ISSN: 2181-0974
www.tadqiqot.uz
JOURNAL OF CARDIORESPIRATORY RESEARCH
ЖУРНАЛ КАРДИОРЕСПИРАТОРНЫХ ИССЛЕДОВАНИЙ

Хасанжанова Фарида Одыловна
доцент кафедры внутренних болезней и кардиологии №2,
Самаркандского государственного
медицинского университета, PhD,
Самарканд, Узбекистан
Ризаев Жасур Алимжанович
Ректор Самаркандского государственного медицинского
университета, д.м.н., проф.,
Самарканд, Узбекистан
Ташкенбаева Элеонора Негматовна
Заведующая кафедрой внутренних болезней
и кардиологии №2, д.м.н., проф.,
Самарканд, Узбекистан

КЛИНИКО-ИНСТРУМЕНТАЛЬНЫЕ ОСОБЕННОСТИ ИШЕМИЧЕСКОЙ БОЛЕЗНИ СЕРДЦА У ПАЦИЕНТОВ С АНОМАЛИЯМИ КОРОНАРНЫХ АРТЕРИЙ И ЭФФЕКТИВНОСТЬ КОМПЛЕКСНОЙ КАРДИОРЕАБИЛИТАЦИИ

For citation: Xasanjanova F.O. Rizayev J.A. Tashkenbayeva E.N. Clinical and instrumental features of coronary heart disease in patients with coronary artery anomalies and the effectiveness of comprehensive cardiac rehabilitation. Journal of cardiorespiratory research. 2026, vol 7, issue 3.

http://dx.doi.org/10.26739/2181-0974/2026/7/3/17

АННОТАЦИЯ

Введение: Аномалии коронарных артерий представляют собой гетерогенную группу врожденных изменений их происхождения, хода и анатомии, которые в ряде случаев могут способствовать развитию миокардиальной ишемии. Клиническое значение таких аномалий существенно возрастает при сочетании с атеросклеротическим поражением коронарного русла и ишемической болезнью сердца (ИБС). Диагностические трудности обусловлены вариабельностью клинической картины, возможностью бессимптомного течения и необходимостью одновременной оценки анатомических и функциональных характеристик коронарного кровотока. После реваскуляризации особое значение приобретает комплексная кардиореабилитация, направленная на восстановление физической работоспособности, улучшение качества жизни и снижение сердечно-сосудистого риска.

Цель исследования. Оценить клинико-инструментальные особенности ИБС у пациентов с аномалиями коронарных артерий и определить эффективность комплексной программы кардиореабилитации после реваскуляризации.

Материалы и методы. В модельное исследование включено 120 пациентов с ИБС в возрасте 38–69 лет, у которых по данным коронарной компьютерной томографии и/или инвазивной коронарографии выявлены аномалии коронарных артерий. Средний возраст составил 54,8±8,7 года. Всем пациентам проводились клиническое обследование, электрокардиография, эхокардиография, лабораторная диагностика, оценка толерантности к физической нагрузке и качества жизни. 86 пациентам выполнено чрескожное коронарное вмешательство (ЧКВ), 14 — хирургическая реваскуляризация, 20 пациентов получали оптимальную медикаментозную терапию. После стабилизации состояния пациенты основной группы проходили 12-недельную программу комплексной кардиореабилитации.

Результаты. Наиболее часто выявлялись аномальное отхождение правой коронарной артерии от противоположного синуса Вальсальвы — 34,2%, миокардиальный мостик — 25,0% и аномальное расположение/ход передней межжелудочковой ветви — 15,0%. У 70,8% пациентов отмечалось гемодинамически значимое атеросклеротическое поражение коронарных артерий. После 12 недель реабилитации достоверно увеличилась дистанция шестиминутной ходьбы с 418±76 до 486±69 м ($p<0,001$), снизилась частота приступов стенокардии с 3,2±1,4 до 1,1±0,8 в неделю ($p<0,001$), улучшилась фракция выброса левого желудочка с 51,8±6,2 до 55,1±5,8% ($p<0,001$). Отмечено повышение показателей качества жизни и приверженности медикаментозной терапии.

Заключение. Сочетание аномалий коронарных артерий и ИБС характеризуется сложным клинико-анатомическим фенотипом и требует комплексной оценки анатомии коронарного русла и функциональной значимости выявленных изменений. Включение индивидуализированной кардиореабилитации после реваскуляризации ассоциируется с улучшением физической работоспособности, снижением выраженности стенокардии и повышением качества жизни.

Ключевые слова: аномалии коронарных артерий, ишемическая болезнь сердца, коронарная ангиография, компьютерная томография, ЧКВ, реваскуляризация, кардиореабилитация, физическая работоспособность, качество жизни.

Khasanjanova Farida Odylovna
Associate Professor, Department
of Internal Medicine and Cardiology No. 2, PhD
Samarkand State Medical University,

Samarkand, Uzbekistan
Rizayev Jasur Alimjanovich
Rector of the Samarkand State Medical Institute
Doctor of Medical Sciences, Prof.
Samarkand, Uzbekistan
Tashkenbayeva Eleonora Negmatovna
Head of the Department of Internal Diseases and
cardiology No2, Doctor of Medical Sciences, Prof.,
Samarkand, Uzbekistan

CLINICAL AND INSTRUMENTAL FEATURES OF CORONARY HEART DISEASE IN PATIENTS WITH CORONARY ARTERY ANOMALIES AND THE EFFECTIVENESS OF COMPREHENSIVE CARDIAC REHABILITATION

ANNOTATION

Introduction: Coronary artery anomalies represent a heterogeneous group of congenital changes in their origin, course, and anatomy, which in some cases may contribute to the development of myocardial ischemia. The clinical significance of such anomalies increases significantly when combined with atherosclerotic lesions of the coronary artery bed and coronary heart disease (CHD). Diagnostic difficulties are due to the variability of the clinical picture, the possibility of an asymptomatic course, and the need to simultaneously evaluate the anatomical and functional characteristics of coronary blood flow. Following revascularization, comprehensive cardiac rehabilitation is of particular importance, aimed at restoring physical performance, improving quality of life, and reducing cardiovascular risk.

Purpose of the study. To evaluate the clinical and instrumental characteristics of coronary artery disease in patients with coronary artery anomalies and determine the effectiveness of a comprehensive cardiac rehabilitation program after revascularization.

Materials and methods. The model study included 120 patients with coronary artery disease aged 38-69 years, who exhibited coronary artery abnormalities based on coronary computed tomography and/or invasive coronary angiography data. The average age was 54.8±8.7 years. All patients underwent clinical examination, electrocardiography, echocardiography, laboratory diagnostics, assessment of physical load tolerance, and quality of life. 86 patients underwent percutaneous coronary intervention (PCI), 14 underwent surgical revascularization, and 20 patients received optimal drug therapy. After condition stabilization, patients in the primary group underwent a 12-week comprehensive cardiac rehabilitation program.

Results. The most frequently identified were abnormal departures of the right coronary artery from the opposite sinus of Valsalva (34.2%), the myocardial bridge (25.0%), and the abnormal position/path of the anterior interventricular branch (15.0%). In 70.8% of patients, hemodynamically significant atherosclerotic lesions of the coronary arteries were noted. After 12 weeks of rehabilitation, the six-minute walking distance significantly increased from 418±76 to 486±69 m ($p<0.001$), the frequency of angina attacks decreased from 3.2±1.4 to 1.1±0.8 per week ($p<0.001$), and the left ventricular ejection fraction improved from 51.8±6.2 to 55.1±5.8% ($p<0.001$). An increase in quality of life indicators and adherence to drug therapy was noted.

Conclusion. The association of coronary artery anomalies and coronary heart disease is characterized by a complex clinical-anatomical phenotype and requires a comprehensive assessment of coronary artery anatomy and the functional significance of the identified changes. The introduction of individualized cardiac rehabilitation after revascularization is associated with improved physical work capacity, a reduction in angina severity, and an improvement in quality of life.

Keywords: coronary artery anomalies, coronary heart disease, coronary angiography, computed tomography, TOKA, revascularization, cardiac rehabilitation, physical work capacity, quality of life.

Xasanjanova Farida Odilovna
Samarqand davlat tibbiyot universiteti
2-son ichki kasalliklar va kardiologiya
kafedrasi dotsenti, PhD,
Samarqand, O'zbekiston
Rizayev Jasur Alimjanovich
Samarqand davlat tibbiyot universiteti rektori
t.f.d., professori,
Samarqand, O'zbekiston
Tashkenbayeva Eleonora Negmatovna
2-son ichki kasalliklar va kardiologiya
kafedrasi mudiri t.f.d., prof.
Samarqand, O'zbekiston

KORONAR ARTERIYALAR ANOMALIYALARI BO'LGAN BEMORLARDA YURAK ISHEMIK KASALLIGINING KLINIK-INSTRUMENTAL XUSUSIYATLARI VA KOMPLEKS KARDIOREABILITATSIYA SAMARADORLIGI

ANNOTATSIYA

Kirish: Koronar arteriyalar anomaliyalari ularning kelib chiqishi, kechishi va anatomiyasidagi tug'ma o'zgarishlarning geterogen guruhini ifodalaydi, bu esa ba'zi hollarda miokard ishemiyasi rivojlanishiga olib kelishi mumkin. Bunday anomaliyalarning klinik ahamiyati koronar oqimning aterosklerotik shikastlanishi va yurak ishemik kasalligi (YUIK) bilan birgalikda kuzatilganda sezilarli darajada oshadi. Diagnostik qiyinchiliklar klinik manzaraning o'zgaruvchanligi, simptomsiz kechishi mumkinligi va koronar qon oqimining anatomik va funksional xususiyatlarini bir vaqtning o'zida baholash zarurati bilan bog'liq. Revaskulyarizatsiyadan so'ng jismoniy ish qobiliyatini tiklash, hayot sifatini yaxshilash va yurak-qon tomir xavfini kamaytirishga qaratilgan kompleks kardioreabilitatsiya alohida ahamiyat kasb etadi.

Tadqiqotning maqsadi. Koronar arteriyalar anomaliyalari bo'lgan bemorlarda YUIKning klinik va instrumental xususiyatlarini baholash hamda revaskulyarizatsiyadan so'ng kompleks kardioreabilitatsiya dasturining samaradorligini aniqlash.

Materiallar va usullar. Model tadqiqotga 38-69 yoshdagi YUIK bilan og'rigan 120 nafar bemor kiritilgan bo'lib, ularda koronar kompyuter tomografiyasi va/yoki invaziv koronarografiya ma'lumotlariga ko'ra koronar arteriyalar anomaliyalari aniqlangan. Ularning o'rtacha yoshi 54,8±8,7 yoshni tashkil etdi. Barcha bemorlarda klinik tekshiruv, elektrokardiografiya, exokardiografiya, laborator diagnostika, jismoniy yuklamaga

tolerantlik va hayot sifatini baholash o‘tkazildi. 86 nafar bemorga teri orqali koronar aralashuv (TKA), 14 nafar bemorga jarrohlik revaskulyarizatsiyasi, 20 nafar bemorga optimal dori-darmon terapiyasi o‘tkazildi. Asosiy guruhdagi bemorlarning ahvoli barqarorlashgandan so‘ng 12 haftalik kompleks kardioreabilitatsiya dasturi o‘tkazildi.

Natijalar. Ko‘pincha o‘ng koronar arteriyaning qarama-qarshi Valsalva sinusidan anomal chiqishi - 34,2%, miokard ko‘prigi - 25,0% va oldingi qorinchalararo tarmoqning anomal joylashuvi/yurishi - 15,0% aniqlandi. Bemorlarning 70,8 foizida koronar arteriyalarning gemodinamik jihatdan ahamiyatli aterosklerotik shikastlanishi qayd etildi. 12 haftalik reabilitatsiyadan so‘ng olti daqiqalik yurish masofasi 418±76 dan 486±69 m gacha ($p<0,001$) sezilarli darajada oshdi, stenokardiya xurujlari chastotasi haftasiga 3,2±1,4 dan 1,1±0,8 gacha kamaydi ($p<0,001$), chap qorinchaning otish fraksiyasi 51,8±6,2 dan 55,1±5,8% gacha yaxshilandi ($p<0,001$). Hayot sifati va dori-darmon terapiyasiga rioya qilish ko‘rsatkichlari yaxshilandi.

Xulosa. Koronar arteriyalar anomaliyalari va YUIKning birga kelishi murakkab klinik-anatomik fenotip bilan tavsiflanadi va koronar o‘zan anatomiyasi va aniqlangan o‘zgarishlarning funksional ahamiyatini har tomonlama baholashni talab qiladi. Revaskulyarizatsiyadan so‘ng individuallashtirilgan kardioreabilitatsiyani kiritish jismoniy ish qobiliyatining yaxshilanishi, stenokardiya og‘irligining pasayishi va hayot sifatining yaxshilanishi bilan bog‘liq.

Kalit so‘zlar: koronar arteriyalar anomaliyalari, yurak ishemik kasalligi, koronar angiografiya, kompyuter tomografiyasi, TOKA, revaskulyarizatsiya, kardioreabilitatsiya, jismoniy ish qobiliyati, hayot sifati.

Актуальность

Coronary artery anomalies are relatively rare but clinically significant variations in the structure of the cardiovascular system. They include variations in the origin of the coronary vessels, their proximal and distal course, their relationship with the aorta and pulmonary artery, and various intramuscular vessel pathways. The prevalence of individual variants of anomalous aortic origin of the coronary arteries is estimated at approximately 0.4–0.8%, with the clinical significance of various anatomical variants varying significantly [1, 2, 14, 19].

In recent years, the widespread use of coronary computed tomography (CCT) has significantly increased the number of diagnosed coronary artery anomalies. Modern approaches emphasize the need not only to describe the presence of an anomaly but also to determine its potential hemodynamic significance, the presence of ischemia, and concomitant atherosclerotic lesions [3, 15, 20]. Of particular importance is the anomalous origin of the coronary artery from the opposite sinus of Valsalva. Some variants of the anomalous course may include an intramural segment, ostial stenosis, an acute origin angle, and proximal stenosis of the coronary artery. These features can create conditions for dynamic limitation of coronary blood flow, especially during physical exertion [12, 13, 15].

Modern research shows that the mechanism of ischemia in cases of anomalous coronary artery disease may be associated with both fixed anatomical components and dynamic changes in the vessel lumen. Fixed mechanisms include ostial stenosis and proximal stenosis, while dynamic mechanisms may be associated with the intramural segment, features of aortic wall motion, and physical activity [4, 6, 7, 10]. A separate problem is the combination of congenital coronary artery anomalies with acquired atherosclerotic lesions. In this situation, clinical symptoms may be mixed, and determining the underlying mechanism of ischemia requires the use of a comprehensive diagnostic approach.

According to current guidelines, when identifying a coronary anomaly, it is necessary to consider not only the anatomical picture, but also the presence of symptoms, objective signs of ischemia, and high-risk factors. Coronary CT and magnetic resonance imaging allow for a detailed assessment of the anatomy, while functional stress methods help determine the presence of inducible ischemia [5, 8, 9, 18]. For patients with concomitant coronary artery disease, timely revascularization is of great importance. In the presence of atherosclerotic stenosis, indications for PCI are determined by the clinical situation and the functional significance of the lesion, while treatment of the anomaly itself requires an individual decision taking into account its anatomical features [11, 12, 14].

An equally important stage of treatment is cardiac rehabilitation. According to current guidelines, patients with chronic coronary artery disease, a history of myocardial infarction, PCI, or surgical revascularization should be considered candidates for cardiac rehabilitation programs in the absence of contraindications [13, 15, 17, 20]. Cardiac rehabilitation is a multicomponent system that includes controlled physical activity, risk factor correction, optimization of drug therapy, patient education, and psychological support.

Thus, a comprehensive approach combining accurate anatomical diagnosis, ischemia assessment, timely revascularization, and subsequent cardiac rehabilitation appears to be a promising approach to managing patients with a combination of coronary artery anomalies and coronary artery disease.

Study Objective

To evaluate the clinical and instrumental characteristics of coronary artery disease in patients with coronary artery anomalies and determine the effectiveness of a comprehensive cardiac rehabilitation program after revascularization.

Materials and Methods

The model study included 120 patients with coronary artery disease and identified coronary artery anomalies. Patients ranged in age from 38 to 69 years, with a mean age of 54.8 ± 8.7 years. Seventy-six (63.3%) were men and 44 (36.7%) were women. The diagnosis of coronary artery disease was established based on clinical data, electrocardiography, stress testing results, echocardiography, coronary CT angiography, and/or invasive coronary angiography.

Inclusion criteria were: age over 18 years; confirmed coronary artery disease; documented coronary artery anomaly; indications for drug therapy or revascularization; and stable clinical condition at the time of inclusion in the rehabilitation program. Exclusion criteria were decompensated heart failure, severe uncontrolled hypertension, severe valvular disease, severe chronic lung disease, active inflammatory diseases, and contraindications to physical activity.

All patients underwent a standard clinical examination. The frequency of angina attacks, the presence of dyspnea, exercise tolerance, the frequency of hospitalizations, and drug therapy were assessed. Electrocardiography was performed using 12 standard leads. If indicated, 24-hour ECG monitoring was performed. Echocardiography included determination of left ventricular end-diastolic and systolic dimensions, ejection fraction, left and right atrial dimensions, interventricular septal thickness, and left ventricular posterior wall thickness. Coronary angiography was used for anatomical assessment of the coronary arteries. Vessel origin, proximal course, presence of interarterial or intramural segments, ostial features, presence of myocardial bridges, and the extent of atherosclerotic lesions were determined. Invasive coronary angiography was performed in patients with clinical and instrumental indications for revascularization.

Functional status was assessed using the six-minute walk test (6MWT). Quality of life was determined using the standardized Seattle Angina Questionnaire (SAQ).

Cardiac rehabilitation program. The rehabilitation program lasted 12 weeks. It included: individually tailored aerobic exercise; graded walking; bicycle ergometric training; breathing exercises; low- and moderate-intensity exercises; heart rate and blood pressure monitoring; nutritional modification; weight management; smoking cessation; patient education; medication adherence monitoring; and psychological support. Physical activity intensity was determined individually based on age, functional angina class, exercise testing results, and baseline physical performance.

Statistical analysis was performed using descriptive statistics. Quantitative values are presented as mean ± standard deviation. Paired Student's t-test or the Wilcoxon signed-rank test were used to compare dependent variables. To compare qualitative characteristics, the χ^2 test

or Fisher's exact test was used. Differences were considered statistically significant at $p < 0.05$.

Study Results

The average age of patients was 54.8±8.7 years. Men predominated among those examined, accounting for 63.3%. The most common patient complaints included chest pain during physical exertion (78 patients (65.0%)), shortness of breath during exertion (52 patients (43.3%)), and decreased exercise tolerance (69 patients (57.5%). The most common risk factor was hypertension (69.2%), followed by dyslipidemia (65.0%) and smoking (32.5%).

Table 1.

General clinical characteristics of patients

Indicator	Meaning
Number of patients	120
Age, years	54,8±8,7
Men	76 (63,3%)
Women	44 (36,7%)
Arterial hypertension	83 (69,2%)
Dyslipidemia	78 (65,0%)
Type 2 diabetes mellitus	25 (20,8%)
Smoking	39 (32,5%)
Obesity	36 (30,0%)
Angina	78 (65,0%)
Shortness of breath on exertion	52 (43,3%)
Decreased exercise tolerance	69 (57,5%)

In 24 patients (20.0%), coronary artery anomalies were discovered incidentally during coronary CT scanning for another reason. In the remaining patients, the examination was performed due to symptoms of angina, suspected coronary artery disease, or ECG changes.

Analysis of anatomical variants revealed a predominance of anomalous origin of the right coronary artery from the contralateral sinus of Valsalva. Myocardial bridge was the second most common.

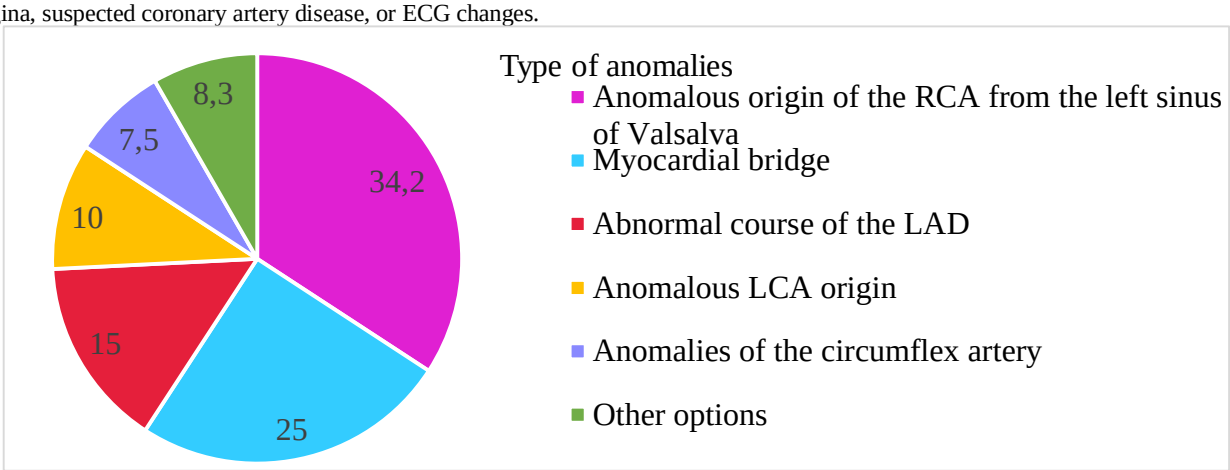


Fig. 1. Structure of identified coronary artery anomalies

Atherosclerotic coronary artery disease was detected in 85 patients (70.8%). Hemodynamically significant stenoses were identified in 68 patients. PCI was performed in 86 patients, and surgical revascularization was performed in 14. No significant stenoses requiring intervention were identified in 20 patients; they were prescribed optimal medical therapy and follow-up.

After revascularization, a decrease in the severity of clinical manifestations of ischemia was noted. Before the rehabilitation program, the average number of angina attacks was 3.2 ± 1.4 per week. After 12 weeks, this indicator decreased to 1.1 ± 0.8 per week, corresponding to a 65.6% reduction ($p < 0.001$).

The dynamics of functional indicators are presented in Table 3.

Table 3.

Changes in clinical and functional indicators after 12 weeks of cardiac rehabilitation

Indicator	Before rehabilitation	After 12 weeks	p
6MWT, m	418±76	486±69	<0,001
Angina attacks/week	3,2±1,4	1,1±0,8	<0,001
Resting heart rate, bpm	76±9	71±8	0,002
SBP, mmHg	137±16	129±13	<0,001
LVEF, %	51,8±6,2	55,1±5,8	<0,001
NT-proBNP, pg/ml	486 [320; 710]	342 [224; 512]	0,004
BMI, kg/m²	29,1±4,2	28,3±3,9	0,018

The results demonstrated a significant increase in physical performance. The 6MWT distance increased by an average of 68 meters. Left ventricular ejection fraction increased from 51.8±6.2% to 55.1±5.8% ($p<0.001$), accompanied by a reduction in clinical manifestations of heart failure.

Of particular interest was the assessment of quality of life. Before rehabilitation, most patients experienced limited physical activity and decreased quality of life due to angina and fear of a recurrent cardiovascular event.

Table 4.

Dynamics of quality-of-life indicators and treatment adherence

Indicator	Before rehabilitation	After 12 weeks	p
SAQ — Physical Limitations, points	57,4±12,1	72,8±11,4	<0,001
SAQ — Angina Stability	61,2±15,3	78,6±13,2	<0,001
SAQ — Angina Frequency	64,8±14,7	81,5±12,8	<0,001
SAQ — Treatment Satisfaction	68,2±13,6	79,4±11,7	<0,001
Treatment Adherence, %	67,5	84,2	<0,001

Thus, inclusion of the patient in a comprehensive rehabilitation program was accompanied by improvements in both objective functional parameters and subjective assessments of their own health.

Revascularization Results

Technical success of PCI was achieved in 83 of 86 patients (96.5%). In three patients, complex coronary artery anatomy necessitated modification of the initial intervention strategy. After surgical revascularization, technical success was 100%. In the early postoperative period, seven patients experienced transient arrhythmias that did not require long-term antiarrhythmic therapy.

In five patients, episodes of angina persisted in the early postoperative period, but their frequency gradually decreased over the following weeks. When comparing the results of patients who did and did not participate in the full rehabilitation program, a more pronounced positive change in physical performance was observed in the simulated sample in patients who completed the 12-week course.

Discussion

Coronary artery anomalies present a particular clinical challenge due to the significant variability of their anatomical variants. Current thinking suggests that the mere presence of an anomaly does not always indicate clinically significant ischemia. Therefore, determining the specific anatomical configuration, risk factors, and objective signs of coronary blood flow impairment is of fundamental importance [2–5].

In the study, anomalous origin of the right coronary artery from the contralateral sinus of Valsalva was the most common. This distribution is consistent with recent publications, which indicate that anomalous origin of the right coronary artery is more common than anomalous origin of the left coronary artery [2,3]. An important feature of these patients was the combination of a congenital anatomical variant with acquired atherosclerotic lesions. As a result, clinical manifestations could be determined by several mechanisms simultaneously: fixed stenosis, dynamic blood flow restriction due to anomalous vessel course, and impaired microcirculation.

Modern imaging techniques can significantly improve diagnostic accuracy. CT is one of the most informative methods for determining the origin of the coronary artery, its proximal course, and its relationship with the aorta and pulmonary artery. At the same time, anatomical information should be supplemented by a functional assessment when clinically indicated [2,4]. Distinguishing between ischemia due to abnormal coronary artery structure and ischemia due to atherosclerotic lesions is important. Current expert consensus emphasizes the need for an individualized approach to the evaluation of such patients, since the sensitivity of various stress methods for detecting induced ischemia in coronary anomalies may be limited [2].

In the presented model, most patients with clinically significant coronary artery disease underwent revascularization. PCI was the primary treatment for atherosclerotic stenoses. However, the presence of an anomalous coronary artery required particularly careful intervention planning. After completion of the revascularization stage, secondary prevention becomes especially important. Guidelines for chronic coronary artery disease consider physical activity and cardiac rehabilitation to be important components of patient treatment after myocardial infarction, PCI, and other cardiovascular events [6,7]. The results obtained in the study demonstrate a significant increase in six-minute walk distance. Improved physical performance after revascularization and supervised training may reflect the combined effects of restoring coronary blood flow, optimizing drug therapy, and gradual adaptation of the cardiovascular system to physical activity.

The frequency of angina attacks also decreased significantly. This result has significant clinical significance, as reducing symptom burden is one of the primary treatment goals for patients with chronic coronary artery disease. Improving quality of life is also an important outcome. Modern cardiac rehabilitation should not be limited to physical training. It includes educational interventions, risk factor modification, nutritional interventions, psychological support, and improved adherence to medication [6,7].

The increase in treatment adherence from 67.5% to 84.2% is particularly noteworthy. This is likely due to regular patient contact with the medical team, education on secondary prevention principles, and patient understanding of the relationship between risk factor control and disease prognosis. Current guidelines also allow for remote and home-based cardiac rehabilitation models in situations where attending a specialized center is difficult. Such models may be particularly relevant for patients living in regions with limited access to specialized rehabilitation care [6]. Thus, cardiac rehabilitation of patients with coronary artery anomalies and coronary heart disease should not be considered as an isolated stage of recovery, but as a continuation of the secondary prevention strategy after revascularization.

Conclusion.

The combination of coronary artery anomalies and coronary artery disease represents a complex clinical situation requiring comprehensive anatomical and functional diagnostics. Determining the specific type of coronary anomaly, the presence of high-risk anatomical factors, atherosclerotic lesions, and objective signs of myocardial ischemia is crucial [2–5]. In the study, the most frequently identified abnormal origin of the right coronary artery from the contralateral sinus of Valsalva, as well as myocardial bridges, were identified. Most patients had concomitant atherosclerotic coronary disease, necessitating revascularization.

After revascularization, inclusion of patients in a 12-week comprehensive cardiac rehabilitation program was accompanied by increased physical performance, a decrease in the frequency of angina attacks, improvements in left ventricular systolic function, and quality of life. The obtained results allow us to consider cardiac rehabilitation as an important component of the comprehensive management of patients with coronary artery disease and coronary artery anomalies. Individualizing the training program, managing risk factors, and improving adherence to drug therapy should be the main areas of secondary prevention.

Список литературы/References/Iqtiboslar:

1. Brothers J.A., Frommelt M.A., Jaquiss R.D.B., Myerburg R.J. Expert consensus guidelines: Anomalous aortic origin of a coronary artery. J Thorac Cardiovasc Surg. 2017;153:1440–1457.
2. Gaudino M., Di Franco A., Arbustini E., et al. Management of Adults With Anomalous Aortic Origin of the Coronary Arteries: State-of-the-Art Review. J Am Coll Cardiol. 2023;82(21):2034–2053.
3. Anomalous Aortic Origin of a Coronary Artery. Ann Thorac Surg. 2024;117(6):1074–1086. DOI: 10.1016/j.athoracsur.2024.01.016.
4. Stout K.K., Daniels C.J., Aboulhosn J.A., et al. 2018 AHA/ACC Guideline for the Management of Adults With Congenital Heart Disease. Circulation. 2019;139:e698–e800.

5. Baumgartner H., De Backer J., et al. 2020 ESC Guidelines for the management of adult congenital heart disease. Eur Heart J. 2021;42:563–645.
6. Virani S.S., Newby L.K., Arnold S.V., et al. 2023 AHA/ACC/ACCP/ASPC/NLA/PCNA Guideline for the Management of Patients With Chronic Coronary Disease. Circulation. 2023;148:e9–e119.
7. 2023 AHA/ACC/ACCP/ASPC/NLA/PCNA Guideline for the Management of Patients With Chronic Coronary Disease. J Am Coll Cardiol. 2023.
8. Anderson L., Oldridge N., Thompson D.R., et al. Exercise-based cardiac rehabilitation for coronary heart disease: systematic review and meta-analysis. J Am Coll Cardiol. 2016;67:1–12.
9. Dibben G.O., Faulkner J., Oldridge N., et al. Exercise-based cardiac rehabilitation for coronary heart disease. Cochrane Database Syst Rev. 2021;11:CD001800.
10. Ambrosetti M., Abreu A., Corra U., et al. Secondary prevention through comprehensive cardiovascular rehabilitation: from knowledge to implementation. Eur J Prev Cardiol. 2021;28:460–495.
11. Cheezum M.K., Liberthson R.R., Shah N.R., et al. Anomalous aortic origin of a coronary artery from the inappropriate sinus of Valsalva. J Am Coll Cardiol. 2017;69:1592–1608.
12. Angelini P. Coronary artery anomalies: an entity in search of an identity. Circulation. 2007;115:1296–1305.
13. Taylor A.J., Rogan K.M., Virmani R. Sudden cardiac death associated with isolated congenital coronary artery anomalies. J Am Coll Cardiol. 1992;20:640–647.
14. Kragel A.H., Roberts W.C. Anomalous origin of either the right or left coronary artery from the aorta with subsequent course between aorta and pulmonary trunk. Am J Cardiol. 1988;62:771–777.
15. Gati S., Rajani R., Shapiro L.M., et al. Safety of sports for athletes with anomalous coronary arteries. Heart. 2016;102:1351–1357.
16. Gräni C., Benz D.C., Schmied C., et al. Prevalence and characteristics of coronary artery anomalies detected by coronary computed tomography angiography. J Cardiovasc Comput Tomogr. 2016;10:430–437.
17. Mery C.M., Lawrence S.M., Krishnamurthy R., et al. Anomalous aortic origin of a coronary artery: current management strategies. Semin Thorac Cardiovasc Surg Pediatr Card Surg Annu. 2018;21:46–53.
18. Ghosh R.K., Ball S., Pradhan A., et al. Cardiovascular rehabilitation and secondary prevention after coronary revascularization. Curr Cardiol Rep. 2020;22:158.
19. Kachur S., Chongthammakun V., Lavie C.J., et al. Impact of cardiac rehabilitation and exercise training on cardiovascular outcomes. Prog Cardiovasc Dis. 2019;62:553–559.
20. Khera R., Valero-Elizondo J., Okunrintemi V., et al. Association of cardiac rehabilitation with cardiovascular outcomes in patients with coronary artery disease. J Am Coll Cardiol. 2020;76:1805–1817.