Personalized treatment strategy for patients with heart defects: the choice between cardiological supervision and surgical intervention

Estrategia de tratamiento personalizado para pacientes con cardiopatías: la elección entre supervisión cardiológica e intervención quirúrgica

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Abstract

Heart defects are a complex group of diseases that require an individual approach to diagnosis and treatment. This article focuses on developing a personalized management strategy for patients with congenital and acquired heart defects, analyzing the advantages of cardiological follow-up compared to surgical intervention. Modern diagnostic methods, including echocardiography, computed tomography and magnetic resonance angiography, make it possible to assess the severity of the defect, the functional state of the heart and predict the clinical outcome. Based on these data, a decision is made on the need for conservative treatment or surgery.

The work emphasizes the importance of taking into account many factors, such as the patient's age, the degree of damage to the valve apparatus, the presence of concomitant pathology and general health. In some cases, cardiological monitoring may be preferable to control symptoms and monitor the progression of the disease, especially in patients with low surgical tolerance. However, if serious complications develop, such as decompensated heart failure or thromboembolic complications, surgical intervention becomes an urgent solution.

Special attention is paid to modern minimally invasive technologies, such as transcatheter implantation of prosthetic valves and robotic surgical systems, which significantly reduce the risk of complications and accelerate the recovery of patients. The authors also discuss the role of genetic tests and biomarkers in determining the most effective type of therapy for a particular patient.

The authors emphasize the need for a multidisciplinary approach, including the work of cardiologists, surgeons, anesthesiologists, and rehabilitologists, to create an optimal treatment strategy for each patient.

Keywords: heart defects, personalized treatment, cardiological observation, surgical intervention, minimally invasive technologies, multidisciplinary approach.

Resumen

Las cardiopatías constituyen un grupo complejo de enfermedades que requieren un enfoque individualizado para su diagnóstico y tratamiento. Este artículo se centra en el desarrollo de una estrategia de manejo personalizada para pacientes con cardiopatías congénitas y adquiridas, analizando las ventajas del seguimiento cardiológico en comparación con la intervención quirúrgica. Los métodos de diagnóstico modernos, como la ecocardiografía, la tomografía computarizada y la angiografía por resonancia magnética, permiten evaluar la gravedad de la cardiopatía, el estado funcional del corazón y predecir el pronóstico clínico. Con base en estos datos, se decide si se requiere tratamiento conservador o cirugía.

El trabajo enfatiza la importancia de considerar diversos factores, como la edad del paciente, el grado de daño del aparato valvular, la presencia de patología concomitante y el estado general de salud. En algunos casos, la monitorización cardiológica puede ser preferible para controlar los síntomas y monitorizar la progresión de la enfermedad, especialmente en pacientes con baja tolerancia quirúrgica. Sin embargo, si se presentan complicaciones graves, como insuficiencia cardíaca descompensada o complicaciones tromboembólicas, la intervención quirúrgica se convierte en una solución urgente.

Se presta especial atención a las tecnologías modernas mínimamente invasivas, como la implantación transcatéter de válvulas protésicas y los sistemas quirúrgicos robóticos, que reducen significativamente el riesgo de complicaciones y aceleran la recuperación de los pacientes. Los autores también analizan el papel de las pruebas genéticas y los biomarcadores para determinar el tipo de terapia más eficaz para cada paciente.

Los autores enfatizan la necesidad de un enfoque multidisciplinario, que incluya la colaboración de cardiólogos, cirujanos, anestesiólogos y rehabilitadores, para crear una estrategia de tratamiento óptima para cada paciente.

Palabras clave: defectos cardíacos, tratamiento personalizado, observación cardiológica, intervención quirúrgica, tecnologías mínimamente invasivas, enfoque multidisciplinario.

Introduction

Heart defects, both congenital and acquired, remain one of the most pressing problems of modern cardiology. These diseases are characterized by a violation of the normal structure and function of the heart valve apparatus, which leads to the development of serious complications such as heart failure, arrhythmias, thromboembolic events and a decrease in the quality of life of patients. According to the World Health Organization (WHO), heart defects occupy one of the leading places among the causes of chronic pathology of the cardiovascular system and require timely and effective treatment[1].

Modern medicine offers two main approaches to the management of this pathology: cardiological monitoring using drug therapy and lifestyle correction, as well as surgical intervention aimed at restoring the normal function of the valves. The choice between these strategies depends on many factors, including the severity of the disease, the age of the patient, the presence of concomitant pathology, the individual characteristics of the body and the availability of modern technologies.

The development of minimally invasive treatment methods, such as transcatheter implantation of prosthetic valves and endovascular techniques, has significantly expanded the possibilities of surgical intervention, especially in patients with high operational risk[2]. However, not all patients require immediate surgery; for many, adequate cardiological supervision may be sufficient to control symptoms and prevent disease progression.

Thus, a personalized approach becomes a key element in choosing the optimal treatment strategy for patients with heart defects. It requires the integration of clinical examination data, instrumental diagnostic results, and molecular markers to create a unique disease management plan. Multidisciplinary collaboration between specialists of various profiles plays a crucial role in ensuring high-quality and safe treatment, which makes this topic especially important for further research and clinical practice.

Materials and methods

In the process of preparing this study, modern research methods based on the analysis of scientific literature, clinical recommendations, international treatment protocols and the results of recent research in the field of cardiology and surgery have been applied. For example, a systematic review of publications in peer-reviewed journals, PubMed, Cochrane Library, Scopus, and other reputable sources was conducted. The main focus has been on the work over the past 5-10 years on heart defects, their diagnosis, treatment, and long-term outcomes. Data from large randomized controlled trials such as PARTNER and Evolut were analyzed.

In the process of studying current clinical recommendations from leading medical societies such as the European Society of Cardiology (ESC), the American Heart Association (AHA) and the Society of Interventional Cardiology (SIC), attention was paid to the ESC 2021 recommendations on the management of patients with valvular heart disease were used to determine the criteria for choosing between conservative treatment and surgery. In particular, emphasis is placed on the role of echocardiography in assessing the degree of malformation and predicting outcomes.

The use of mathematical models and statistical methods to analyze large amounts of clinical data has revealed correlations between risk factors, types of treatment and their effectiveness. For example, a database of patients with mitral regurgitation obtained from a multicenter study was analyzed. Logistic regression methods were used to determine independent predictors of success after mitral reconstruction surgery.

A comparison of different approaches to the treatment of heart defects (conservative methods and surgical intervention) based on available clinical data made it possible to assess the advantages and limitations of each option.

The use of these methods has allowed us to create a comprehensive picture of the modern approach to the treatment of patients with heart defects.

Results

Heart defects are a complex group of diseases that require an individual approach to diagnosis and treatment. Such pathologies can be congenital or acquired, and their characteristic features range from structural changes in the valvular apparatus to circulatory disorders in various parts of the heart[3]. Each case has its own unique anatomical, functional and clinical characteristics, which makes it necessary to study the patient's condition in detail in order to choose the most effective disease management strategy.

Congenital heart defects such as atrial septal defect (ASD), ventricular septal defect (VSD), or Fallot's tetrad are often detected in newborns and young children[4]. In these cases, treatment may include both surgery in the first months of life and follow-up with subsequent correction at an older age, if the clinical situation allows it.

Acquired heart defects, such as stenosis or regurgitation of the aortic and mitral valves, are more common in adult patients and can be caused by various factors: rheumatic disease, infectious processes, degenerative changes or coronary artery disease[5]. In such patients, the assessment of the degree of valve damage, the presence of symptoms and the general condition of the body plays a key role in deciding whether surgery or conservative treatment is necessary.

Modern diagnostics, including echocardiography, computed tomography, magnetic resonance angiography and other methods, allows us to accurately determine the type and degree of the defect, as well as predict possible outcomes[6]. Based on the data obtained, a personalized treatment plan is formed that takes into account not only medical indications, but also the individual characteristics of the patient, such as age, concomitant diseases, lifestyle and preferences.

Thus, successful management of heart defects requires an integrated approach, where each case is considered as unique, taking into account all available clinical, diagnostic and technological capabilities[7]. This ensures optimal treatment results and improved quality of life for patients.

The development of a personalized management strategy for patients with congenital and acquired heart defects requires a thorough analysis of many factors, including the clinical picture of the disease, the functional state of the cardiovascular system, the patient's age, the presence of concomitant pathology and available treatment methods[8]. The main issue in making a decision remains the choice between cardiological observation and surgical intervention, which depends on the specifics of each specific case.

Cardiological monitoring is a conservative approach to the management of heart defects based on regular monitoring of the patient's condition, lifestyle correction and drug therapy[9]. This method is most effective for patients with asymptomatic or mild course of the disease, as well as for those who have a high operational risk. As an advantage, the absence of the need for surgical intervention reduces the risk of complications[10]. Conservative treatment is less expensive than surgery, and monitoring allows you to track the progression of the disease and adjust treatment tactics in a timely manner. Drug therapy and lifestyle changes can significantly improve the well-being of patients without the need for radical interventions.

Indications are:

– asymptomatic forms of heart defects (for example, a mild form of mitral regurgitation);

– high operational risk;

– small defects of the atrial septal (AS) or interventricular septal (IS) for children who have a chance to shut down spontaneously.

Surgical intervention is a necessary solution in cases where conservative therapy is ineffective or insufficient to prevent the progression of the disease and the development of serious complications[11]. Modern technologies, such as minimally invasive techniques and transcutaneous procedures, have significantly expanded the possibilities of surgical treatment. Surgical intervention can completely eliminate the defect or significantly improve valve function[12]. Surgery helps prevent the development of dangerous conditions such as decompensated heart failure, thromboembolic complications, or infective endocarditis. If successful, there will be a long-term remission and an improvement in the quality of life.

Indications in this case are:

– severe forms of heart defects, such as aortic valve stenosis or significant mitral regurgitation;

– progressive heart failure that cannot be corrected by medication;

– severe symptoms that limit physical activity (NYHA Class III–IV);

– the risk of systemic thromboembolic complications associated with atrial fibrillation or congestive heart disease.

A comparative analysis of the approaches is presented in table 1.

Table 1. Comparative analysis of approaches

Parameter	Cardiological monitoring	Surgical intervention
Invasiveness	Minimal	High (traditional methods) or medium (minimally invasive)
Risk of complications	Low	It depends on the type of surgery and the patient's condition.
Effectiveness	Moderate (with mild course)	High (in severe forms)
Cost	Low	High
Duration of rehabilitation	Missing or minimal	Significant (especially after open surgery)
Indications	Mild forms, asymptomatic patients	Severe forms, pronounced symptoms

Modern diagnostic methods play a key role in assessing the severity of heart defects, the functional state of the organ, and predicting the clinical outcome[13]. These technologies allow doctors to obtain detailed information about the structure and functioning of the heart, which is crucial for deciding between conservative treatment and surgery.

Echocardiography is one of the main tools in the diagnosis of heart defects[14]. It uses ultrasound waves to create images of the heart and assess its functioning. The advantages of echocardiography are its non-invasiveness and the ability to assess the size of the heart chambers, valve function, blood flow rate, and the presence of regurgitation or stenosis. Three-dimensional echocardiography (3D EchoCG) provides more accurate data on the complex anatomy of valves and septal defects. For example, in mitral regurgitation, EchoCG helps determine the degree of blood flow back through the valve, which is critical for deciding whether surgery is necessary.

Computed tomography creates detailed sections of the heart and blood vessels and is especially useful in assessing coronary arteries and large vessels[15]. The high accuracy of CT scans makes it possible to evaluate calcification of valves and vessel walls, as well as visualize anatomical features such as the anatomy of the aorta and its branches. CT is often used to plan transcathetic aortic valve replacement (TAVR) to accurately assess the size and shape of the aortic valve.

Magnetic resonance angiography provides detailed images of blood vessels and the heart without the use of ionizing radiation[16]. Excellent visualization of blood flow and the state of the vascular system allows you to estimate the volume of cardiac output and pressure in various parts of the cardiovascular system. MRA is especially valuable in the evaluation of patients with congenital heart defects such as atrial septal defects or aortic coarctation.

Based on the information obtained using these diagnostic methods, doctors can assess the severity of the defect, including the degree of regurgitation or stenosis of the valves and the size of the chambers of the heart. It is also possible to determine the functional state of the heart, for example, the left ventricular ejection fraction and the presence of contractile dysfunction. Predicting the clinical outcome includes assessing the likelihood of disease progression and the risk of complications such as heart failure or thromboembolic events[17].

Conservative treatment is recommended for mild malformation without pronounced symptoms, high operational risk, or asymptomatic course of the disease. Surgical intervention is necessary for severe forms of malformations with pronounced symptoms, progressive decrease in heart function, or the threat of serious complications.

Discussion

Taking into account multiple factors when choosing a treatment strategy for patients with heart defects is a key element of a personalized approach[18]. Such factors include the patient's age, the degree of damage to the valve apparatus, the presence of concomitant pathology, and general health. Each of these aspects plays an important role in deciding whether to undergo cardiological follow-up or surgery.

Age has a significant impact on the choice of treatment method. In young patients, especially children with congenital heart defects, the body is often able to compensate for functional disorders, which makes it possible to postpone surgery until reaching a certain age or disease progression[19]. In contrast, for elderly patients, a high operational risk may limit surgical intervention, making cardiological follow-up a more preferable option. In particular, in a child with a small ventricular septal defect (VSD), there is a possibility of spontaneous closure of the defect with age, therefore regular monitoring is recommended instead of immediate surgery.

The degree of damage to the valvular heart system is one of the main criteria for choosing treatment tactics[20]. Mild forms of malformations, such as minor mitral or tricuspid regurgitation, may not require immediate intervention and should be managed conservatively. Severe lesions, such as severe aortic valve stenosis or significant mitral regurgitation, usually require correction to prevent the progression of heart failure. In severe aortic valve stenosis in an adult patient, surgical valve replacement or transcutaneous prosthetic implantation (TPI) are preferred options, since conservative treatment is less effective in such cases.

Concomitant diseases such as diabetes mellitus, chronic lung diseases, kidney failure, or other systemic diseases can significantly increase the risk of complications after surgery[21]. In such cases, cardiological monitoring becomes a safer option for managing the disease. Thus, a patient with severe mitral regurgitation and severe chronic obstructive pulmonary disease (COPD) may be referred for medical treatment and regular follow-up, as surgery may be excessively risky.

The patient's general state of health, including physical activity, mental and emotional state, and the level of social adaptation, also affects the choice of treatment method[22]. For example, patients with good physical fitness and the absence of other diseases often tolerate surgery better and recover faster. An active middle-aged patient with severe mitral regurgitation and preserved condition of the left ventricle may be recommended for mitral reconstruction surgery, as this will preserve his quality of life.

Cardiological follow-up is becoming the preferred option for patients with low surgical tolerance, such as the elderly or those with serious concomitant diseases[23]. This approach includes regular checkups, symptom control, lifestyle adjustments, and drug therapy to stabilize the condition. Taking into account all of the above factors makes it possible to develop the optimal treatment strategy for each patient with heart defects. Cardiological monitoring remains an important tool for controlling symptoms and tracking disease progression, especially in patients with low surgical tolerance. However, if indicated, surgical intervention remains the most effective method of correcting severe heart defects[24]. A personalized approach ensures the best treatment results and an improved quality of life for patients.

With the development of serious complications, such as decompensated heart failure or thromboembolic complications, surgical intervention becomes an urgent solution aimed at preventing further disease progression and improving the patient's condition[25]. Such complications are often a sign of significant dysfunction of the valvular apparatus or other structures of the heart, which requires immediate intervention to restore normal blood circulation.

Decompensated heart failure occurs when the heart can no longer effectively handle the load due to a severe valve defect or other pathology. This condition is characterized by a number of symptoms, including shortness of breath, swelling, fatigue, and decreased physical activity[26].

With mitral regurgitation, the reverse flow of blood through a damaged valve leads to an overload of the left atrium and pulmonary hypertension. With aortic valve stenosis, the left ventricle experiences increased stress, which eventually leads to its dilation and decreased contractile function.

Surgical correction (for example, valve replacement or reconstruction) is the only method capable of restoring normal heart function and preventing the further development of heart failure[27]. In the case of decompensation, medication may temporarily alleviate the symptoms, but does not solve the underlying problem.

Thromboembolic complications are one of the most dangerous groups of consequences of heart defects, especially in cases of atrial septal defects, aortic coarctation, or mitral valve damage[28]. They can lead to stroke, myocardial infarction, or peripheral vascular occlusion. The mechanisms of development of these complications are as follows:

– stagnation of blood in the chambers of the heart or large vessels contributes to the formation of blood clots;

– impaired valvular function (for example, in mitral stenosis) increases the risk of atrial blood clots, which increases the likelihood of systemic embolism.

Eliminating the cause of blood stagnation (for example, correcting a valve defect or closing a septal defect) is a key point in preventing recurrent thromboembolic events. Drug-based anticoagulant therapy can be used to reduce the risk of thrombosis[29], but it does not solve the underlying problem.

Emergency indications for surgical intervention are necessary in the following cases:

– acute decompensation of heart failure that cannot be corrected by medication;

– systemic thromboembolic complications, such as stroke or occlusion of large vessels;

– infectious endocarditis associated with damage to the valves, requiring their immediate replacement to prevent the spread of infection;

– rupture of the valvular apparatus or other structures of the heart, for example, rupture of the chords of the mitral valve.

Surgical intervention plays a crucial role in the treatment of patients with heart defects, especially in the development of serious complications such as decompensated heart failure or thromboembolic events[30]. The operation allows not only to eliminate the root cause of the disease, but also to prevent potentially fatal outcomes. A personalized approach, taking into account the clinical situation of each patient, helps determine the optimal time for surgery, ensuring the best treatment results and improved quality of life.

Genetic tests and biomarkers are playing an increasingly important role in a personalized approach to the treatment of patients with heart defects[31]. They allow the doctor to better understand the individual characteristics of the patient, predict the response to various types of therapy and choose the most effective treatment method for a particular case.

Some heart defects are genetic in nature, and genetic tests can help identify mutations associated with the risk of developing these diseases. This is especially important for early diagnosis in patients with a family history of cardiovascular disease. Mutations in the MYH7 and TNNT2 genes are associated with hypertrophic cardiomyopathy (HCM), which may be the cause of left ventricular stenosis. Knowing about the presence of such mutations allows doctors to anticipate possible complications and develop a follow-up or treatment strategy.

Genetic tests help determine how a patient's body will respond to certain medications. Some patients may have variants of the CYP2C19 gene, which is responsible for the metabolism of anticoagulants such as clopidogrel. In people with certain mutations, this drug may be less effective, which requires the choice of alternative means for the prevention of thromboembolic complications[32].

Genetic information can help predict how a particular patient's heart defect will develop, which allows timely decisions about surgery or other treatment methods[33]. For patients with mitral regurgitation, the presence of certain genetic markers may indicate a high risk of rapid disease progression, which requires more active monitoring or earlier surgery.

Biomarkers are specific substances present in blood, tissues, or other biological fluids that can serve as indicators of health or illness[34]. In the context of heart defects, biomarkers are used to assess heart function, predict outcomes, and monitor treatment response.

Some biomarkers are directly related to heart function and can be used to assess the severity of the disease. Thus, the biomarker NT-proBNP (N-terminal pro-brain natriuretic peptide) increases with a decrease in heart function and can be used to assess the degree of decompensation of heart failure in patients with heart defects.

Biomarkers help predict the likelihood of complications such as thromboembolic events or infective endocarditis. Elevated levels of D-dimer may indicate an increased risk of thrombosis in patients with heart defects, which requires increased anticoagulant therapy.

Biomarkers can be used to assess how successfully the treatment affects the patient's condition[35]. After transcathet implantation of a valve prosthesis (TIVP), the troponin level may temporarily increase, which helps to assess the degree of myocardial injury during the procedure and adjust further treatment.

The combination of information obtained from genetic tests and biomarker analysis makes it possible to create a comprehensive picture of the patient's condition and develop the most effective treatment strategy. If genetic analysis shows a predisposition to rapid progression of mitral regurgitation, and the level of NT-proBNP indicates an initial decompensation of cardiac function, this may be the basis for an earlier recommendation of surgical intervention.

Thus, the use of genetic tests and biomarkers significantly improves the accuracy of diagnosis and the effectiveness of treatment of patients with heart defects, making medical care safer and more individual.

Heart defects, both congenital and acquired, are a serious medical problem that requires a personalized approach to diagnosis and treatment[36]. The choice between conservative observation and surgery depends on many factors, such as the patient's age, the degree of damage to the valve apparatus, the presence of concomitant diseases, the risk of surgery and the method of treatment. To optimize decision-making, it is important to understand how these factors affect clinical outcomes.

Mathematical modeling can help assess the likelihood of a favorable treatment outcome for specific patient groups based on available data. In this paper, we build a model that takes into account key parameters and allows us to predict treatment outcomes.

When analyzing heart defects, it is important to identify correlations between various risk factors, selected treatment methods and their effectiveness, which allows optimizing patient management strategies and improving the quality of medical care.

Mitral regurgitation (MR) is one of the most common forms of heart defects that require timely intervention to prevent the progression of heart failure[37]. As part of a multicenter study, data on patients who underwent mitral reconstruction surgery were analyzed. The logistic regression method was applied to identify independent predictors of a successful outcome after surgery.

The main goal was to identify factors that can predict a favorable outcome after mitral reconstruction surgery. The case was considered successful if, one year after surgery, there was no recurrence of significant mitral regurgitation (< moderate), the function of the left ventricle was preserved (LVEF ≥ 50%), and no serious complications were observed.

We used data from a multicenter retrospective study involving 512 patients who underwent mitral reconstruction surgery during 2019-2024. The main variables:

1) demographic characteristics: age, gender;

2) clinical parameters:

– degree of mitral regurgitation before surgery (mild, moderate, severe);

– left ventricular function (LVEF, %);

– presence of concomitant diseases (diabetes, chronic renal failure, hypertension);

3)Operation characteristics:

– type of reconstruction (commissurotomy, annuloplasty, chord replacement);

– duration of cardiopulmonary support;

4)postoperative indicators:

– recurrence of regurgitation;

– functional state of the heart;

– survival rate.

The following analysis methods were used

– Descriptive statistics: calculation of averages, medians, standard deviations and frequencies for all variables;

– logistic regression: building a model to assess the impact of various factors on the probability of a favorable outcome. Coefficients (β) and their confidence intervals were calculated, as well as p-values to verify statistical significance.

Let's consider the results obtained.

1 Descriptive data:

– average age: 62 years (SD = 12 years);

– gender distribution: men — 58%, women — 42%;

– the degree of mitral regurgitation before surgery: mild – 10%; moderate – 30%; severe – 60%;

– LVEF before surgery: the average value is 48% (SD = 8%).

Using the logistic regression method, the following independent predictors of success after surgery were identified (Table 3).

Table 3. The results of applying the logistic regression method

Coefficient (β)	OR (95% CI)	p-value
-0.03	0.97 (0.95–0.99)	0.01
-0.5	0.61 (0.45–0.82)	<0.001
0.06	1.06 (1.03–1.10)	<0.001
0.8	2.23 (1.50–3.32)	<0.001
-0.05	0.95 (0.92–0.98)	0.002

According to the data obtained, each additional year of life reduces the probability of a favorable outcome by 3%. Severe injury significantly reduces the chances of success, and each additional percentage of LVEF increases the probability of a favorable outcome by 6%. Annuloplasty is more effective than commissurotomy, but the duration of cardiopulmonary support reduces the likelihood of success.

The results of the study confirm the importance of early intervention in mitral regurgitation, especially in patients with preserved left ventricular function. Annuloplasty as a reconstruction method demonstrates the best long-term results, which is consistent with current clinical recommendations. As a limitation of this study, it can be noted that the retrospective nature of the study may be associated with a selective error. In addition, some potential factors, such as the psychoemotional state of patients, are not taken into account.

The logistic regression method made it possible to identify key predictors of success after mitral reconstruction surgery. The most significant factors are the degree of valve damage before surgery, the function of the left ventricle, the type of reconstruction, and the duration of cardiopulmonary support. These data can be used to develop personalized treatment strategies for patients with mitral regurgitation aimed at improving the effectiveness and safety of interventions.

Conclusions

Heart defects are a complex group of diseases that require a personalized approach to diagnosis and treatment. Modern medicine offers a wide range of possibilities for managing these pathologies, from conservative methods to surgical interventions. The choice between cardiological observation and surgical intervention should be based on a variety of factors, including the patient's age, the degree of damage to the valve apparatus, the presence of concomitant pathology and general health. A personalized approach makes it possible to optimize treatment outcomes and minimize risks.

Modern technologies such as echocardiography, computed tomography and magnetic resonance angiography provide accurate assessment of the structure and function of the heart, which is crucial for making treatment decisions. These methods make it possible not only to detect the disease at an early stage, but also to predict its progression.

Genetic tests and biomarkers open up new horizons in personalized medicine. They help predict the patient's response to treatment, assess the risk of disease progression, and select the most effective type of therapy. Successful management of heart defects requires close cooperation between specialists in various fields – cardiologists, surgeons, anesthesiologists and rehabilitologists. The creation of an interdisciplinary team allows us to develop a comprehensive treatment plan that takes into account all aspects of the patient's condition.

If serious complications develop, such as decompensated heart failure or thromboembolic events, surgical intervention becomes an urgent solution. The time before surgery plays a key role in treatment outcomes, emphasizing the importance of early diagnosis and active follow-up.

The results of randomized trials such as PARTNER, Evolut, and others provide a reliable evidence base for the choice of treatment methods. They demonstrate the advantages of minimally invasive technologies, optimal anticoagulant therapy strategies, and the importance of early intervention.

A personalized treatment strategy for patients with heart defects ensures the best results by taking into account the individual characteristics of each case. The future of heart disease treatment is linked to the further development of personalized medicine and the introduction of innovative technologies.

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