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RESULTS OF AORTOCORONARY BYPASS GRAFTING ACCORDING TO OPCAB IN PATIENTS WITH CORONARY HEART DISEASE AND OBESITY

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SUMMARY

The article presents a comparative analysis of the immediate results of surgical interventions in CHD patients with multivessel lesions who underwent CABG- OPCAB, depending on the BMI level. **Conclusion:** Despite the ongoing numerous studies devoted to the study of CABG outcomes that contribute to improving the quality of life, reducing the period of rehabilitation after CABG, it is necessary to further study the results of these interventions in groups of patients with comorbid pathology, including obesity, to improve their outcomes of operations and prognoses, both immediate and long-term.

KEYWORDS: Coronary artery bypass grafting, obesity, body mass index.

INTRODUCTION

Currently, coronary artery bypass grafting (CABG) is the "gold" standard for the treatment of coronary heart disease (CHD) with damage to several coronary arteries or the main trunk of the left coronary artery.[9] Improvements in CABG technique have made it possible to operate on patients with a higher risk of death and postoperative complications.

Off-pump coronary artery bypass (OPCAB) - as a method of surgical treatment of coronary artery disease in multi-vessel lesions, became widely used in the late 90s and is now an alternative technique to traditional operations on coronary vessels using IR. Although OPCAB is performed through a complete median sternotomy, the latter still refers to minimally invasive interventions and allows avoiding or significantly reducing a number of complications associated with the use of CPB, cardioplegic cardiac arrest, and manipulations on the aorta.[3] According to most scientists, obesity is an independent risk factor for major coronary events and complications.[4] Due to the steady increase in the number of patients with coronary artery disease on the background of obesity, these patients are increasingly becoming candidates for CABG.[6] Many surgeons consider obesity as a predictor of adverse events after myocardial revascularization.[8] According to other authors, the immediate results of revascularization in obese patients are comparable to the results of surgery in non-obese patients.[5] The ambiguity of opinions on this issue contributed to our study, the purpose of which was: to conduct a comparative analysis of the immediate results of surgical interventions in patients with coronary artery disease with multivessel lesions who underwent CABG using the OPCAB method, depending on the level of body mass index (BMI).

MATERIAL AND METHODS

We examined 279 patients with coronary artery disease with complex multivessel lesions of the coronary bed, who routinely underwent CABG according to the OPCAB method, in the period from December 2019 to August 2021. All patients underwent general clinical and laboratory studies.

All patients were observed in the hospital, while examinations were carried out at the initial stage - "before" the operation and before discharge from the hospital - the stage "AFTER" the operation.

Preoperative data assessment included patient age, gender, and BMI calculation. According to the coronary angiography (CAG), the number of affected coronary arteries and the presence of SLCA lesions were determined.

Operational data included: the patient's operational status, the number of bypasses, the number of cases of conversion to EC, and the number of intraoperative complications. For the latter were taken: ventricular extrasystole, atrial fibrillation, decreased LVEF.

Postoperative data included the following: mechanical ventilation time, mediastinal drainage volume, time spent in the intensive care unit (ICU) and hospital, and

mortality, which was defined as death from any cause occurring during the hospital stay.

RESULTS

The study of the anthropometric characteristics of the examined patients revealed that patients with elevated BMI were 1.1 years younger (p>0.05). A more detailed analysis of the examined by age categories did not reveal significant differences in the analyzed groups. In general, in both compared groups, persons of the 60+ category prevailed (≈ 56%)

In the gender aspect in 2gr. the number of women prevailed more than 2 times (p<0.0001). The average age of men in 1gr. was 61.0±8.1 years and in 2gr. – 59.6±7.6 years (p=0.200); average age of women in 1gr. = 64.2±7.1 years and in 2gr. – 62.1±7.1 years (p=0.269).

In general, out of the entire sample, the number of persons with a BMI level ≥ 25 kg/m2 was 242 people, i.e. 86.7% of the surveyed were overweight or obese of varying severity. This once again emphasizes that the problem of obesity at the present time is "gaining momentum", especially among people of young working age. The above was confirmed by the results of the correlation analysis, which established an inverse relationship between the age of the subjects and the level of BMI (p>0.05), i.e. an increase in BMI was associated with young age, however, the identified trends did not reach the level of significance.

As mentioned above, in the group with increased BMI, the number of women was greater. In this regard, a correlation analysis was carried out between the sex of patients and BMI values, which established a positive highly significant relationship with the female gender. Those women had higher BMI values than men.

Analysis of the data on CABG-ORSAV performed showed the following: 2 shunts were applied in 18.3% of cases out of the entire sample of subjects; 3 shunts in 61.3% and 4 shunts in 20.4% of patients. A detailed analysis depending on the level of BMI is presented in Table 2, which shows that in the group with increased BMI, cases of anastomosis with 4 conduits were observed 7.5% more often than in the control group (p>0.05). This, in turn, was reflected in such an indicator as the average number of shunts per 1 patient, which also turned out to be higher in people with elevated BMI.

The incidence of stem lesions in 1gr. amounted to 42.7% and in 2gr. - 47.0%. The frequency of non-fatal intraoperative complications was 8.4% and 11.8%, respectively, in the 1st and 2nd groups. Those. In persons with elevated BMI, intraoperative complications were observed more often than in the control group, and they were mainly represented by various cardiac arrhythmias and a decrease in hemodynamic parameters. Namely, ventricular extrasystoles were registered in 2.8% of respondents from 1gr. and in 3.7% - from 2g; atrial fibrillation - in 3.5% and 4.4%; decrease in hemodynamic parameters, which required the connection of vasopressors - in 2.1% and 3.7% of patients, respectively, in the 1st and 2nd groups. Intraoperative conversion to EC occurred in 2.1% of cases among the control group and in 5.1% of cases among patients with elevated BMI (p>0.05). An analysis of the relationship between conversion cases and gender revealed a direct positive correlation with the female gender.

Analysis of the relationship between the age of the respondents and the number of superimposed conduits found an inverse relationship (p<0.005). This once again confirms the fact that in modern society there is a tendency towards rejuvenation of coronary artery disease and an increase in obesity.

Subjective assessment of pain syndrome by the patients themselves was carried out using VAS. From these positions, it was found that “before” the operation, the average score on VAS was 6.4±1.2 points - in 1g. and 6.6±1.1 points - in group 2, i.e. in patients with increased BMI, nociceptive sensitivity was higher than in patients in the control group. The assessment of this indicator “AFTER” the operation at the stage of discharge from the hospital also found that in 2gr. the average VAS score turned out to be higher than in 1 group: 3.0±0.7 versus 3.4±0.7 points. Subjective improvement in general well-being was noted by 91.6% of respondents from 1g. and 89.7% - from 2gr., i.e. in individuals with increased BMI, the presence of a more pronounced perception of pain contributed to the development of more cases when the patient did not notice an improvement in well-being from the treatment.

It is noteworthy that in patients with elevated BMI, the volume of total blood loss was greater than in the comparison group, and this difference tended to be significant.

In the postoperative period, patients with a BMI > 30 kg/m^2 had a relatively longer stay both in the ICU and in the hospital (both p<0.0001), but the groups did not differ in other postoperative data. Neither in the 1st nor in the 2nd groups of cases of death in the hospital was registered.

Among patients 2gr. we carried out a more detailed intragroup analysis of data depending on the degree of obesity according to BMI gradations (Table 3):

- A-subgroup with BMI=30.1-35.0 kg/m^2 – 100 patients;
- B-subgroup with BMI=35.1-40.0 kg/m^2 – 24 patients and
- B-subgroup with BMI ≥ 40.1 kg/m^2 – 12 patients.

From these positions, it was found that in all three subgroups, three shunts were most often sutured, however, in the largest number of cases - in patients of the C-subgroup (75% - in the C-subgroup versus 56%

and 50%, respectively, in A and B subgroups). However, the average number of shunts in patients of the B-subgroup was the smallest.

Also, among patients of the B-subgroup, there was a greater number of intraoperative complications (the difference with the A-subgroup was 3.7% and with the B-subgroup - 4.2%), conversions on EC (13.7% and 8.4%, in comparison with A- and B-subgroups) and stem lesions of the coronary bed (by 14.3% - compared with the A-subgroup and 4.1% - with the B-subgroup). In a comparative aspect, the total volume of blood loss in patients of the B-subgroup was the largest: the difference with the A-subgroup was 21.6 ml and with the B-subgroup - 8.5 ml. This, in turn, contributed to a decrease in the success of the operations and the deterioration of the chronological picture of rehabilitation. Namely, the successful intervention in the A-subgroup was 13.7% and in the B-subgroup - 8.4% better than in the C-subgroup. The time of stay in the ICU in patients of the A-subgroup was 5.6 hours and in patients of the B-subgroup - 2.5 hours shorter than in patients of the B-subgroup. The total time of inpatient treatment in the B-subgroup averaged 8.7 days, which was by 0.3 and 0.2 units. less compared to the A- and B-subgroups, respectively.

Comparative assessment of pain sensitivity on the VAS scale in the selected subgroups of respondents did not establish significant differences either "BEFORE" or "AFTER" the operation. Although, the subjective assessment of the patients themselves in relation to their own well-being revealed that the presence of a greater degree of obesity (i.e., BMI $\geq$ 35.1 kg/m2) was associated with a less pronounced sense of satisfaction from the treatment (improvement in well-being in the greatest number of cases was noted by patients A - subgroups with BMI=30.1-35.0 kg/m2).

DISCUSSION

According to the definition of the World Health Organization, obesity is an abnormal accumulation of fat that poses a risk to health.[10] For the diagnosis of obesity, the body mass index (BMI) is used, calculated as the ratio of body weight in kilograms to the square of height in meters, which was also used in our work. In the modern world, there is an increase in the number of people suffering from obesity, which, in our opinion, is due to the growth of computerization of production, which, in turn, contributes to the development of physical inactivity and obesity.

Obesity significantly reduces life expectancy, contributing to the development of cardiometabolic disorders (type 2 diabetes mellitus, dyslipidemia, coronary artery disease, stroke, arterial hypertension (AH)) and non-metabolic diseases (gastroesophageal reflux disease, non-alcoholic steatohepatitis, liver cirrhosis, cancer, sleep disorders, depression and damage to the musculoskeletal system).[2]

According to a study by Keren M.A. (2009), the combination of obesity with coronary artery disease is the most unfavorable factor in the lesion of the coronary bed, namely, the trunk of the LCA and diffuse and occlusive lesions of the coronary arteries. This is consistent with the results of our work, where it was also found that in patients with a BMI > 30 kg/m^2, the registration of stem lesions of the coronary bed was observed more often than in patients with a BMI $\leq$ 30 kg/m^2.

According to Chugunova Yu.V. it was found that in patients with obesity, the quality of life in the perioperative period of CABG is lower compared to patients without it. This was also confirmed in our study. Namely. patients with a BMI level > 30 kg/m^2 were characterized by a smaller number of cases of subjective improvement in well-being and an increase in the total length of stay in the hospital. In addition, the results of our work revealed that individuals with elevated BMI had a more pronounced perception of pain. Perhaps the revealed phenomenon was due precisely to the presence of obesity. In particular, in the works of Stone A.A. et Broderick J.E. (2012) showed that people with overweight experienced pain 20% more often than subjects with normal BMI.[1]

The high level of safety and clinical efficacy of traditional CABG is beyond doubt, however, the search for reserves to improve its results continues. Thanks to the development of modern technologies, the evolution of coronary artery bypass grafting techniques and the emergence of devices for regional stabilization and exposure of the heart, it has become possible to achieve complete myocardial revascularization during OPCAB operations - the generally recognized standard for CABG operations. The ability to avoid CPB during OPCAB surgery has its theoretical and clinical benefits compared to the traditional method of revascularization.[7] However, despite the ongoing numerous studies devoted to the study of CABG outcomes that improve the quality of life and reduce the rehabilitation period after CABG, further study of the results of these interventions in groups of patients with comorbid pathology, including obesity, is necessary to improve their outcomes of operations and forecasts, both near and far.

CONCLUSION

Thus, our study showed that the presence of elevated BMI values was associated with a relatively young age and female gender ($p>0.05$).

In patients with a BMI > 30 kg/m^2, 4-conduit anastomoses were more often performed 7.5% of the time (at the same time, an inverse relationship was observed between the age of the respondents and the number of shunts applied ($p<0.05$)); intraoperative complications were observed more often, which were mainly represented by various cardiac arrhythmias and a decrease in hemodynamic parameters.

Intraoperative conversion to EC was recorded in 5.1% of cases among patients with elevated BMI, while it had a direct positive correlation with the female sex ($p<0.05$).

Nociceptive sensitivity according to VAS, both "BEFORE" and "AFTER" surgical interventions, was higher in patients with a BMI > 30 kg/m^2 which was accompanied by a decrease in the number of cases of subjective improvement in well-being and an increase in the total duration of hospital stay.

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