbid obesity. Psychological factors and eating disorders can lead to recurrent weight gain and completely negate the results of any bariatric intervention. Therefore, active lifelong participation of patients themselves in regular postoperative monitoring is necessary to control body weight, prevent macro- and micronutrient deficiencies and hypovitaminosis [8].

During the course of any chronic human disease, and obesity is one of the chronic diseases, there are 3 main phases: 1) the compensatory phase, 2) the sustained compensatory phase, and 3) the decompensation or exhaustion phase, leading to death [9]. In the compensatory phase, the patient presents complaints, but we cannot detect anything objectively. In the phase of stable compensation, which is the longest in time, objective methods reveal changes in the general blood and urine analyses, biochemical analyses. This is the phase of functional changes in the body. Only in the last third of this phase

morphological changes appear, patients are detected stones in the gallbladder, in the urinary tract, etc. Only under this condition, surgeons take part in the treatment, but bariatric surgeons perform operations in the phase of functional changes, do not take into account the functional state of human organs and systems. The influence of function on the treatment process is clearly presented in patients with hyper- and hypothyroidism, which require different treatment approaches. Studying human physiology in higher education, we considered separately respiratory, endocrine, digestive, urinary and other systems. The organism was broken down into different organs and systems and studied comprehensively in various disciplines, but the human body is whole and not divided. For a full understanding of the processes occurring in it, it is advisable to consider it from the point of view of functional systems according to P. K. Anokhin. Functional systems are self-organizing functional formations united by nervous and humoral regulation and contributing to the achievement of useful results for the organism, necessary for its adaptation to the environment, i.e. it is "a temporary combination of heterogeneous organs uniting at a given moment to perform a common function".

Obesity is caused by an excess of energy intake (assimilation) from food over energy expenditure (dissimilation) by the body [4]. In humans, there are organs through which the body takes in food substances and oxygen (to oxidize nutrients), which are the digestive and respiratory systems, and organs that excrete waste substances outwards, the urinary system. Excretion also occurs through the digestive, respiratory and skin organs. The heart, blood and lymphatic vessels (cardiovascular system) distribute the material received by the digestive and respiratory systems throughout the body, while substances to be eliminated are delivered to the excretory organs. The organs that carry out chemical bonding and regulation of all processes in the body are the glands of internal secretion, which make up the endocrine system.

Obesity can occur when the balance between assimilation and dissimilation is disrupted by a disorder of any organ or system. A complete clinical examination of the patient will help to find the cause of obesity and take it into account in the choice of treatment.

The first International Statistical Congress, held in Brussels in 1853, asked Dr William Farr and Dr Marc d'Espine from Geneva to prepare a single classification of causes of death applicable internationally. At the Second Congress, held in Paris in 1855, Farr and d'Espine presented two separate lists based on very different principles. Farr's classification, based on the etiological

principle, consisted of five groups: epidemic diseases, constitutional (systemic) diseases, diseases subdivided according to anatomical localization, developmental diseases and diseases as a direct consequence of violence. D'Espin grouped diseases according to the pathogenetic principle, according to the nature of their manifestation (gouty, herpetic, hematic, etc.). In 1864 this classification was revised in Paris on the basis of the model proposed by W. Farr. It laid the foundation for the classification that is now known as the International Classification of Diseases (ICD). Since 1893, the classification has been revised approximately every 10 years. In scientific medicine, the generally accepted classification of diseases is ICD-10, which corresponds to the principles of evidence-based medicine and is a normative document of unity of methodological approaches and international comparability of material [10].

At present, ICD-10 consisting of XXI classes is used. If we read the preface to the ICD-10, the classification of statistical data consisting of classes presented in 5 groups. The first group includes epidemic diseases, which are represented in class I as "certain infectious and parasitic diseases". The second group is represented by "constitutional or general diseases", including diseases from class II to VI. "Local diseases" are in the third group and are grouped according to anatomical localization from classes VII to XIV. The fourth group includes developmental diseases, represented in classes XV to XVII, and the fifth group includes injuries, which are grouped in classes XIX.

Due to the etiological construction of ICD-10 (organ - disease), we can trace in reverse order the cause of disease development, not from class to disease, but vice versa, and end with a group of diseases, which shows the cause of the disorder, the basis of a given pathological process.

Obesity and other types of overnutrition (E65-E68) are class IV (endocrine diseases, eating disorders and metabolic disorders) and constitutional or general diseases, not class XI (diseases of the digestive organs) and the group of local diseases that bariatric surgeons target. This means that the cause of obesity lies in endocrine gland dysfunction, not in GI pathology. These disorders are complex, interrelated, diverse and to obtain good results in the treatment of metabolic disorders, simple solutions are not possible. Successes will be short-term, surgical treatment will lead to profound metabolic disorders in the body, to predictable negative results and ultimately to shortened life expectancy.

Surgeons alone will not be able to cope with the treatment of metabolic

obesity. This problem requires close collaboration between physiologists, pathophysiology, pathologists, endocrinologists, therapists and surgeons.

Understanding the etiology and pathogenesis of obesity development will allow the development of treatment options aimed at curing metabolic disorders in each individual case and obtaining stable, sustainable results.

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