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CLINICAL AND ORGANIZATIONAL ASSESSMENT OF ENDOVASCULAR CARE ACCESSIBILITY AT THE REGIONAL LEVEL

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The world health care system´s concern of inequalities in treatment of receiving the necessary medical care. The purpose of article to evaluate the availability of endovascular care (EVC) for patients at regional level in Russia and to develop a system for its improvement. As a result the low availability of EVC for the population at the regional level in Russia with coronary heart disease, atherosclerosis of the brachiocephalic arteries and critical lower limb ischemia (CLLI) was funded. The main reasons for the difficulties in obtaining EVC in the regions of Russia are the low frequency of diagnosing a critical stage of cardiovascular disease (CVD) requiring surgical treatment, the absence of cardiovascular surgeons and cardiologists in the medical care organizations, the failure in information to patients attending a regular doctor´s appointment about effectiveness and safety of endovascular treatment technology. More old-school traditional methods remain in place like bypass or endarterectomy surgery. Further obstacles are prolonged waiting list at the regional level for the provision of high-tech care in cardiovascular surgery, choice of conservative treatment methods or amputation of lower limbs for patients with CLLI 3 and 4 st. ($p < 0.05$).
In Conclusion the Clinical and organizational assessment of the endovascular care accessibility in CVD for the population in regions of Russia elaborated. One way to improve the situation is the introduction of the cardiovascular care clinical management. A dual-circuit clinical and organizational system was developed and proposed to increase endovascular care accessibility in regions.

K e y w o r d s : endovascular care; health care accessibility; cardiovascular disease; atherosclerosis; clinical, organizational, regional level.

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Introduction

Cardiovascular diseases are the important social and economic problem in the world. More than 30% of otherwise preventable deaths in the world, amounting to more than 17 million people per year, are associated with acute myocardial infarction and stroke. The World Health Organization (WHO) has found that more than 80% of deaths from heart attack and stroke are recorded in low and middle income countries, and equally among men and women. At the same time, the mortality rate from cardiovascular diseases in economically developed countries is lower than in developing countries, and the average life expectancy in recent years has increased by 12—15 years [1, 2].

National programs have been implemented in many countries around the world in the past 30 years, which were aimed to the reducing risks, promoting a healthy diet and active life style and increasing accessibility of high tech treatment strategies. For instance such programs were as follows: the Canadian Initiative "Healthy Heart" (Canada, 1987), "State Plan of Action. Prevention of Death and Disability from Cardiovascular Diseases" as part of the "Healthy people — 2000» (USA, 1994), National project «Health» (Russian Federation, 2006), the European initiative «Stent for life», etc. These contributed to increase patient's adherence to modification of risks factors for cardiovascular diseases, the availability of endovascular care for acute myocardial infarction, and the 40% reduction in mortality from cardiovascular diseases in the USA, 70% in Russia, and 80% among men in Finland [3—6]. WHO representative Etienne Krug said: "We intend to deal with the main causes of cardiovascular diseases — smoking, excessive consumption of salt, sugar and fat, as well as lack of physical activity. All these factors play a serious role in the development of heart attack and stroke".

One of the main tasks of world health care, is to solve the problem of medical care accessibility, to increase the availability and quality of medical care to patients with myocardial infarction, stroke and critical lower limb ischemia along with the prevention of the cardiovascular diseases development and their fatal complications. It is important to note that critical lower limb ischemia is a contributing factor in the risk of developing coronary heart disease [4].

High-tech surgical care using endovascular technology is now scientifically justified as the effective and safety alternative to surgical treatment and is widely used around the world [7, 9].

In the Russian Federation endovascular care is available to all residents on the basis of State Guaranteed Medical Care Program. However, the official statistics of the Ministry of Health indicate that the number of surgical and endovascular interventions performed in the regions

of the Russian Federation is not consistent with incidence of myocardial infarction, acute cerebrovascular accident, aortic stenosis and critical lower limb ischemia [9].

Significant amounts of planned (non-acute) endovascular care are performed in big hospitals and research medical organizations in Moscow and in St. Petersburg to residents of our country and are paid by the system of compulsory health insurance [10].

The low availability of expensive endovascular care in the regions of the Russian Federation is an indicator of poor accessibility of medical care for the population, and may be the reason for the continued high mortality from myocardial infarction and stroke, and for significant number of amputations of the lower extremities in patients with critical ischemia as well. Inter regional settlements in the compulsory health insurance system create an economic burdens on regional budgets.

The core goal of analysis is to evaluate the availability of endovascular care (EC) for patients at the regional level in Russia and to develop a system for it´s improvement.

The purpose of article: to evaluate the availability of endovascular care for patients at regional level in Russia and to develop a system for its improvement.

Materials and methods

The study was conducted in 2018—2019 at the Research clinical center of Russian Railways. The subject of the study was the availability of EC for cardiovascular diseases (CVD) in the regions of Russia. The subject of the study was the analysis of the reasons for the low availability of endovascular care for patients with atherosclerosis of coronary, brachiocephalic and peripheral arteries and varicose veins disease of the lower extremities in the regions of the Russian Federation. Object of study — 1242 patients with cardiovascular diseases. The main group included 731 CVD patients — residents of 14 regions of Russia, the control group — 511 patients from Moscow.

The number of observations of the sample was calculated by the formula [11]:

$$n = \frac{t^2 \cdot p \cdot q}{\Delta^2},$$

where t — Student's criterion equal to 2, p — incidence rate from published data (if not known — 50% is taken), $q = 100 - p\%$, Δ — marginal error, taken from 3 to 10.

The results of the survey were accounted for and analyzed directly during a survey of patients with a cardiovascular surgeon at the primary outpatient appointment. The patients' answers to the first 6 questions of the questionnaire were expressed by one of the statements: a) Yes or b) No. Each answer was assigned +1 or −1 point, respectively. The percentage of the scores reflected the availability and information available on cardiovascular surgeon's consultation for patients at the regional level, as well as the consultant's commitment to prioritized endovascular surgical treatment technology to improve the quality of cardiovascular care. Answers to questions, including question 7, of the questionnaire were analyzed with the calculation of the percentage of options.

Table 1

Medical and demographic characteristics of patients

Indicator	Main group (n=731)	Control group (n=511)
Gender (м/f)	412/301	387/124
Average age, years	67±7,7	71±6,2
Disease:		
I20.8 Ischemic heart disease (stable angina)	41	30
I70.2 Atherosclerosis of the lower extremities arteries (critical ischemia of the lower extremities 3—4 st)	286	196
I71.4 Aneurysm of the infrarenal aorta is more than 5.5 cm in diameter.	2	1
I70.8 Atherosclerosis of the brachiocephalic arteries	88	29
I83.0 or I83.9 Varicose vein disease	314	255

A statistical analysis of the materials was carried out using Microsoft Office 2013 programs. The statistical method included analysis of the distribution of attributes and their numerical characteristics, and a representative error was calculated for relative indicators. Statistical processing of the materials was carried out on the basis of the Statistica 6.0 package with the calculation of adequate statistical indicators and their reliability ($p \leqslant 0.05$).

The medical and demographic characteristics of the patients included in the study are presented in table 1.

The study was conducted on the basis of results of a survey of patients with cardiovascular diseases who underwent outpatient admission at the Research clinical center of Russian Railways. The questionnaire included questions revealing the problems of accessibility status for patients with cardiovascular diseases and obstacles in obtaining specialized endovascular medical care: appointments of cardiovascular surgeon or cardiologist at the place of residence; patients' knowledge of endovascular methods treatment of coronary heart disease, atherosclerosis of the carotid arteries or lower limb ischemia without incisions and anesthesia; the availability of medical indications for surgical (endovascular) treatment;

Table 2

Reasons of the low availability of endovascular care accordingly to the patients´ survey

Questioners	Main group (n=731)	Control group (n=511)
1. Consultation with a cardiovascular surgeon or cardiologist and whether a diagnosis is made:		
1) Stable angina	36%*	100%
2) Atherosclerosis of low extremities arteries	61%	68%
3) Atherosclerosis of brachiocephalic arteries	2%	6%
4) Aorta aneurism	100%	100%
5) Varicose vein disease	88%	97%
2. Low awareness of alternative endovascular treatment	88%	52%*
3. Difficulties in obtaining endovascular (surgical) care at the place of residence:	98%	8%*
1) Prolonged waiting times	66%*	0%
2) Recommendation for conservative treatment	17%*	56%
3) Recommendations for treatment in a medical organization in another region	8%*	0%
4) Medical shortage	9%*	0%
5) Recommendation for amputation of low extremities (n=482)	100%	100%

* Differences are significant.

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difficulties with hospitalization in a regional medical organization for the surgical intervention. These are the main obstacles that constrain the endovascular interventions in a regional medical organization, according to the survey.

Discussion of the research results

The survey analysis of questionnaires of patients with cardiovascular diseases revealed the low commitment of both regional doctors and Moscow doctors as well to administer the endovascular treatment.

At the same time the majority of patients in Moscow and in regions were given indications for laser endovascular obliteration of superficial veins in the case of diagnosis of varicose veins disease at the outpatient stage at the outpatient stage, 97% and 88% correspondingly ($p = 0.05$).

The main reasons for the low availability of endovascular care were identified. Those are, for example, the low level of patients´ awareness of doctors who can administer alternative endovascular method of treatment (88% in the main group, 52% in the control group); difficulties in obtaining endovascular (surgical) care in the community (98% in the main group, 8% in the control group). Other reasons which obstruct the administration of endovascular (surgical) care at the place of residence are: prolonged waiting time of waiting for surgery (66% to 0%), recommendations for the conservative treatment (17% to 56%), specialists' staff shortage (9% to 0%), correspondingly.

The probable reasons for the low use of endovascular technology for coronary heart disease, atherosclerosis of brachiocephalic arteries and critical ischemia of the lower extremities at the regional level are the low frequency of diagnosing of cardiovascular diseases at the critical stage requiring surgical treatment; the lack of specialists (cardiovascular surgeons and cardiologists); low frequency of referrals of patients following a regular doctor´s appointment for effective and safe endovascular treatment technology; the appointment of a traditional surgical operation (bypass or endarterectomy); waiting lists for the provision of high-tech care in the profile of cardiovascular surgery at the regional level; doctor's recommendations for conservative treatment or amputation of the lower extremity in case of critical lower limb ischemia 3 and 4 st. ($p < 0.05$). It is important to note that even in Moscow doctors in the local clinics offer the hospitalization for amputation for patients with gangrene of the lower limb often.

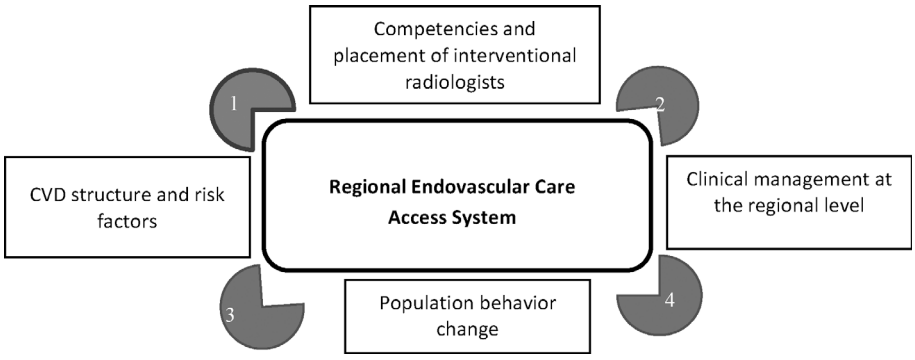
The queue for the provision of planned surgical care to patients with varicose veins of the lower extremities in regions exist for those only who wish to undergo treatment at the expense of the compulsory health insurance system.

All patients who consulted at the Research clinical center were hospitalized in the department of vascular surgery for surgical treatment. Endovascular technology was performed for all patients with a high clinical success rate — 100%.

Cardiovascular surgeons of the Cardiovascular surgery Department of the Research clinical center made 18 visits in 2018—2019 to the regions In order to increase the availability of endovascular care to residents of the constituent entities of the Russian Federation. 312 patients were consulted 186 of whom with cardiovascular diseases were hospitalized and operated successfully using endovascular technology.

All identified factors of low availability of endovascular care at the regional level can be solved by the proper organization of medical care, There are regional vascular centers which provide the treatment of patients with acute myocardial infarction and stroke, endovascular technology using stenting of coronary arteries widely In all constituent entities of the Russian Federation. Our experience shows that the advanced training of cardiovascular surgeons, improving their endovascular technologies is the most effective for the treatment of patients with critical lower limb ischemia, helps to increase the availability of endovascular care for the population and eliminate the queues.

It is reasonable to invite leading experts in the cardiovascular and endovascular surgery to treat «complex» patients to regional clinics to improve the quality of endovascular care at the regional level, to reduce the volume of inter- regional settlements and to reduce the economic burden on regional compulsory health insurance funds.



A dual-circuit clinical and organizational system to increase accessibility of endovascular care for population in regions: the internal circuit — studies of the incidence (1) and behavior (2) of the population; the development of clinical management (3); competence improvement of interventional radiologists (4); external circuit — levels of morbidity and behavior of the population, competencies evaluation and the number of doctors for endovascular diagnostics and treatment.

Continuous medical education of cardiologists, cardiovascular surgeons and interventional radiologists is necessary to provide medical care to patients with cardiovascular diseases in accordance with national recommendations, international standards and clinical protocols.

It is recommended that the main specialists in cardiovascular surgery, interventional radiology and cardiology of the regional healthcare department should develop and implement the annual plans for regular patients' on-site consultations with cardiovascular diseases in the main regional and federal medical centers In order to improve the provision of

medical care to patients with cardiovascular diseases, to increase the commitment of doctors to prescribe effective and safe endovascular technology for the treatment of coronary heart disease, atherosclerosis of the brachiocephalic and peripheral arteries and to increase its accessibility for the population.

Conclusion

The main reasons for the low availability of endovascular care for the population at the regional level are as follows: the factor of patient awareness; the lack of endovascular (surgical) care at the place of residence; the queues for treatment; the commitment of doctors to conservative treatment; and the lack of specialist personnel. The developed clinical and organizational system for increasing accessibility in obtaining endovascular care for the population in the regions of the Russian Federation is presented in Figure and includes several priority blocks: more information for people to increase adherence to modification of risk factors for cardiovascular diseases; medical examination; improvement of staff training; and strengthening interregional professional relationships that integrate practices cardiovascular care based on clinical management.

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