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FEATURES OF THE CLINICAL AND METABOLIC STATUS IN PATIENTS WITH TYPE 2 DIABETES MELLITUS IN THE POSTOPERATIVE PERIOD



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2-ТИП ҚАНДЛИ ДИАБЕТ БИЛАН КАСАЛЛАНГАН БЕМОРЛАРНИНГ ЖАРРОҲЛИКДАН КЕЙИНГИ ДАВРДАГИ КЛИНИК ВА МЕТАБОЛИК ҲОЛАТИНИНГ ЎЗИГА ХОС ХУСУСИЯТЛАРИ

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ОСОБЕННОСТИ КЛИНИЧЕСКОГО И МЕТАБОЛИЧЕСКОГО СТАТУСА ПАЦИЕНТОВ С САХАРНЫМ ДИАБЕТОМ 2 ТИПА В ПОСЛЕОПЕРАЦИОННОМ ПЕРИОДЕ

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Резюме. *Кириш. Маълумки қандли диабет коморбид ҳолатлар билан кечади, шунингдек тромбоэмболик асоратлар хавфини ҳам оширади. Беморларнинг ҳаёт сифатини яхшилаш ва қандли диабетни радикал даволашда бариатрик операциялар қўлланилиб, сўнгги пайтларда бундай амалиётлар сони тобора кўпайиб бормоқда. Тадқиқот мақсади - 2-тип қандли диабетда қўлланиладиган жарроҳлик терапиясини такомиллаштириш. Материаллар ва назорат усуллари. 2-тип қандли диабет билан хасталанган, жарроҳлик йўли билан даволанган 82 нафар бемор тадқиқотга жалб этилди. 2 гуруҳга ажратилди: 1-гуруҳ беморлар модификацияланган минигастрошунтлаш (МГШ) билан, 2-гуруҳ беморлар классик МГШ билан операция қилинган. Барча беморлар жинси ва ёши бўйича мос. Уларнинг 58 нафари (70,7%) эркаклар ва 24 нафари (29,3%) аёллардан иборат, ўртача ёши 51,7±1,5 ёшни ташкил этди. Натижалар. Жарроҳлик аралашувидан 12 ой ўтгач, 1-гуруҳда барча ўрганилган кўрсаткичларнинг статистик жиҳатдан сезиларли даражада ижобий динамикаси қайд этилди. 1-гуруҳда ортиқча тана вазнини йўқотиш фоизи (%EWL) 80,7±1,5% га эришилди, бу 2-гуруҳ кўрсаткичларидан статистик жиҳатдан сезиларли даражада ошди (77,1±2,3%, p<0,01).*

Калит сўзлар: *2-тип қандли диабет, минигастрошунтлаш, гастроэнтероанастомоз, BAROS.*

Abstract. *Introduction. Diabetes mellitus is accompanied by significant comorbid pathology, as well as increased risk of thromboembolic complications. To improve the quality of life and reduce the risk for the treatment of diabetes mellitus, various methods are used the most effective of these are bariatric operations, which have been steadily increasing lately. The aim of the study - to improve the surgical treatment used for type 2 diabetes mellitus. Material and methods. 82 patients with type 2 diabetes mellitus who received surgical treatment were examined. They were divided into 2 groups: 1st group of patients operated on with modified MGS, 2nd group of patients on classical MGS. All patients were compatible in gender and age. Of these, 58 (70.7%) were men and 24 (29.3%) were women, with an average age of 51.7 ± 1.5 years. Results. 12 months after the surgical intervention in the 1st group, statistically significantly more pronounced positive dynamics of all the studied indicators were noted. The percentage of excess body weight loss (%EWL) in the 1st group reached 80.7±1.5%, which was statistically significantly higher than the indicators of the 2nd group (77.1±2.3%, p<0.01).*

Keywords: *Type 2 diabetes mellitus, gastroenteroanastomosis, BAROS, MGB-OAGB.*

Relevance. A large number of methods aimed at reducing blood glucose have been developed. Among them, there are numerous conservative treatments for type 2 diabetes, which currently remain the first-line therapy for this disease. It is worth noting that often, especially in the presence of comorbid pathologies, the effectiveness of conservative methods proves insufficient, which contributes to the further progression of the condition. In modern clinical practice, bariatric rules are recognized as the standard for treating obesity and associated metabolic diseases, including type 2 diabetes mellitus. In the arsenal of bariatric surgery, short gastric resection, various variants of biliopancreatic disconnection, Roux gastric-youth shunting, and mini-gastric bypass (MGB) are dominant [1]. MGB evolved from Mason's gastric-youth shunting through technical modification [3],

and the conclusions of foreign studies demonstrate the advantages of MGB over RYGB: reduced surgical time, reduced risk of anastomosis failure and postoperative hernia formation, effective accessibility of reconstructive procedures with equivalent or superior metabolic correction efficiency [2]. However, anxiety about oncological risks, disorders with chronic biliary reflux to the stomach and esophagus remains [4]. Pathophysiological prerequisites are the persistence of the gastroproducing zone in the long connective zone, distal location of the anastomosis, and the risk of anastomosis stenosis with the development of gastrostasis, which indicates its particular relevance in the presence of diabetic autonomic neuropathy [5]. In the context of the steady increase in the use of MGB in the clinical practice of bariatric surgery, a deep and comprehensive analysis of its clinical and metabolic outcomes is becoming particularly relevant.

Purpose of the study: to improve the surgical treatment of type 2 diabetes mellitus.

Material and methods. 82 patients with type 2 diabetes mellitus who received surgical treatment were examined. They were divided into 2 groups: 1st group of patients operated on with modified MGB n=48, 2nd group of patients with classical MGB n=34. All patients were compatible in gender and age. Of these, 58 (70.7%) were men and 24 (29.3%) were women, with an average age of 51.7 ± 1.5 years. The technique of the operation is laparoscopic. To compare the two groups of patients, the following clinical and laboratory indicators were assessed: -% EWL, blood glucose, insulin, C-peptide, and glycated hemoglobin. In addition, BAROS and SF36 questionnaires were used to assess the quality of life in the postoperative period.

Criteria for inclusion of patients in the study: diabetes mellitus grade II in a patient over 18 years old with one or more concomitant diseases. Exclusion criteria: the presence of a disease in the stage of decompensation, cancer, pregnancy and breastfeeding period, mental illness, alcoholism and/or drug addiction, and the age of less than 18 years.

During this study, MGS was performed using standard and modified methods. At the standard method, the operation began with the formation of the gastric tube and dissection was performed in the area of the left diaphragm pedicle. Further, using an ultrasound scalpel, mobilization of the lesser curvature in the area of the stomach angle at the level of the "goose paw" was performed, and the stomach was sutured perpendicular to the lesser curvature using a linear suturing apparatus. Further, the stomach was sutured parallel to the lesser curvature to the angle of Giss in the proximal direction using a calibration probe. Then, the stomach wall was perforated from the Treitz ligament, measuring approximately 150-200 cm of the small intestine. Gastrojejunal anastomosis was formed in the apparatus variant. In the modification method, the technical aspects of the operation were related to the length of the loop, the width of the gastrojejunal anastomosis, and the formation of a pouch.

Results and discussion. All patients underwent anthropometric measurements, standard laboratory biochemical and instrumental examination, as well as EGDFS of the upper gastrointestinal tract with biopsy, histological analysis of biopsies, ultrasound of the abdominal organs and retroperitoneal space. In this study, the influence of MGS on carbohydrate metabolism was analyzed, and for this purpose, methods were used to determine blood glucose levels on an empty stomach, glycosylated hemoglobin (HbA1), C-peptide in dynamics, BMI, and %EWL. After the operation, patients were scheduled for follow-up examinations. During these examinations,patients' body weight was measured, and their BMI and % EWL were calculated [7]. BMI was calculated using the generally accepted formula. % EWL was calculated as the lost body weight in kg divided by the difference between the pre-surgery weight and ideal weight, multiplied by 100% [6].Dynamics of body weight decrease in the postoperative period throughout the year in both groups of patients showed positive results (Table 1).

A study was conducted to observe two groups of patients following bariatric surgery in order to compare the dynamics of excess weight loss. The first group consisted of 48 patients, while the second group included 34 patients. The percentage of excess weight loss was assessed at 3, 6, 9, and 12 months post-operatively. At 3 months after surgery, the percentage of excess weight loss in the first group was 44.2±2.3%, whereas in the second group this indicator equaled 39.1±1.9%. By the 6th month of observation, the percentage of excess weight loss in the first group reached 67.1±1.9%, while in the second group the indicator was 61.5±2.1%. At the 9th month of the post-operative period, the first group showed a result of 76.3±1.9%, and the second group demonstrated 70.4±2.4%.

Table 1. Comparative dynamics of excess body weight loss percentage (%EWL)

Observation periods	Group 1 (n=48) %EWL	Group 2(n=34) %EWL
3 months	44,2±2,3	39,1±1,9
6 months	67,1±1,9	61,5±2,1
9 months	76,3±1,9	70,4±2,4
12 months	80,7±1,5	77,1±2,3

Table 2. Comparative dynamics of blood glucose levels (mmol/l)

Observation periods	Group 1 (n=48) mmol/l	Group 2(n=34) mmol/l
Before surgery	10,51±1,14	10,46±1,32
3 months	8,84±2,36	9,84±1,12
6 months	6,83±0,39	7,83±0,24
9 months	6,02±0,36	7,02±0,45
12 months	6,0±0,25	6,8±0,36

By the end of the 12th month of observation, the percentage of excess weight loss in the first group was 80.7±1.5%, while in the second group it was 77.1±2.3%. 12 months after the surgical intervention in the 1st group, statistically significantly more pronounced positive dynamics of all the studied indicators were noted. The percentage of excess body weight loss (%EWL) in the 1st group reached 80.7±1.5%, which was statistically significantly higher than the indicators of the 2nd group (77.1±2.3%, $p<0.01$). Both study groups presented with similar baseline glycemic profiles prior to surgical intervention. Group 1 (n=48) demonstrated a mean fasting blood glucose level of 10.51±1.14 mmol/L, while Group 2 (n=34) showed 10.46±1.32 mmol/L. These elevated values, significantly exceeding the normal fasting glucose range of 3.9-5.5 mmol/L, indicate poor glycemic control and confirm the presence of decompensated type 2 diabetes mellitus in the majority of patients. The comparable baseline parameters between groups ensure appropriate conditions for subsequent comparative analysis (Table 2). At the three-month follow-up, both groups exhibited notable improvements in glycemic control, though with markedly different trajectories. Group 1 demonstrated a substantial reduction to 8.84±2.36 mmol/L, representing a 15.9% decrease from baseline values. This early metabolic improvement likely reflects the combined effects of caloric restriction, rapid weight loss, and enhanced insulin sensitivity following bariatric surgery. In contrast, Group 2 showed a more modest improvement to 9.84±1.12 mmol/L, corresponding to only a 5.9% reduction. Despite this improvement, Group 2 patients remained in the hyperglycemic range. The 1.0 mmol/L difference between groups at this timepoint suggests potential variations in surgical technique, patient compliance, or baseline metabolic parameters. By the sixth postoperative month, both groups demonstrated progressive improvement in glucose homeostasis, with the divergence between groups becoming more pronounced. Group 1 achieved a mean glucose level of 6.83±0.39 mmol/L, representing a cumulative 35% reduction from baseline and approaching the target range for diabetes management. This accelerated improvement during the 3–6-month interval (from 8.84 to 6.83 mmol/L) represents the peak period of metabolic benefit, coinciding with maximal weight loss velocity. Group 2 showed glucose levels of 7.83±0.24 mmol/L, a 25.1% reduction from baseline, indicating continued improvement but at a slower rate. The persistent 1.0 mmol/L gap between groups suggests fundamental differences in metabolic response or surgical methodology. At nine months, the positive trend continued in both cohorts, though the rate of improvement began to plateau. Group 1 recorded 6.02±0.36 mmol/L, demonstrating a 42.7% total reduction from preoperative values and achieving near-normoglycemic status. This value falls within the target range for diabetes management and represents excellent glycemic control. The change from 6 to 9 months was modest (0.81 mmol/L), suggesting stabilization of metabolic parameters. Group 2 demonstrated glucose levels of 7.02±0.45 mmol/L, a 32.9% cumulative reduction, with continued gradual improvement. While still above optimal targets, this group showed consistent downward trajectory, indicating ongoing metabolic adaptation to the altered gastrointestinal anatomy and reduced body weight. At one-year follow-up, both groups achieved stable glycemic control with minimal changes from the nine-month assessment. Group 1 maintained excellent control at 6.0±0.25 mmol/L, representing a total 42.9% reduction from baseline and effectively achieving diabetes remission criteria in most patients. The stability between 9 and 12 months (6.02 vs. 6.0 mmol/L) indicates successful metabolic equilibrium and suggests long-term sustainability of these improvements. Group 2 reached 6.8±0.36 mmol/L, a 35% total reduction from preoperative levels, finally achieving the target threshold of <7.0 mmol/L for diabetes management. While Group 2 demonstrated a slower trajectory, the eventual achievement of glycemic targets validates the metabolic efficacy of bariatric surgery across different approaches or patient populations. The persistent 0.8 mmol/L difference between groups at 12 months, while narrowed from earlier timepoints, remains clinically relevant and warrants further investigation into the underlying factors responsible for these differential outcomes. Preoperative both groups demonstrated comparable carbohydrate metabolism disturbances. Insulin levels in Group 1 were 48.1±12.5 μU/ml, while in Group 2 they were 48.7±11.8 μU/ml, significantly exceeding normal values (2.6-24.9 μU/ml) and indicating pronounced hyperinsulinemia and insulin resistance. C-peptide concentration was also comparable between groups: 3.4±1.9 ng/ml in Group 1 and 3.5±1.1 ng/ml in Group 2, reflecting compensatory hypersecrtion of insulin by pancreatic β-cells in response to peripheral

insulin resistance. Glycated hemoglobin (HbA1c) was 7.81±0.62% in Group 1 and 7.62±0.81% in Group 2, exceeding the target level of 6.5% and indicating unsatisfactory carbohydrate metabolism compensation during the preceding 2-3 months. Similar baseline parameters in both groups create optimal conditions for objective comparative analysis of the effectiveness of the interventions performed (Table 3). By the third postoperative month, both groups demonstrated substantial improvement in all studied carbohydrate metabolism parameters, though with varying degrees of intensity. In Group 1, insulin levels decreased to 33.1±10.2 μU/ml, representing a 31.2% reduction from baseline, reflecting improved tissue insulin sensitivity and decreased need for endogenous insulin secretion. Group 2 showed a more modest reduction to 38.6±10.6 μU/ml (20.7% reduction), indicating less pronounced improvement in insulin resistance at this stage. C-peptide concentration in Group 1 decreased to 2.9±0.8 ng/ml (14.7% reduction), while in Group 2 it decreased minimally to 3.3±1.8 ng/ml (5.7% reduction), indicating gradual reduction of functional load on pancreatic β-cells. HbA1c levels in Group 1 reached 6.63±0.57% (15.1% reduction), approaching target values, whereas in Group 2 it was 7.12±0.71% (6.6% reduction), remaining above the recommended threshold. These differences in early postoperative dynamics may be attributed to the type of surgery performed, degree of weight loss, or differences in patient adherence to dietary recommendations. By the sixth month of observation, the trend toward improvement in metabolic parameters intensified in both groups, with the gap between groups becoming more evident. Insulin levels in Group 1 decreased to 24.2±8.3 μU/ml, representing a cumulative 49.7% reduction from baseline and approaching the upper limit of the normal range, indicating nearly complete restoration of insulin sensitivity. In Group 2, insulin was 30.1±8.1 μU/ml (38.2% reduction from baseline), demonstrating continuing but less pronounced improvement. C-peptide in Group 1 reached 2.5±0.5 ng/ml (26.5% reduction), which is within the normal range and indicates normalization of β-cell function, while in Group 2 it was 3.1±0.9 ng/ml (11.4% reduction), remaining somewhat elevated. Glycated hemoglobin in Group 1 decreased to 6.1±0.32% (21.9% reduction), achieving the target level for most patients with diabetes, whereas in Group 2 it was 7.3±0.67% (4.2% reduction from previous measurement), though showing a paradoxical slight increase compared to baseline, which may reflect individual fluctuations in carbohydrate metabolism compensation or methodological errors. The 3–6-month period is characterized by the most intensive weight loss and maximal metabolic changes, explaining the pronounced positive dynamics of all studied parameters. By the ninth postoperative month, both groups continued to demonstrate improvement in indicators, although the rate of change slowed, which is characteristic of the metabolic stabilization stage. In Group 1, insulin levels were 18.6±4.1 μU/ml, showing a cumulative 61.3% reduction and falling within normal values, indicating nearly complete resolution of insulin resistance and hyperinsulinemia. Group 2 reached a level of 24.3±3.6 μU/ml (50.1% reduction from baseline), demonstrating significant improvement, though inferior to Group 1 results. C-peptide concentration in Group 1 decreased to 2.1±0.7 ng/ml (38.2% total reduction), being within the normal range and indicating adequate but not excessive secretory activity of β-cells, while in Group 2 it was 2.9±0.5 ng/ml (17.1% total reduction), still somewhat exceeding optimal values. Glycated hemoglobin in Group 1 reached 5.9±0.56% (24.5% total reduction), corresponding to values of practically healthy individuals and indicating achievement of sustained diabetes remission in most patients. In Group 2, HbA1c was 6.9±0.81% (9.5% total reduction from baseline), approaching target values but still indicating incomplete carbohydrate metabolism compensation. The difference between groups at this stage becomes statistically and clinically significant, requiring analysis of factors determining these differences. One-year follow-up demonstrated achievement of stable metabolic state in both groups with persistence of differences in final outcomes. Insulin levels in Group 1 decreased to 12.3±3.2 μU/ml, representing an impressive cumulative 74.4% reduction from baseline and falling within normal physiological values, indicating complete restoration of insulin sensitivity and normalization of glucose metabolism. In Group 2, insulin was 21.4±4.8 μU/ml (56.1% total reduction), which, although within reference values, still exceeds Group 1 indicators by approximately 1.7-fold.

Table 3. Comparative dynamics of carbohydrate metabolism

Observation periods	Insulin (μU/ml)		C-peptide (ng/ml)		HbA1c (%)	
	Group 1 (n=48)	Group 2 (n=34)	Group 1 (n=48)	Group 2 (n=34)	Group 1 (n=48)	Group 2 (n=34)
Before surgery	48,1±12,5	48,7±11,8	3,4±1,9	3,5±1,1	7,81±0,62	7,62±0,81
3 months	33,1±10,2	38,6±10,6	2,9±0,8	3,3±1,8	6,63±0,57	7,12±0,71
6 months	24,2±8,3	30,1±8,1	2,5±0,5	3,1±0,9	6,1±0,32	7,3±0,67
9 months	18,6±4,1	24,3±3,6	2,1±0,7	2,9±0,5	5,9±0,56	6,9±0,81
12 months	12,3±3,2	21,4±4,8	1,8±0,4	2,6±0,6	5,4±0,31	6,2±0,48

C-peptide in Group 1 reached 1.8±0.4 ng/ml (47.1% total reduction from baseline), which is an optimal indicator of β-cell secretory function with normal insulin sensitivity, while in Group 2 it was 2.6±0.6 ng/ml (25.7% total reduction), which is somewhat higher and may indicate persistent moderate insulin resistance. Glycated hemoglobin in Group 1 reached an excellent level of 5.4±0.31% (30.9% total reduction), corresponding to values of individuals without carbohydrate metabolism disorders and confirming achievement of complete type 2 diabetes remission. In Group 2, HbA1c was 6.2±0.48% (18.6% total reduction from baseline), which is near the target range and indicates good but not ideal compensation. The substantial 0.8% difference in HbA1c between groups by the end of the first year of observation has important clinical significance, as it is associated with different risks of developing micro- and macrovascular complications of diabetes in the long term. Stabilization of all parameters between 9 and 12 months in both groups indicates achievement of new metabolic homeostasis and suggests the possibility of long-term maintenance of achieved results.

The use of the modified MGS method in the 1st group demonstrated a statistically significant advantage over the standard method in the 2nd group across all studied parameters of carbohydrate metabolism and body weight loss. A more pronounced improvement in blood glucose (15.5% greater), insulin (18.3% greater), C-peptide (21.4% greater), glycated hemoglobin (12.3% greater), and %EWL (12.3% greater) in group 1 indicates a significantly higher effectiveness of the modified approach in correcting metabolic disorders associated with type 2 diabetes mellitus.

Conclusion. Analysis of the data in the following groups shows that the use of modified minimally gastric shunting techniques in patients with type 2 diabetes mellitus provides equivalent effectiveness in changing the scale of carbohydrate metabolism towards standard operations.

Literature:

1. Хитарьян А. Г., Хубиев С. Т., Межунц А. В., Завгородняя Р. Н., Велиев К. С. и др. Сравнительный анализ результатов лечения морбидного ожирения методом мини-гастрошунтирования с созданием аппаратного и ручного гастроэнтероанастомоза // Эндоскопическая хирургия. 2018. Т. 24, № 6. С. 19–28. DOI: 10.17116/endoskop20182406119.
2. Mahawar K. K., Jennings N., Brown J., Gupta A., Balupuri S., Small P. K. “Mini” gastric bypass: systematic review of a controversial procedure // Obesity Surgery. 2013. Vol. 23, № 11. P. 1890–1898. DOI: 10.1007/s11695-013-1026-8. PMID: 23934271.
3. Pai M. P., Paloucek F. P. The origin of the “ideal” body weight equations // Annals of Pharmacotherapy. 2000. Vol. 34, № 9. P. 1066–1069. DOI: 10.1345/aph.19381. PMID: 10981254.
4. Piazza L., Ferrara F., Leanza S., Coco D., Sarvà S., Bellia A., Di Stefano C., Basile F., Biondi A. Laparoscopic mini-gastric bypass: short-term single-institute experience // Updates in Surgery. 2011. Vol. 63, № 4. P. 239–242.
5. Rutledge R., Kular K., Manchanda N. The Mini-Gastric Bypass original technique // International Journal of Surgery. 2019. Vol. 61. P. 38–41. DOI: 10.1016/j.ijsu.2018.10.042. PMID: 30476553.
6. Salminen P., Grönroos S., Helmiö M., Hurme S., Juuti A., Juusela R., Peromaa-Haavisto P., Leivonen M., Nuutila P., Ovaska J. Effect of laparoscopic sleeve gastrectomy vs Roux-en-Y gastric bypass on weight loss, comorbidities, and reflux at 10 years in adult patients with obesity: The SLEEVEPASS randomized clinical trial // JAMA Surgery. 2022. Vol. 157, № 8. P. 656–666.
7. Tolone S., Cristiano S., Savarino E., Lucido F. S., Fico D. I., Docimo L. Effects of omega-loop bypass on esophagogastric junction function // Surgery for Obesity and Related Diseases. 2016. Vol. 12, № 1. P. 62–69. DOI: 10.1016/j.soard.2015.03.011. PMID: 25979206.

ОСОБЕННОСТИ КЛИНИЧЕСКОГО И МЕТАБОЛИЧЕСКОГО СТАТУСА ПАЦИЕНТОВ С САХАРНЫМ ДИАБЕТОМ 2 ТИПА В ПОСЛЕОПЕРАЦИОННОМ ПЕРИОДЕ

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Резюме. *Введение. Сахарный диабет сопровождается значительной сопутствующей патологией, а также повышенным риском тромбоэмболических осложнений. Для улучшения качества жизни и снижения риска летальности, используются различные методы лечения, наиболее эффективными из которых являются бариатрические операции, которые в последнее время неуклонно растут. Цель исследования – совершенствовать хирургическую терапию, применяемую при сахарном диабете 2 типа. Материал и методы. Исследованы 82 больных с сахарным диабетом 2 типа, получивших хирургическое лечение. Они были разделены на 2 группы: 1 группа больных были оперированы с модифицированной МГШ, 2 группа больных в классическом МГШ. Все больные были совместимы по полу и возрасту. Из них мужчины – 58 (70,7 %) и женщины – 24 (29,3 %), средний возраст составляло 51,7 ± 1,5 лет. Результаты. Через 12 месяцев после хирургического вмешательства в 1 группе отмечалась статистически значимо более выраженная положительная динамика всех исследуемых показателей. Процент потери избыточной массы тела (%EWL) в 1 группе достиг 80,7±1,5%, что статистически значимо превышало показатели 2 группы (77,1±2,3%, p<0,01).*

Ключевые слова: *2 тип сахарный диабет, минигастрошунтирование, гастроэнтероанастомоз, BAROS.*