

MODERN PRINCIPLES OF TREATMENT OF ABDOMINAL AORTIC ANEURYSM

СОВРЕМЕННЫЕ ПРИНЦИПЫ ЛЕЧЕНИЯ АНЕВРИЗМЫ БРЮШНОЙ АОРТЫ

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Abstract. *Over the past three decades, the incidence of all cardiovascular diseases, including abdominal aortic aneurysms (AAA), has increased sharply. Along with the general increase in morbidity, there has been a significant increase in the number of complicated forms of atherosclerotic lesions of the main vessels, including AAA, such a fatal and inevitable complication of the disease as its rupture.*

The article presents the main causes, diagnostic methods and principles of treatment of specific complications that arise after endoprosthetic repair of an abdominal aortic aneurysm.

Key words: *abdominal aortic aneurysm, treatment principles, stent graft, prosthetics.*

Аннотация. *За последние три десятилетия резко возросла частота всех сердечно-сосудистых заболеваний, в том числе аневризм брюшной аорты (АБА). Наряду с общим ростом заболеваемости наблюдается существенный рост числа осложненных форм атеросклеротического поражения магистральных сосудов, в том числе и АБА, - столь фатального и неминуемого осложнения заболевания, как ее разрыв.*

В статье приведены основные причины, методы диагностики и принципы лечения специфических осложнений, возникающих после эндопротезирования аневризмы брюшной аорты.

Ключевые слова: *аневризма брюшной аорты, принципы лечения, стент-графт, протезирование.*

Annotatsiya. *So 'nggi uch o'n yillikda barcha yurak-qon tomir kasalliklari, shu jumladan qorin aortasi anevrizmasi (QAA) keskin oshdi. Kasallikning umumiy o'sishi bilan bir qatorda, asosiy tomirlarning aterosklerotik shikastlanishlarining murakkab shakllari, shu jumladan QAA, anevrizma yorilishi kabi halokatli va muqarrar asorati sezilarli darajada oshadi.*

Maqolada qorin aortasi anevrizmasini endoprotez bilan almashtirishdan keyin yuzaga keladigan o'ziga xos asoratlarning asosiy sabablari, diagnostika usullari va davolash tamoyillari keltirilgan.

Kalit so'zlar: *qorin aortasi anevrizmasi, davolash tamoyillari, stent transplantatsiyasi, protezlash.*

Introduction. Aneurysm (Greek: *aneurysma*, from *aneuryno* - to expand) is a pathological expansion with an increase in diameter more than 2 times compared to the norm or the presence of a local bulge of the vessel wall [1].

Thanks to endoprosthetic replacement of abdominal aortic aneurysm, it became possible to treat patients with severe concomitant pathology. The traditional surgical method (aneurysm resection with aortic replacement) is a difficult intervention for the patient, which retains its significance at present, since it is accompanied by better results in the long term. The determining factor in choosing the final method of treatment is the patient's life expectancy.

Successful endoprosthetics of abdominal aortic aneurysm require favorable aneurysm anatomy, selection of a stent graft, extensive experience of the operating surgeon, and sufficient

material equipment of the medical institution. In addition, regular monitoring of postoperative complications is a prerequisite for endoprosthetics of abdominal aortic aneurysm.

Treatment of AAA has long been a concern for doctors all over the world. Until the mid-20th century, all attempts at surgical treatment of AAA ended in failure. In 1817, Cooper A. was the first to perform ligation of the aorta above the aneurysm. In 1832, Pirogov N.I. determined the changes in blood circulation that occur after ligation of the abdominal aorta [2].

In case of unfavorable or difficult for endoprosthetic aneurysms, the risk of complications increases significantly. Endovascular correction in a is performed in 15 to 25% of patients within 5 years after the primary operation. Up to 5% of patients require open surgical conversion.

Literature review. Since 2000, with the introduction of computed tomography angiography (CTA) and bifurcation The use of endoprostheses has led to a significant breakthrough in the diagnosis and treatment of AAA, which has contributed to a decrease in the number of complications and an increase in the number of *EVARs performed* worldwide [9; 10]. Thus, in 2008, *EVAR* accounted for only 2% in our country, while in 2018 it was already 33.8% [11].

Complex AAAs are characterized by a high location of the proximal neck: infrarenal (less than 10 mm), juxtarenal, pararenal or paravisceral localization. For endovascular treatment of such aneurysms, branched or fenestrated stent grafts.

The maximum diameter of the abdominal aorta normally reaches 2.5 cm [15]. The morphological substrate of AAA is most often an atherosclerotic lesion of the aortic wall with its further degenerative degeneration and development of aneurysm. There is no single classification that fully reflects the essence of arterial aneurysm [16]. Pokrovsky A.V. in 1979. Burakovskiy V.I. and Bokeria L.A. indicated the localization of the aneurysm in the infrarenal part of the aorta in 95-96% of cases of all AAA, which is explained by the low content of elastin and collagen in the terminal part of the aorta [17]. In the blood serum of patients with AAA, an increase in the level of matrix metalloproteinase was found, which indicates the degradation of the extracellular matrix of the middle layer of the aortic wall [18]. A recent study has highlighted the importance of “complication biomarkers” after *EVAR*, which may indicate a continued increase in AAA [19].

Numerous clinical and pathological observations indicate that selective damage to any one vascular region is the exception rather than the rule [6].

An important condition for choosing indications for surgical treatment is considered to be the presence of such an aneurysm size, at which the risk of its rupture would exceed mortality without surgical intervention. Until the beginning of the 21st century, with an AAA diameter of more than 4.0 cm, the patient was subject to surgical treatment. In the study by Kazanchyan P.O. and Popov V.A., the annual frequency of aneurysm rupture was noted from 0 to 0.5% with an AAA diameter of less than 5.0 cm in men and less than 4.5 cm in women [20]. According to the results of randomized studies «UKSAT», «ADAM», «CAESAR» and «PIVOTAL» with aneurysms of less than 5.5 cm in diameter, it is recommended to adhere to conservative tactics.

Thus, an indication for surgical treatment of asymptomatic AAA should be considered aortic dilation of more than 5.0-5.5 cm in men and more than 4.5-5.0 cm in women. However, with rapid growth of the aneurysm (more than 1 cm per year) and/or the appearance of pain upon palpation in the projection of the aorta and unexplained pain in the abdomen or lower back, as well as in the case of distal embolism without an obvious source, urgent surgical treatment is indicated within 24-48 hours.

AAA is accidentally detected in 3.2% of the adult population during ultrasound examination, in 5% of patients with coronary heart disease, and 10% of patients with peripheral vascular disease [11]. According to population screening studies, among the population group over 50 years of age, the incidence of AAA ranges from 1.4 to 8.2% [2]. The incidence of AAA detection according to autopsy studies ranges from 0.16 to 8%.

Lesions of the brachiocephalic arteries in patients with coronary atherosclerosis are detected in 1.3-18.2% of cases, while concomitant lesions of the coronary arteries in atherosclerotic genesis of cerebral ischemia occur in 19-40% of cases. In this case, about a third of patients with two-regional

lesions also have changes in one or another third vascular basin [8]. Stenosis and occlusion of extracranial cerebral arteries are encountered 2-5 times more often than intracranial ones.

Clinical manifestations of combined atherosclerotic lesions vary in the severity of ischemic syndromes and the time of their development. Patients often present with clinical symptoms of occlusive lesions in one or two basins, while lesions in other areas are latent, and under certain conditions develop into complications, sometimes fatal [16]. The main clinical sign is systolic murmur in the projection of the aortic arch branches. Auscultatory symptoms of carotid artery lesions appear with their stenosis in 30 to 95% of cases. In this case, hemodynamically significant stenosis of the carotid artery occurs with a decrease in its lumen to 50% or less. On the other hand, auscultatory symptoms are generally absent with critical stenosis and occlusion of the aortic arch branches.

Very often, cerebrovascular disorders are preceded by a tic symptom caused by coronary artery pathology. All researchers emphasize that the severity of coronary heart disease is a factor determining mortality rates in the immediate and late periods after “major” vascular surgeries. In this regard, all patients who are referred for surgery on a particular vascular pool, including the abdominal aorta and its branches, must undergo coronary angiography. When hemodynamically significant coronary artery stenosis is detected, the first step is to perform coronary artery bypass grafting (CABG), and then perform surgery on the vessels. According to the literature, as the severity of coronary heart disease worsens, the severity of cerebral ischemia increases [8].

The main principle of surgical treatment of widespread atherosclerosis is *the most complete possible revascularization of all affected basins* [10]. The need for active surgical tactics in patients with combined atherosclerotic lesions is due to the consequences of perioperative and remote complications during isolated reconstructions of one or another vascular basin.

According to a number of authors, myocardial revascularization significantly reduces the risk of cardiac complications during AAA resection. However, CABG in elderly patients is accompanied by a significantly higher risk of fatal complications compared to younger patients. Mortality after CABG in this group averages 8.9%, therefore, the risk of CABG may exceed that of AAA resection. In addition, CABG surgery changes hemodynamics and blood enzyme composition, which can contribute to AAA rupture. Therefore, most clinicians are cautious about the idea of simultaneous myocardial revascularization or before abdominal aortic reconstruction in elderly patients and resort to CABG only in patients with unstable coronary artery disease, which makes up about 6-12% of the total number of patients requiring abdominal aortic reconstruction. Moderate coronary artery disease with compensated cardiorespiratory reserve creates conditions for performing the required volume of peripheral reconstruction [19]. When severe coronary region disease is combined with hemodynamically significant stenosis of the carotid arteries, preference is given to simultaneous restoration of blood flow in both regions. Many vascular surgeons are reserved about simultaneous reconstructions of the coronary basin and abdominal aorta, considering staged correction to be the most appropriate [15], which allows reducing perioperative mortality to 1.9-8.7% and achieving a long-term survival rate of up to 82.4% [20].

When comparing the long-term survival rates in patients after isolated resection of the aneurysm and in patients who underwent reconstruction of both arterial pools, it was shown that among those who survived for 5 years, about 90% were patients with myocardial revascularization.

However, there is a group of patients with severe coronary artery disease (patients with trunk lesions, multiple changes in the coronary arteries with III-IV FC according to NYHA or unstable angina) and critical occlusive lesions of the aortofemoral segment (pain at rest, trophic changes), as well as complicated AAA (with ruptures that progressively increase), for whom there is no alternative to one-stage operations.

According to V. S. Rabotnikov and Yu. V. Belov et al. [4], the cardinal factor determining the stages of surgical treatment of patients with widespread atherosclerosis is the ratio of the severity of coronary heart disease and cerebral ischemia. Indications for CABG are the presence of damage to the left coronary artery trunk; damage to three or more coronary arteries; damage to two coronary arteries if one of them is the anterior interventricular branch (LAD); damage to the proximal LAD

against the background of severe angina. An indication for carotid endarterectomy is severe (over 75%) carotid stenosis with clinical manifestations.

The advantage of single-stage operations is the rapid rehabilitation of the patient, saving time and money; in addition, the discomfort associated with being in a surgical hospital and preparing for the operation is experienced by the patient only once; the risk of anesthesia, the possibility of infectious complications, pulmonary embolism also occur only once. With staged tactics, each operation is shorter in duration, the approaches are not as widened. Usually, staged operations are safer than single-stage ones, although this is not true in the case of severe biregional lesions, when the absence of surgical correction of one of them is associated with a high risk of complications.

Conclusion. In conclusion, it should be noted that the frequency of combined lesions of various vascular basins in AAA, requiring surgical correction, according to literature data, reaches 60-70%, and the number of patients in this category is steadily increasing every year.

Thus, complications after *EVAR* are numerous and diverse, which requires their timely diagnosis and surgical correction. There is a need to create a more rational approach to the prevention, diagnosis and treatment of complications after *EVAR*. With a high life expectancy of patients, preference should be given to traditional intervention - resection of the aneurysm with prosthetics of the abdominal aorta.

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