The influence of cardiovascular diseases on the outcomes of surgical treatment in gynecology

La influencia de las enfermedades cardiovasculares en los resultados del tratamiento quirúrgico en ginecología

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Abstract

Cardiovascular diseases (CVD) are one of the most significant factors influencing the outcomes of surgical treatment of gynecological pathologies. Given the high prevalence of CVD among older women and patients with chronic diseases, their impact on the course of the surgical and postoperative periods deserves special attention.

The authors analyze the mechanisms of interrelation of cardiovascular disorders and surgical interventions in gynecology. The main cardiological conditions, such as arterial hypertension, coronary artery disease (CAD), heart failure, cardiac arrhythmias and thromboembolic complications, and their role in the formation of operational risks are considered. Special attention is paid to the role of the systemic inflammatory response, hemodynamic instability and coagulation disorders that can occur both during surgery and in the postoperative period.

The importance of a high-quality preoperative examination, including a thorough assessment of the patients' cardiovascular system, is emphasized. The article emphasizes the need for a cardiologist to participate in the planning of surgical treatment of patients with CVD, which makes it possible to adjust therapy, choose the optimal method of anesthesia and minimize the risks of complications.

In addition, the work focuses on the postoperative period, which describes the features of managing patients with cardiovascular diseases. Approaches to the prevention of thromboembolic complications, blood pressure management and maintenance of normal cardiovascular system function under operational stress are considered.

The work highlights the importance of an interdisciplinary approach involving the interaction of gynecologists, cardiologists, anesthesiologists, and intensive care physicians to ensure safety and improve treatment outcomes. The current recommendations on optimizing the training of patients with concomitant cardiovascular diseases, the choice of surgical tactics and rehabilitation in the postoperative period are presented.

Keywords: cardiovascular diseases, gynecological surgery, preoperative preparation, cardiological risks, postoperative complications, interdisciplinary approach.

Introduction

Cardiovascular diseases (CVD) occupy a leading position among the causes of morbidity and mortality worldwide, especially in the age group of women over 40 years old[1]. With increasing life expectancy and the number of patients with chronic diseases, the relationship of CVD with other pathologies requiring surgical intervention is becoming increasingly relevant. Gynecological operations, both planned and emergency, are often performed in patients with cardiac diseases, which requires a special approach to their diagnosis, treatment and rehabilitation.

Difficulties in the surgical treatment of gynecological pathologies in patients with concomitant CVD are due to a number of factors: an increased risk of intraoperative complications, the effect of anesthetic measures on the cardiovascular system, as well as a high probability of thromboembolic and other postoperative complications[2]. Under conditions of surgical stress, hemodynamic disorders, and activation of inflammatory processes, the cardiovascular system undergoes significant stress, which requires careful preoperative preparation and a coordinated approach to patient management.

Despite the development of modern diagnostic and therapeutic methods, the issues of optimizing the preparation of patients with CVD, the choice of surgical tactics and the prevention of postoperative complications remain relevant. Effective cooperation between gynecologists, cardiologists, anesthesiologists and other specialists plays a key role in ensuring the safety of operations and improving their outcomes. The aim of the study is to study the main aspects of the effect of CVD on the course and results of surgical treatment in gynecology and also provides recommendations for an interdisciplinary approach to the management of patients with cardiological diseases.

Materials and methods

During the preparation of this study, scientific publications, studies, monographs and clinical recommendations on the relationship between cardiovascular diseases and gynecological operations were studied. Modern approaches to diagnosis, preoperative preparation and postoperative management of patients with CVD were also analyzed. Using the method of comparative analysis, data on various types of cardiovascular diseases (for example, hypertension, coronary artery disease, heart failure) and their impact on the outcomes of surgical treatment in gynecology were compared. Using the methods of systematization and classification, risk factors, methods of preoperative preparation, as well as complications arising in the postoperative period were grouped and ordered. The article examines the evolution of views on the role of cardiovascular diseases in surgical practice, as well as analyzes changes in approaches to preoperative preparation and rehabilitation of patients with CVD.

Results. Cardiovascular diseases (CVD) are one of the most significant factors influencing the outcomes of surgical treatment of gynecological pathologies. The high prevalence of CVD, especially among older patients and women with concomitant chronic diseases, creates additional risks at all stages of treatment: from preoperative preparation to postoperative recovery[3]. The risks mentioned above are due to both the direct effect of cardiac disorders on the functioning of the body, and indirect factors such as reduced resistance to surgical stress, hemodynamic disorders and an increased tendency to thrombosis.

To ensure favorable outcomes of operations, an individualized approach to patients with CVD is required, including a detailed assessment of the state of the cardiovascular system, careful planning of surgical intervention and multidisciplinary interaction of specialists.

The interaction of the cardiovascular system and surgical interventions in gynecology is determined by several key mechanisms that affect the patient's condition in the preoperative, intraoperative and postoperative periods. Table 1 shows the main cardiac diseases and their impact on operational risks during surgical interventions in gynecology.

Table 1. Major cardiac diseases and their impact on operational risks during surgical interventions in gynecology

Cardiac disease	The risk mechanism	Operational risks	The approach to treatment
Arterial hypertension (AH)	Increased stress on the heart, left ventricular hypertrophy, risk of stroke and myocardial infarction	Increased risk of bleeding, stroke, myocardial infarction, kidney failure; complications during anesthesia	Blood pressure monitoring before and during surgery, the use of antihypertensive drugs
Coronary heart disease (CHD)	Insufficient blood supply to the myocardium, the risk of myocardial infarction	Increased risk of myocardial infarction, arrhythmias, heart failure, and tissue necrosis	Preoperative risk assessment, monitoring of heart function, use of antianginal and antiarrhythmic drugs
Heart failure	Insufficient heart function to maintain normal blood circulation, impaired oxygen delivery to tissues	Increased risk of cardiovascular complications, hypotension, shock, and hemodynamic disorders during and after surgery	Optimization of cardiac function before surgery, careful monitoring of hemodynamics, the use of diuretics and drugs that support cardiac activity
Cardiac arrhythmias (for example, atrial fibrillation)	Violation of normal cardiac conduction, increased risk of thrombosis	Increased risk of stroke, arrhythmias, and hemodynamic disorders in the postoperative period	Antiarrhythmic therapy, anticoagulant therapy, rhythm control during surgery
Thromboembolic complications (for example, thrombophilia)	Tendency to increased formation of blood clots, violation of normal blood flow	Risk of thrombosis, venous thromboembolism (for example, pulmonary embolism), myocardial infarction, stroke	Prevention of thrombosis with anticoagulants, coagulation monitoring, mechanical methods of thrombosis prevention

Arterial hypertension (AH) is a chronic increase in blood pressure, which is one of the most common problems among women, especially in older age[4]. This disease is often accompanied by hypertrophy of the left ventricle of the heart and vascular damage, which increases the risk of atherosclerosis, stroke, myocardial infarction and renal failure.

AH increases the load on the heart and blood vessels, which can lead to their damage, as well as disruption of other organs, such as the kidneys and brain. High blood pressure is especially dangerous during the perioperative period, as it can lead to sudden fluctuations in blood pressure, which is a potential threat to the patient. Hypertension also increases the risk of thrombosis and stroke, which is especially important during surgery. During surgery, this can lead to hemodynamic disorders, bleeding, and other complications. Hypertension can also exacerbate the risk of myocardial infarction and impaired renal function, which requires special attention when planning surgery[5].

Coronary heart disease is characterized by a decrease in blood supply to the myocardium, which is caused by narrowing of the coronary vessels due to atherosclerosis. This disease entails such consequences as angina pectoris, myocardial infarction and heart failure. Coronary heart disease can be accompanied by tissue ischemia, cardiac arrhythmia, and decreased pumping function of the myocardium.

Patients with coronary artery disease are at increased risk for any surgical intervention, as surgery can cause sudden fluctuations in blood pressure, which exacerbates myocardial ischemia. The risk of myocardial infarction also increases in the perioperative period, especially in patients with unstable angina or in postoperative recovery, when new episodes of ischemia are possible due to the body's stress response. It is important to carefully monitor the work of the heart and use medications that maintain normal blood circulation and reduce the load on the myocardium.

Heart failure is a condition in which the heart is unable to pump blood efficiently, thereby providing organs and tissues with the necessary amount of oxygen and nutrients. This can be a consequence of various diseases, such as coronary heart disease, hypertension, cardiomyopathy, and others. In the case of heart failure, there is a deterioration in the function of all organs, including the kidneys, liver, and brain[6].

During surgery, patients with heart failure have a high risk of worsening hemodynamics and developing shock,

as the load on the heart increases during surgery and in the postoperative period, which can lead to hypotension, circulatory disorders and, in the most severe cases, death. Risks also include deterioration of kidney function, the development of pulmonary edema and other organ disorders. Therefore, such patients require careful monitoring of the state of the cardiovascular system before and during surgery, as well as an individual approach to the choice of anesthesia and therapeutic methods.

Cardiac arrhythmias such as atrial fibrillation, ventricular tachycardia, and extrasystole are quite common among patients who have undergone surgery[7]. These disorders can lead to ineffective blood circulation, a decrease in blood pressure and an increased risk of thrombosis. Atrial fibrillation, for example, increases the likelihood of developing thromboembolic complications such as stroke, especially if it is not controlled.

Cardiac arrhythmias can also complicate anesthesia, cause arrhythmias during surgery, and make it difficult to maintain a stable condition during the postoperative period. Prevention and treatment of arrhythmias play an important role in reducing risks during surgical interventions. Patients with such diseases require constant monitoring and correction of heart rhythm both before and after surgery.

Thromboembolic complications, such as deep vein thrombosis and pulmonary embolism, are a serious threat to patients with cardiovascular diseases, especially during surgical interventions[8]. These complications occur due to increased blood clotting, which is typical for a number of diseases such as chronic heart failure, atrial fibrillation, and others.

During surgery, especially in the postoperative period, there is a high risk of blood clots due to prolonged immobilization of the patient, stressful state of the body and inflammatory reactions. In patients with cardiac diseases, the risk of these complications increases significantly. Prevention of thrombosis using anticoagulants and mechanical methods (for example, compression stockings) is an important part of preoperative preparation and postoperative care[9].

Accordingly, it can be concluded that cardiological diseases are an important factor influencing the outcomes of surgical interventions in gynecology. The presence of diseases such as arterial hypertension, coronary artery disease, heart failure, cardiac arrhythmias and thromboembolic complications significantly increases operational risks.

During surgery and in the postoperative period, several physiological reactions may occur that significantly affect the outcome of the operation. Among them, special attention should be paid to the systemic inflammatory response, hemodynamic instability and coagulation disorders. Such processes are closely related and can exacerbate each other, increasing operational risks[10].

The systemic inflammatory response (SIR) is the body's natural response to injury, surgery, infection, or other stressful conditions. During surgery, inflammatory mediators (cytokines, interleukins, prostaglandins, etc.) are activated, which causes systemic changes aimed at combating tissue damage[11]. However, with excessive or uncontrolled activation of inflammation, sepsis or acute inflammatory syndrome may develop, which leads to a deterioration in the patient's condition. Inflammation leads to vasodilation, decreased vascular resistance, and hypotension, which can impair blood supply to vital organs.

Inflammation can disrupt microcirculation and oxygen delivery to tissues, which impairs healing of postoperative wounds and can lead to organ failure. Increased inflammatory response increases susceptibility to infectious complications, especially in the postoperative period.

A systemic inflammatory response can increase the risk of sepsis, complications from the cardiovascular system, kidneys, and other organs. The development of multiorgan insufficiency is especially dangerous when inflammation affects several organs simultaneously, which requires intensive treatment and support of organ functions[12].

Hemodynamic instability is a violation of normal blood circulation, manifested by hypotension, tachycardia or shock states. The above disorders can occur both during surgery and in the postoperative period, as a result of surgical stress, blood loss, cardiac disorders, and as a result of a systemic inflammatory response.

A significant decrease in blood pressure can lead to hypoperfusion of organs and tissues, impaired function, and in severe cases, organ failure (for example, renal or hepatic). Accelerated heart rate can lead to increased myocardial oxygen demand, which increases the risk of ischemia and myocardial infarction, especially in patients with coronary heart disease. A state of shock (hypovolemic, cardiogenic, septic) can be life-threatening to the patient, as it causes a sharp deterioration in the blood supply to organs, which leads to their dysfunction and the progression of multiple organ failure.

Hemodynamic instability significantly increases the risk of postoperative complications such as heart and kidney failure, as well as the development of myocardial infarction or stroke. It is important to carefully monitor blood pressure and heart activity during and after surgery to avoid these complications.

Coagulation disorders include both hypercoagulation (increased blood clotting) and hypocoagulation (insufficient blood clotting), and are important risk factors for both surgery and the postoperative period. During surgery, the body can activate the hemostasis system to prevent bleeding, but in some cases this activation can get out of control, leading to thrombosis. On the contrary, problems with thrombosis may occur after surgery if coagulation is disrupted, which increases the risk of bleeding[13].

Inflammation, injury, or surgery can lead to activation of the coagulation system, which increases the risk of thrombosis, venous thromboembolism (for example, pulmonary embolism), myocardial infarction, or stroke. A lack of blood clotting factors or platelet dysfunction can lead to an increased risk of bleeding during surgery and in the postoperative period, which requires intervention to control and correct blood clotting.

Coagulation disorders during the surgical period can lead to significant blood loss, requiring transfusions and intervention to restore normal coagulation levels. In the postoperative period, there is also a risk of thrombosis, especially in patients with vascular diseases or with prolonged bed rest. Prevention of thromboembolic complications using anticoagulant therapy and physical activity in the postoperative period is crucial.

Systemic inflammatory response, hemodynamic instability, and coagulation disorders are important physiological processes that can significantly affect the outcome of surgery and the postoperative period[14]. These processes can lead to various complications, such as infectious diseases, shock, circulatory disorders, thromboembolism, or bleeding. Careful monitoring of the patient's condition, timely diagnosis and correction of these processes play a key role in minimizing risks and improving patient prognosis, especially in gynecological surgery, where these factors can interact with the peculiarities of female physiology.

Discussion

Preoperative examination is an important step in preparing patients for surgery, especially in women with cardiovascular diseases. A thorough assessment of the state of the cardiovascular system allows not only to identify operational risks, but also to prepare the patient for surgery with minimal possible complications. This is especially important in the context of gynecological operations, where the presence of cardiac diseases can significantly increase operational risks and affect the outcome of the intervention.

Preoperative examination begins with a thorough medical history collection, which makes it possible to identify the presence of cardiovascular diseases such as hypertension, coronary heart disease, heart failure, cardiac arrhythmias or thromboembolic disorders[15]. It is important to assess risk factors such as age, gender, hereditary predisposition, the presence of concomitant diseases (diabetes, obesity, chronic kidney disease), as well as previous cardiac events (myocardial infarction, stroke, etc.).

A clinical examination should include a check of cardiovascular function: blood pressure measurement, pulse assessment, listening to the heart for sounds and arrhythmias, as well as an examination for edema, signs of heart failure or vascular diseases.

An electrocardiogram is the main method for assessing the condition of the heart and detecting rhythm disturbances, coronary heart disease, myocardial hypertrophy and other cardiac diseases. An ECG should be performed in all patients over the age of 40 and those with risk factors for cardiovascular diseases.

Echocardiography (ultrasound of the heart) allows you to assess the condition of the heart muscle, valves and blood vessels. Echocardiography is especially important for patients with heart valve diseases, heart failure, and coronary artery disease, as it provides insight into the functional state of the heart and its ability to maintain normal blood circulation[16]. In some cases, especially if there are complaints of cardiac arrhythmias, daily ECG monitoring (Holter method) may be indicated. This helps to identify hidden arrhythmias that may occur during the day, as well as evaluate the effectiveness of antiarrhythmic therapy.

Doppler echocardiography helps to assess the patency of coronary vessels and detect circulatory disorders, which is important for patients with coronary heart disease and angina pectoris. A Doppler scan can provide information about hemodynamics, assess blood flow velocity, and identify abnormalities in the vascular system.

Based on the results of laboratory tests, the hemoglobin level is assessed, which is important in the presence of anemia, as well as the detection of signs of inflam-

mation. Blood biochemistry provides information about kidney and liver function, as well as electrolyte balance, which is important for assessing the patient's general condition and risks in the postoperative period.

The level of cholesterol and lipids in the blood is an important indicator for assessing the risk of atherosclerosis and coronary heart disease. High cholesterol and triglyceride levels may be a contributing factor to the development of heart disease. Assessment of blood clotting ability is necessary to detect coagulation disorders, such as a tendency to thrombosis or, conversely, an increased tendency to bleeding[17]. It is important that the coagulogram is within the normal range, as a violation of coagulation can lead to complications during surgery and in the postoperative period.

When preparing patients for surgery, it is also necessary to assess the functional state of the cardiovascular system. If there is a suspicion of coronary heart disease, or the patient has a history of angina pectoris, it is necessary to conduct a physical activity test to assess the heart's response to stress. This study makes it possible to identify latent ischemia, which may become a risk factor during surgery[18].

Coronary angiography is used to assess the condition of coronary vessels in patients at high risk of coronary artery disease. The method allows you to accurately identify narrowing or blockage of blood vessels, which may require intervention (for example, stenting) before surgery.

Various scales can be used to assess cardiac risks, such as the RCRI (Revised Cardiac Risk Index) scale or the risk assessment scale for surgical interventions in patients with cardiovascular diseases. These scales help predict the likelihood of complications based on the patient's clinical data, such as the presence of cardiac diseases, their severity, as well as other risk factors such as diabetes, hypertension, etc.

One of the key aspects of a high-quality preoperative examination is the cooperation of various specialists: a cardiologist, an anesthesiologist, a surgeon, and others. Consultation with a cardiologist helps to assess the general condition of the cardiovascular system, choose optimal approaches to treatment and surgery, as well as adjust medication (for example, antihypertensive therapy or drugs that affect the hemostasis system)[19]. It is also important to choose the appropriate anesthesia to avoid complications related to the cardiovascular system during and after surgery.

A high-quality preoperative examination with a thorough assessment of the cardiovascular system is the basis for successful surgical intervention, especially in women with cardiac diseases. Timely diagnosis and correction of cardiovascular disorders, the use of modern examination methods and a multidisciplinary approach will help minimize operational risks and improve treatment outcomes[20].

The role of a cardiologist in preparing patients with cardiovascular diseases (CVD) for surgery is crucial to reduce operational risks and improve patient safety. Cardiovascular diseases can significantly affect the course of surgery, as well as the postoperative period, therefore, the participation of a cardiologist at all stages of planning and conducting surgical treatment plays a key role, which makes it possible to adjust therapy, choose the optimal method of anesthesia and minimize the risks of complications[21].

Before the operation, the cardiologist performs a thorough assessment of the patient's condition and, if necessary, makes changes to her treatment. One of the main areas of work of a cardiologist is the optimization of cardiovascular therapy, which reduces the risk of heart complications during and after surgery. In women with arterial hypertension, a cardiologist can change the dosages of antihypertensive drugs or prescribe other medications to ensure stable blood pressure during the perioperative period[22]. It is important to avoid sudden fluctuations in blood pressure, which can trigger complications such as stroke, myocardial infarction or kidney failure.

In patients with coronary artery disease, atrial fibrillation, or other conditions requiring the use of anticoagulants, a cardiologist should carefully monitor the use of medications such as warfarin or the latest anticoagulants. An important point is the balance between preventing thrombosis and minimizing the risk of bleeding during and after surgery[23].

In women with high cholesterol, a cardiologist can adjust the use of statins or other lipid-lowering medications, which will help minimize the risk of atherosclerotic complications in the future. In cases where the patient suffers from heart failure, the cardiologist may prescribe medications that improve cardiac function, such as ACE inhibitors, beta blockers, or diuretics, in order to prepare the body for surgery and prevent deterioration of the condition.

Anesthesia in patients with cardiovascular diseases requires special attention and an individual approach. The cardiologist plays an important role in choosing the method of anesthesia based on the state of the cardiovascular system, the type of surgery, and other factors such as the presence of concomitant diseases[24].

Regional anesthesia (for example, spinal or epidural anesthesia) may be recommended for patients with heart disease, as it has less effect on hemodynamics than general anesthesia, which avoids blood pressure fluctuations that may occur during general anesthesia[25]. However, in some cases, especially during major operations, general anesthesia may be necessary. In such cases, a cardiologist helps you choose medications that minimize the effects on the cardiovascular system.

During surgery, the anesthesiologist and cardiologist should work closely together to ensure stable hemody-

namics. Specialists jointly monitor blood pressure, heart rate, oxygen saturation and other parameters in order to correct anesthesia in time and prevent complications associated with impaired cardiac function.

The risk of complications in patients with cardiovascular diseases increases during and after surgery, and therefore a cardiologist should be actively involved in preventing these complications. This includes not only the adjustment of therapy and the choice of anesthesia, but also a number of preventive measures[26].

Patients with cardiovascular diseases, especially with atrial fibrillation or after a myocardial infarction, have a high risk of thrombosis. The cardiologist develops an individual program for the prevention of venous thromboembolism, which may include the use of anticoagulants, mechanical prophylaxis (for example, compression stockings) and activation of the patient in the postoperative period[27].

After surgery, the cardiologist participates in monitoring the patient's cardiac activity to prevent possible complications such as myocardial infarction, arrhythmias, or exacerbation of heart failure. The cardiologist also plays a key role in monitoring the patient during the postoperative period, helping to prevent and control complications such as acute coronary events, cardiac arrhythmias, or pulmonary hypertension[28]. Early intervention and correction of therapy can significantly reduce the likelihood of serious consequences.

Conclusions

Cardiovascular diseases (CVD) significantly increase the operational risks in patients, which is associated with possible complications such as arrhythmias, heart attacks, hypertensive crises, heart failure, thromboembolism and other cardiogenic problems. This requires special attention at every stage of the preparation and conduct of the operation.

Assessment of the state of the cardiovascular system using diagnostics, blood pressure monitoring, echocardiography, ECG and other methods is a necessary step to assess operational risks and prepare the patient for surgical gynecological intervention. It is important to adjust drug therapy, including antihypertensive, anticoagulant, and cardiotropic therapy.

The involvement of a cardiologist in treatment planning is crucial to minimize operational risks. The cooperation of a cardiologist and an anesthesiologist in the selection of anesthesia methods, including the preference for regional anesthesia in the case of cardiovascular diseases, can significantly reduce the burden on the cardiovascular system and prevent complications during surgery.

If possible, minimally invasive surgical procedures such as laparoscopy can reduce surgical stress on the cardiovascular system, reduce blood loss, and accelerate the patient's recovery.

Postoperative care for patients with CVD who have undergone gynecological surgery should include careful monitoring of cardiovascular functions, early activation and prevention of thromboembolic complications. Rehabilitation should be comprehensive, including physical activity, cardio rehabilitation, and psychological support.

Each patient requires an individual approach in planning surgical treatment, taking into account the characteristics of cardiovascular diseases. This approach helps to minimize risks and increase the effectiveness of treatment. The collaboration of gynecologists, surgeons, cardiologists, anesthesiologists, and other specialists is necessary to ensure safe surgical intervention, improve prognosis, and reduce the likelihood of postoperative complications.

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