The way to predict the effectiveness of bariatric surgery in patients with comorbid obesity in post-pandemic period

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Summary. It is estimated that from 650 million to 2 billion adults worldwide, are overweight or obese, the numbers indicating epidemic levels of disease. In individuals, body mass index (BMI) exceeding 27 kg/m^2 is associated with a high risk of mortality and the presence of comorbid pathologies, in particular, atherogenic dyslipidemia, arterial hypertension (AH), type 2 diabetes mellitus (T2D), thromboembolism, hepatic steatosis, etc. Preliminary data indicate that obesity is among key risk factors in severe and fatal cases of COVID-19, when comorbid with AH and T2D.

The aim of this study – to analyze the possibility of developing an optimized model utilizing anamnestic, clinical, biochemical and genetic parameters for predicting the outcomes of bariatric surgery in the patients with obesity, type 2 diabetes mellitus (T2D) and/or arterial hypertension (AH).

Results. Lifestyle changes and conservative treatment of obesity usually only result in a short-term effect, since the measures aiming to induce weight loss consign the person to a constant struggle with natural homeostatic processes. Recurrence of obesity in such patients is observed in 95% of the cases. Therefore, the International Association of Endocrinologists recommends that patients with a BMI greater than 40 kg/m^2, as well as with a BMI of 35.0 to 39.9 kg/m^2 and metabolic syndrome undergo a surgical treatment of obesity using minimally invasive techniques. At the same time, a number of issues associated with bariatric laparoscopic interventions remain unresolved, since these procedures are invasive and carry all the risks accompanying surgery, general anesthesia, and the postoperative recovery period. An innovative surgical approach, the X-ray endovascular bariatric embolization of the gastric arteries (BAE) is proposed as an alternative to laparoscopic intervention. However, the indications for the use of BAE are undefined, especially in the cases of comorbid obesity; there are no clear algorithms and guidelines for its use.

Conclusions. There have been no comprehensive studies of short-term, intermediate and long-term outcomes of BAE in Ukraine. This warrants the need to develop an optimal model for predicting the outcomes of
both classical bariatric laparoscopic surgery with regulated gastric band and innovative BEA procedure in patients with comorbid obesity in post-pandemic period using anamnestic, clinical, biochemical and genetic predictors.

Key words: bariatric surgery; obesity; effectiveness.

INTRODUCTION

It is estimated that from 650 million to 2 billion adults worldwide, are overweight or obese, the numbers indicating epidemic levels of disease [1]. In Ukraine, just in children the prevalence of obesity increased from 0.08 % in 2003 to 1.34 % in 2016, while 2016 Global Health Observatory data indicate that 24.1 % of the adult population of our country are obese. In individuals, body mass index (BMI) exceeding 27 kg/m² is associated with a high risk of mortality and the presence of comorbid pathologies, in particular, atherogenic dyslipidemia, arterial hypertension (AH), type 2 diabetes mellitus (T2D), thromboembolism, hepatic steatosis, etc. By 2025, total global health spending for treating complications linked to obesity is predicted to reach $1.2 trillion [3].

Preliminary data indicate that obesity is among key risk factors in severe and fatal cases of COVID-19, when comorbid with AH and T2D. Adipose tissue can be considered as an endocrine organ that secretes adipokines, which affect inflammation and immune function. Therefore, increased production of pro-inflammatory cytokines in obese individuals can exacerbate the cytokine storm, which determines the progression of COVID-19. Additionally, [4] the ACE2 receptors, which are the gateway for SARS-CoV-2, are expressed in adipose tissue. Furthermore, obesity is associated with an increased risk of thromboembolism and COVID-19 is characterized by a prothrombotic state in the lungs [5]. On the other hand, there are no data on the potential impact of SARS-COV-2 infection on obesity.

The aim of this study is to analyze the possibility of developing an optimized model utilizing anamnestic, clinical, biochemical and genetic parameters for predicting the outcomes of bariatric surgery in the patients with obesity, type 2 diabetes mellitus (T2D) and/or arterial hypertension (AH).

RESULTS AND DISCUSSION

The mechanisms governing the development and progression of obesity and associated comorbid pathologies are not fully understood. From a pathogenesis point of view, obesity is a result of changes to neurochemical and reverse signaling stemming from the disequilibrium in energy regulation and leading to chronic metabolic inflammation associated with moderate hyperexpression of pro-inflammatory mediators and tissue modification which promotes infiltration by immune cells. Genetic and epigenetic mechanisms have also been invoked to help in understanding the pathophysiology of obesity [6]. Genomewide association study (GWAS) of obesity taking into account BMI, waist-to-hip ratio and other quantitative indicators of excess weight, revealed more than 300 significant genetic polymorphism markers [7]. Current data on genetic predictors of obesity point to PPAR (receptors activated by peroxisome proliferators) gene mutations. However, there are almost no data on genetic predictors of obesity and the risk of comorbid pathology in Ukrainian population.

Lifestyle changes and conservative treatment of obesity usually only result in a short-term effect, since the measures aiming to induce weight loss consign the person to a constant struggle with natural homeostatic processes. Recurrence of obesity in such patients is observed in 95 % of the cases. Therefore, the International Association of Endocrinologists recommends that patients with a BMI greater than 40 kg/m², as well as with a BMI of 35.0 to 39.9 kg/m² and metabolic syndrome undergo a surgical treatment of obesity using minimally invasive techniques [8]. In contrast to conservative treatments, bariatric surgery simultaneously addresses multiple anatomical and physiological processes, including the increased secretion of local satiety factors, altered transmission of nerve impulses to the gut and brain, intestinal microbiome remodeling, change in gastric evacuation and rapid delivery of nutrients to the gut. Bariatric surgery also results in significant alleviation of comorbid pathologies associated with obesity, including T2D and hypertension.

At the same time, a number of issues associated with bariatric laparoscopic interventions remain unre-
solved, since these procedures are invasive and carry all the risks accompanying surgery, general anesthesia, and the postoperative recovery period [9]. An innovative surgical approach, the X-ray endovascular bariatric embolization of the gastric arteries (BAE) is proposed as an alternative to laparoscopic intervention [10]. It involves the introduction of spherical emboli into the artery gastrica sinistra and/or artery gastroepiploica. However, the indications for the use of BAE are undefined, especially in the cases of comorbid obesity; there are no clear algorithms and guidelines for its use. In addition, there have been no comprehensive studies of short-term, intermediate and long-term outcomes of BAE in patients with obesity and comorbid pathology in Ukraine. This underscores the need to develop a mathematical model for predicting its outcomes and comparing them to classical bariatric laparoscopic surgery.

**CONCLUSIONS**

There have been no comprehensive studies of short-term, intermediate and long-term outcomes of BEA in Ukraine. This warrants the need to develop an optimal model for predicting the outcomes of both classical bariatric laparoscopic surgery with regulated gastric band and innovative BEA procedure in patients with comorbid obesity in post-pandemic period using anamnestic, clinical, biochemical and genetic predictors.

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Received 04.06.20