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ORIGINAL ARTICLES

SLEEVE GASTRECTOMY AND ACTIVE INTESTINAL BYPASS IN PATIENTS WITH SEVERE OBESITY

Tsonka Dimitrova[1], Galina Yaneva[1], Daniel Kostov[2], Nikolay Mankov[3]

[1]Department of Biology, Faculty of Pharmacy, Medical University of Varna, Bulgaria
[2]Clinic of Surgery, Naval Hospital, Military Medical Academy, Bulgaria,
[3]Eurohospital, Varna, Bulgaria

ABSTRACT

INTRODUCTION: Bariatric surgery is the most effective treatment modality for severe obesity in adults and children. Numerous recent investigations by foreign authors have convincingly proven the successful and safe implementation of a variety of bariatric and metabolic surgical methods for definite and stable weight reduction.

AIM: The aim of the present article is to concisely review the most recent publications in the field of bariatric surgery in patients with morbid obesity and to share our initial experience by three case reports.

MATERIALS AND METHODS: We briefly report three patients with severe obesity, two women and one man, who were operated on by sleeve gastrectomy and active intestinal bypass in the Clinic of Surgery at the Naval Hospital in Varna, part of the Military Medical Academy, in the 2020–2022 period. They were followed up until 2024.

RESULTS: This surgical intervention resulted in a remarkable weight loss and a body mass index reduction. The male patient's weight decreased from 220 kg down to 82 kg. The female patients' weight reduction was from 198 kg down to 83 kg and from 127 kg down to 76 kg, respectively.

CONCLUSION: There is accumulated evidence on the sufficient safety and significant effectiveness of the bariatric surgery in selected patients with severe obesity. A broader implementation of this modern method in the clinical practice in Bulgaria should be recommended.

Keywords: *severe obesity, bariatric surgery, sleeve gastrectomy, active intestinal bypass*

INTRODUCTION

Obesity is a chronic, complex, and common socially significant disease in adults and children worldwide. It is characterized by the excessive accumulation of adipose tissue. Nowadays bariatric surgery is the most effective treatment modality. It successfully reduces associated comorbidities and improves patient's quality of life.

Address for correspondence:
Tsonka Dimitrova
Faculty of Pharmacy
Medical University of Varna
84 Tsar Osvoboditel Blvd
9002 Varna
Bulgaria
e-mail: tsonka72@abv.bg

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The meta-analyses of 45 cross-sectional and/or prospective studies abstracted in *PubMed*, *EMBASE*, *the Cochrane Library*, and *Web of Science* databases up to September 18, 2022, demonstrate that the overall pooled index of concordance of 126 prediction models for children/adolescents with obesity and overweight in the training set is 0.769 (between 0.754 and 0.785 at 95% confidence interval) and 0.835 (between 0.792 and 0.879 at 95% confidence interval), respectively (1). Numerous predictors are related to children's lifestyles, such as sleep duration, sleep quality, and eating speed. Most of them are controllable factors.

In a cross-sectional study of a total of 92 Iranian adolescents at a mean age of 17.32±1.88 years (range, 11–19 years), 56 girls and 36 boys, with severe obesity undergoing bariatric surgery during the period from 2016 to 2018, dyslipidemia was diagnosed in 63 or in 68.48% of the cases (2). The most common conditions were: hypertriglyceridemia—in 45 (48.91%), low high-density lipoprotein cholesterol—in 36 (39.13%), hypercholesterolemia—in 17 (18.48%), and high low-density lipoprotein cholesterol—in 15 adolescents (16.30% of the cases).

The correlation between vitamin levels and obesity was evaluated employing three statistical models: linear regression, logistic regression, and Bayesian kernel machine regression model (3). The levels of vitamins A, C, and D were considerably higher among the non-obesity than among the obesity group. Using the lowest quartile of vitamin level as a reference, these levels demonstrated a significant negative correlation with the obesity risk in both adjusted and unadjusted models. There was a negative relationship between vitamin mixtures with binary outcome (obesity) and continuous outcome (body mass index, waist circumference, and high sensitivity C-reactive protein). The reduced levels of these vitamins increase the risk of obesity.

Serum spexin levels were assessed in 53 patients with obesity (with a mean body mass index of 48.5±9.4 kg/m^2) after bariatric surgery and in 55 normal-weight subjects (4). At baseline, spexin concentration was statistically significantly lower among the operated patients ($p<0.0001$). After three and after six months, it increased statistically significantly when compared to the pre-surgical level ($p<0.001$) and, at six months, it reached the levels of the control group. There was a statistically significant negative correlation between age and pre-surgical spexin concentrations at baseline between both groups, as well as at three and at six months after surgery in the first group ($p=0.03$).

The initial success of glucagon-like peptide-1 receptor agonists concerning weight loss and metabolic amelioration is followed by the development of unimolecular dual and triple polyagonists, which additionally exploit the effects of glucagon and/or glucose-dependent insulinotropic polypeptide (5). This achieves a magnitude of weight loss approximating that of common metabolic surgery operations. Through the implementation of such therapies, the feasibility of a medical bypass, i.e., the replication of the clinical metabolic surgery effects using non-surgical interventions is foreseeable in the near future and promotes precision medicine in obesity therapeutics.

The results from a systematic review and meta-analysis of six studies involving 588 extreme obesity patients show that non-steroidal anti-inflammatory drugs effectively and safely alleviate the postoperative pain after laparoscopic sleeve gastrectomy without major safety concerns (6). The most common adverse events include postoperative nausea and vomiting with an incidence rate of 21%. There is a potential opioid consumption reduction.

The results from a systematic review and meta-analysis of five comparative studies including a total of 2210 adult obese patients undergoing bariatric surgery and assessing the utilization of digital health applications for measuring postoperative patients' outcomes reveal the effectiveness of eHealth-delivered health services (7). There show a 10% increase in total weight reduction and a 22% reduction in excess weight loss.

AIM

The aim of the present article is to concisely review the most recent publications in the field of bariatric surgery in patients with morbid obesity and to share our initial experience gained from three case reports.

MATERIALS AND METHODS

Three patients, two women and one man, presenting with a severe obesity, were operated on by bariatric surgery in the Clinic of Surgery at the Naval Hospital in Varna, part of the Military Medical Academy, in the 2020–2022 period. They underwent sleeve gastrectomy and bypass by active 2-meter- or 3-meter-long intestine. The postoperative period was uneventful. A remarkable weight loss and a body mass index reduction were achieved. These favorable patients' overweight parameters remained stable during the follow-up until 2024.

RESULTS

We briefly report three cases of patients to illustrate the successful application of bariatric surgery for severe obesity management.

Case One

In 2020, one 37-year-old male patient had an extraordinarily high body mass index of 76.12 kg/m^2. Following a strict six-month diet therapy, the value of the body mass index diminished down to 68.16 kg/m^2. In 2021, a sleeve gastrectomy and bypass by an active 2-meter-long intestine was successfully performed. As of 2024, he is a 40-year-old active entrepreneur with a body mass index of 28.37 kg/m^2. There has been a weight reduction from 220 kg down to 82 kg.

Case Two

In 2020, one 37-year-old female patient presented with a body mass index of 62.49 kg/m^2 and type 2 diabetes mellitus as well. A balloon was inserted into the stomach, and after five months, the value of her body mass index decreased down to 54.60 kg/m^2. A gastrotomy, a stomach balloon extirpation, and a sleeve gastrectomy along with bypass by an active 3-meter-long intestine were successfully accomplished. As of 2024, she is a mother of a two-year-old girl. Her body mass index is 26.20 kg/m^2. There has been a weight reduction from 198 kg down to 83 kg.

Case Three

In 2021, one 27-year-old female patient presented with a body mass index of 49.61 kg/m^2, chronic cholecystitis, and diaphragmatic hernia as well. A sleeve gastrectomy and bypass by an active intestine of approximately 3 meters in length was successfully carried out. As of 2024, she is pregnant for the third time and her body mass index is already 29.69 kg/m^2. There has been a weight reduction from 127 kg down to 76 kg.

DISCUSSION

Our own results are similar to foreign authors' data published recently in the literature on the applications of bariatric and metabolic surgery in patients with morbid obesity.

According to the results from a retrospective investigation of 54 patients undergoing laparoscopic sleeve gastrectomy, the mean resected stomach weight was 169.7±40.1 g (range, 101–295 g) (8). There was a statistically significant correlation between it, on the one hand, and the patient's preoperative weight ($r=0.486$; $p<0.001$), body mass index ($r=0.420$; $p=0.002$), and age ($r=0.327$; $p=0.01$), on the other hand. It did not predict the postoperative weight loss measured by total weight loss and excess weight loss percentages.

The five-year results from a three-year randomized controlled trial demonstrate a treatment difference of 9% (between 1.5% and 19.6% at 95% confidence interval) excess weight loss in favor of the banded sleeve gastrectomy (in 42) towards the non-banded sleeve gastrectomy (in 40 obese patients) (9). The total weight loss was 31.6% (between 27.3% and 35.5% at a 95% confidence interval) after the first and 27.4% (between 23.5% and 31.3% at a 95% confidence interval) after the second procedure. A conversion to a gastric bypass was performed in 11.9% and in 20% of the cases in both groups, respectively.

The results from a systematic review and meta-analysis of 20 studies including a total of 1057 obesity patients at mean ages between 28.2 and 49.5 years, 744 women and 313 men, and retrieved from *the Cochrane Library*, *EMBASE*, *PubMed*, *Scopus*, and *Web of Science* databases up to February 2023 demonstrate that conversional one-anastomosis gastric bypass as revisional surgery after primary sleeve gastrectomy is an effective procedure in terms of weight loss and obesity-associated medical problems for selected patients (10).

The efficacy of primary sleeve gastrectomy, Roux-en-Y gastric bypass, and one-anastomosis gastric bypass in improving health outcomes for 299 patients at a mean age of 39.4±9.4 years with severe obesity (with a mean body mass index of 44.6±6.5 kg/

m^2) during a five-year follow-up was retrospectively studied (11). The Bariatric Analysis and Reporting Outcome System is a highly reliable scoring system for the assessment of weight loss, obesity-associated medical conditions, and quality of life after metabolic and bariatric surgery. Its total score was statistically significantly higher in the patients undergoing the one-anastomosis gastric bypass than in the other two operations (p=0.02).

The retrospective single-centre investigation of 147 adult Asian patients with severe obesity during the period between August 2016 and October 2021 compared the effects of perioperative dexmedetomidine infusion in terms of the need for pain medications and management of postoperative nausea and vomiting (12). Laparoscopic sleeve gastrectomy and laparoscopic Roux-en-Y gastric bypass were performed in 107 and 40 patients, respectively. The perioperative dexmedetomidine infusion led to statistically significantly lower pain numeric rating scale scores (2.52±2.46 versus 4.27±2.95; p=0.007) in the postanesthesia care unit, fewer postoperative nausea and vomiting (32.46% versus 51.52%; p=0.046), and infrequent needs of additional pain medications (19.47% versus 45.45%; p=0.003).

The safety of the endoscopic revisional gastroplasty, a minimally invasive approach, using a single-channel endoscope for 22 patients, 19 women and three men, at a mean age of 34.2 years and with a mean body mass index of 32.9±3.4 kg/m^2 who presented with weight gain recurrence after different bariatric procedures between January 2020 and July 2022 in Marseille, France, was evaluated (13). There were 14 cases of laparoscopic sleeve gastrectomy, nine cases of Roux-en-Y gastric bypass, and three cases with previous gastric band. The mean length of hospital stay was 1.1±0.9 days. There were no complications. After one year, the mean body mass index was 28.7±7.4 kg/m^2, the mean body mass index loss was 4.2±4.7 kg/m^2, and the mean excess weight loss was 53.1±17%.

In an observational cohort study of 87 patients undergoing Roux-en-Y gastric bypass and 20 patients undergoing sleeve gastrectomy, there was a statistically significantly decreased intake of energy and several macronutrients such as carbohydrates, protein, fat and dietary fibre, and of micronutrients such as folate, vitamin B_{12}, vitamin D, and iron (p<0.01 for all) in the first six postoperative months (14). Consumption of vegetables, wholegrain products, liquid fats, red meat, processed meat, sodium, and unhealthy food choices statistically significantly decreased (p<0.01 for all), while the relative intake of protein (p=0.01) and mono- and disaccharides (p<0.001) increased.

The results from a retrospective case-control study showed a statistically significantly extended duration of exclusive breastfeeding among pregnant women grappling with obesity and undergoing bariatric surgery than among non-operated women in China (p<0.001) (15).

Within a multi-centre observational study of 119 patients with obesity undergoing laparoscopic sleeve gastrectomy, the 30-day postoperative follow-up displayed a significant mean apnea-hypopnea index reduction leading to the resolution of obstructive sleep apnea symptoms in 67.6% of the cases with apnea-hypopnea index ≥15 (16).

The prospective comparative investigation between laparoscopic sleeve gastrectomy performed in 26 morbidly obese patients and laparoscopic one-anastomosis gastric bypass done in 14 ones three months after surgery did not reveal any statistically significant differences in terms of the mean postoperative urinary monocyte chemoattractant protein-1 levels, microalbuminuria, urinary creatinine, monocyte chemoattractant protein-1/creatinine ratio, and estimated glomerular filtration rate (17). Both surgery types improved all the indicators of kidney malfunction and reduced the urinary monocyte chemoattractant protein-1 levels.

Six months after the Roux-en-Y gastric bypass in 30 patients with obesity, the triglycerides, remnant cholesterol, lactate, apolipoprotein B-100, and glycoprotein acetyls decreased by 24%, 18%, 16%, 14%, and 9%, respectively (18). Weight loss and improved insulin sensitivity are the key physiological outcomes mediating the short-term advantageous metabolic effects of this surgery.

Between 2007 and 2017, 1554 adolescents at a mean age of 19.0±1.1 years, 1169 girls and 385 boys, with severe obesity (with a mean body mass index of 43.7±5.5 kg/m^2) undergoing bariatric surgery were identified through the Scandinavian Obesity Surgery

Registry within a Swedish nationwide cohort study (19). Mental health in terms of psychiatric diagnoses and psychiatric drug prescriptions from five years before to ten years after surgery were compared with 15540 matched controls from the general population. These diagnoses and drug prescriptions were more common and the increase of their prevalence rates was higher among obese adolescents.

The results from an observational pilot study evaluating patients' perceived benefits of bariatric surgery after one year in terms of quality of life indicated that the operated patients valued functional benefits after substantial weight loss the most and considered the metabolic benefits and social/mental health benefits important, too (20).

The prevalence of perceived barriers to physical activity among 63 pre- and 119 post-metabolic and bariatric surgery patients with obesity was assessed in a cross-sectional study (21). After surgery, there was a statistically significantly lower prevalence of the barriers in the physical ($p=0.036$) and in the behavioral ($p=0.004$) domains. The patients before surgery were more likely physically inactive when perceiving the barriers in the environmental ($p=0.048$) and in the behavioral ($p=0.048$) domains. The patients after surgery were more likely physically inactive when perceiving the barriers in the environmental ($p=0.027$), social ($p=0.020$), and behavioral ($p=0.037$) domains.

The analysis of the daily weight management-focused social support with weight loss, activity behaviors, and eating regulation in 71 adult patients during the first year after metabolic and bariatric surgery revealed relatively stable moderate-to-high perceived social support (of 3.98 on one to five scale) (22). This support was not related to total weight loss percentage, moderate-to-vigorous physical activity intensity, and sedentary time. The patients with higher perceived social support reported statistically significantly lower disinhibition and higher restraint than those with lower one ($p<0.05$).

The results from a retrospective observational study of the downstream healthcare cost of obese individuals from administrative claims data during the period between 2009 and 2018 demonstrated that bariatric surgery implementation was associated with lower total medical healthcare cost than its absence within a two-to-ten year follow-up (23). Cost ratios ranged between 0.85 and 0.93 ($p<0.05$). The stratification of the group with bariatric surgery procedures by socioeconomic status quartiles did not reveal any statistically significant cost differences (cost ratios between 0.96 and 1.05; $p>0.05$).

CONCLUSION

The analysis of the recent literature data and our results convincingly prove the sufficient safety and significant effectiveness of the sleeve gastrectomy and active intestinal bypass in selected patients with severe obesity. A broader implementation of this modern bariatric surgical method in the clinical practice in Bulgaria should be recommended.

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