

MODERN PRINCIPLES OF DIAGNOSIS AND SURGICAL TREATMENT OF ISCHEMIC MITRAL INSUFFICIENCY

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Conflict of interest

The authors declare that they have no conflicts of interest

Abstract

The purpose of the study is to evaluate and analyze the results of surgical treatment of patients with ischemic mitral insufficiency.

Material and methods. The results of the examination and surgical treatment of 35 patients with ischemic mitral insufficiency are analyzed. In the operative period, in order to identify the degree of mitral insufficiency and the valvular apparatus, an echocardiography was performed, where the diameter of the fibrous ring, the interpapillary distance, the annulopapillary distance, the area of the cusp tension, and the depth of the coaptation of the valves were determined.

Results. A preoperative examination proved the presence of mitral valve insufficiency with regurgitation of varying degrees. 15 patients underwent myocardial revascularization, 20 patients underwent myocardial revascularization + various options for correction of ischemic mitral insufficiency. After the operation, a significant improvement in the spatial-geometric correlation of the LV and mitral valve by reducing the tension forces acting on the valves and in the group of patients undergoing myocardial revascularization + various options for the correction of ischemic mitral insufficiency as the elimination of regurgitation.

Conclusion. In patients with ischemic heart disease after echocardiographic studies, having determined the degree of mitral insufficiency with its moderate and severe degree, it is necessary to have a surgical correction of the mitral valve in its apparatus; the use of myocardial revascularization + various options for the correction of ischemic mitral insufficiency gives more tantalizing results than isolated myocardial revascularization.

Keywords

ischemic mitral insufficiency, isolated myocardial revascularization, mitral valve reconstruction

Митральды ишемиялық жеткіліксіздіктің диагностикасы мен хирургиялық емінің заманауи қағидалары

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Аңдатпа

Жұмыстың мақсаты - ишемиялық митральды жеткіліксіздігі бар науқастарды хирургиялық емдеу нәтижелерін бағалау және талдау.

Материал және әдістер. Митральды ишемиялық жеткіліксіздігі бар 35 науқасты тексеру және хирургиялық емдеу нәтижелері талданды. Ота кезеңінде митральды жеткіліксіздіктің дәрежесін және клапан аппаратын анықтау үшін эхокардиография жасалды, онда сақиналы фиброздың диаметрі, папилляр аралық қашықтық, аннулопапиллярлық қашықтық, жапырақшалардың тартылу аймағы және жапырақтың коаптациясы тереңдігі анықталды.

Нәтижелер. Ота алдындағы кезеңде жүргізілген тексеру әр түрлі дәрежедегі регургитациямен митральды қақпақшаның жеткіліксіздігінің болуын дәлелдеді. 15 науқасқа миокард ревазуляризациясы, 20 науқасқа миокард ревазуляризациясы+ишемиялық митральды жеткіліксіздікті түзетудің әртүрлі нұсқалары, қақпақшаға әсер ететін кернеу күшін төмендету және миокард ревазуляризациясы + ишемиялық митральды жеткіліксіздікті түзетудің әртүрлі нұсқалары орындалған науқастар тобында, сонымен қатар регургитацияны жойылды.

Қорытынды. Жүректің ишемиялық ауруы бар науқастарда эхокардиографиялық зерттеулерден кейін митральды жеткіліксіздік дәрежесін анықтау және оның орташа және ауыр дәрежесінде митральды қақпақшаны хирургиялық түзету қажет; миокард ревазуляризациясын қолдану + ишемиялық митральды жеткіліксіздікті түзетудің әртүрлі нұсқалары оқшауланған миокард ревазуляризациясына қарағанда жақсы нәтиже береді.

Мүдделер қақтығысы

Авторлар мүдделер қақтығысының жоқтығын мәлімдейді

Түйін сөздер

ишемиялық митральды жеткіліксіздік, оқшауланған миокард ревазуляризациясы, митральды қақпақшаның реконструкциясы

Современные принципы диагностики и хирургического лечения ишемической митральной недостаточности

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Аннотация

Цель исследования - оценить и проанализировать результаты хирургического лечения пациентов с ишемической митральной недостаточностью.

Материал и методы. Анализируются результаты обследования и хирургического лечения 35 больных с ишемической митральной недостаточностью. В операционном периоде для выявления степени митральной недостаточности и клапанного аппарата проводили с эхокардиографией, где были определены диаметр фиброзного кольца, межпапиллярное расстояние, аннулопапиллярное расстояние, площадь натяжения створок и глубина коаптации створок.

Результаты. Проведенное в предоперационном периоде обследования доказали о наличии недостаточности митрального клапана с регургитацией различной степени. 15 пациентам выполнены реваскуляризация миокарда, 20 пациентам реваскуляризация миокарда+ различные варианты коррекции ишемической митральной недостаточности. После операции отмечены значительное улучшение пространственно-геометрических соотношений ЛЖ и митрального клапана за счет уменьшения сил натяжения, воздействующих на створки, а в группе больных выполненных реваскуляризация миокарда+ различные варианты коррекции ишемической митральной недостаточности так же устранение регургитации.

Заключение. У больных с ишемической болезни сердца после эхокардиографических исследований определив степени митральной недостаточности при ее умеренной и тяжелой степени необходимо хирургическая коррекция митрального клапана; применение реваскуляризация миокарда+ различные варианты коррекции ишемической митральной недостаточности дает более хорошие результаты чем изолированное реваскуляризация миокарда.

Ключевые слова
ишемическая митральная
недостаточность, изолированное
реваскуляризация миокарда,
реконструкция митрального
клапана

Relevance

Relevance of the safety and efficacy of surgical treatment of patients with ischemic heart disease, complicated by the development of heart failure due to post-infarction remodeling of the left ventricular cavity (LV) and ischemic heart failure (IHF), remains one of the most relevant in modern cardiac surgery. Life expectancy in patients with ischemic mitral valve insufficiency (MV) is unfavorable: the 5-year survival rate is, according to different data, only 25-69%. The main causes of mortality are severe heart failure, recurrent to drug therapy, recurrent and myocardial, and fatal ventricular arrhythmias [1, 2]. Therefore, a comprehensive solution of the problem (surgical reconstruction of the LV cavity, correction of MV and modern effective pharmacotherapy after surgery) can be considered as the main direction for improving the results of treatment of patients in this category. One of the most important factors of their success in such an integrated approach is the choice of tactics for IHF, determined by preoperative analysis of the causes of its development. At present, many researchers agree that the main cause of chronic IHF is the unfavorable distribution of hypo zones. and the discs of the etiology and myocardium LV, leading to its violation of the functional and spatial-geometric relations of the structures of MV and LV [1, 3-5]. This pathology is

based on the concept of LV remodeling, causing its dislocation of papillary bases and restriction of the systolic movement of the MV sashes. wall, that is, at the level of attachment of the posterior papillary muscle. Dislocation of this mouse in the apical and posterior-lateral direction leads to excessive tension of the predominantly basal chords in the systole and a decrease in the amplitude of the systolic movement of the valves and the lower level of the fibrous ring is located closer to the apex, which underlies the formation of mitral insufficiency. In the foreign literature, this mechanism of the occurrence of IHF is described as an increase in theothering forces, limiting their mobility of the MV valves in systole (due to the tension of the papillary masses and chords), due to negative remodeling of the cavity LV [6, 8]. Subsequently, against the background of progression of miratral insufficiency, fibrous changes and reduction of contractility, its further expansion of the LV cavity occurs, which underlies the dilatation of the fibrous ring MV, and increased regurgitation [1, 4].

Material and methods

The results of the surgery were analyzed. Treatment of 35 patients with ishem common mental deficiency. Angina pectoris II functional class (FC by classification CCS) was diagnosed in 11

(31.4%) patients. III – IV FC – in 24 (68.6%). Cordial failure II FC (according to the classification NYHA) was detected in 5 (14.3%) patients. III – IV FC - in 30 (85.7%), 26 (74.3%) patients ejection fraction LV was less than 0.4. Preoperative assessment of significance mitral insufficiency and its causes development was performed using echocardiography the graphs, in whose protocol were included we are parameters that give quantitative characteristic of spatial interrelations relationship of mitral valve structures (diameter of the annulus, interpapillary distance annulopapillary distance, tension area of the valves, coaptation depth of the valves), which allows to objectively evaluate its function. Diagnosis of ischemic mitral insufficiency. Operative assessment of significance mitral failure and its causes development is of paramount importance to determine the optimal tactics of surgery therapeutic treatment [4]. In our research their size and configuration of the LV cavity, its local and global juice of rati bridge, central hemodynam and ki, the state of the valve apparatus. Hearts were assessed with transthoracic and transesophageal echocardiography (EchoCG) (Vivid 7, «GE», USA). In addition to generally accepted indicators, parameters were included in the EchoCG protocol that give a quantitative characterization of the spatial interrelationships of MV structures, which allows an objective assessment of its function: - fibrous ring diameter - distance between the extreme and points and the front and rear hemispheres of the MV ring and the fringe.

Annulopapillary distance (APD) - the distance from the posterior medial papillary heads to the anterior her hemispheres of the fibrous ring MV; the area of the tension of the valves (ATV) - flat area, bounded flat bone fibrous rings MV and his systole; - interpapillary distance (IPD) - distance between papillary bases in a two-chamber apical projections. The importance of these indicators to determine division tactics of surgical treatment I emphasize many authors [8-10]. So, E. Agricola et al. indicate that the CDC and with most closely related to the severity mitral regurgitation and the degree of remodeling LV [6]. Importance of defining Len and CDC emphasize t in their research A. A. Calafiore et al. In their opinion, with initial CDC less than 10 mm and it is this failure is usually ineffective. is positivity and in the postoperative period does not increase. According to their opinion, when the initial CDC is less than 10 mm, the neutral insufficiency is, as a rule, insignificant and does not increase in the postoperative period. If this indicator exceeds 10 mm, then the regurgitation on the MV is more significant and after the operation increases progressively [11]. The results of the preoperative examination of our patients testified to the presence of postinfarct remodeling of the LV

cavity, a decrease in its contractile function and a substantial deformation of the MV structures (Table 1). The increase in the volume of LV, the transformation of its cavity from the ellipsoid into the spherical (sphere index of $1.34 + 0.18$) led to an increase in ADP and CDC, which contributed to the development of mitral regurgitation. Regurgitations We used a multi-component penton classification, taking into account the area of regurgitation jets, the ratio of areas of regurgitation and area of the atrium, the regurgitation fraction and the effective orifice area. Grade II was detected in 16 (21.6%) patients, Grade III in 40 (54.1%) and Grade IV mitral insufficiency in 18 (24.3%).

The indications for surgical treatment of ischemic mitral insufficiency were determined by the state of the coronary arteries, the contractile function of the left ventricle and the degree of insufficiency of the mitral valve. The effect of mitral regurgitation due to rupture of the papillary muscle with the development of refractory heart failure and pulmonary edema necessitates urgent surgical intervention. We operated on 3 (8.6%) patients with acute ischemic mitral insufficiency on average $99.1 + 29.4$ h after the development of myocardial ischemia. Most researchers will appreciate that if intensive therapy allows stabilization of hemodynamics, the surgical treatment should be carried out no earlier than 4-8 weeks after myocardial ischemia. During this time, the final formation of the scar occurs, the left ventricular ejection fraction and the mitral insufficiency stabilize. significantly improves the results of the operation [3, 9, 11].

Chronic ischemic mitral insufficiency, grade III – IV, of course, is the basis for interventions on the mitral valve, which we performed in 25 (71.4%) patients. The feasibility of surgical correction with moderate mitral and fatigue (II degree) is not so clear. On the one hand, an increase in the volume of surgery, duration of cardiopulmonary bypass and myocardial ischemia increase the risk associated with the intervention.

On the other hand, uncorrected ischemic mitral insufficiency is one of the reasons for the progression of cardiac insufficiency in the late postoperative period [2, 5, 9–12]. In such a situation, accurate topical diagnostics of the causes of ischemic mitral insufficiency, assessment of the state of the contractile function of the LV and the pulmonary circulation, determination of the possibility of performing complete myocardial revascularization allow us to determine the feasibility of intervention on MV. Correction of moderate mitral insufficiency in combination with coronary artery bypass grafting (cab) was performed in 20 (57.1%) patients. The basis for the combined operation was postinfarct remodeling of the cavity LV, unfavorable changes in the spatial-geo-

metric relations MV and LV (interpapillary distance – IPD, coaptation depth of cusps – CDC, annulopillary distance – APD, area of cusp tension – ACT), the expansion of the fibrous ring of the mitral valve and clinical picture of angina due to severe multiple coronary artery disease.

Results

All operations were performed under conditions of CPB and pharmaco-cold cardioplegia. The operation of choice was various options for reconstructive interventions on MV (14 - 56%). Patients were monitored during surgery by monitoring the electrocardiogram and intracardiac hemodynamics using a Swan-Ganz catheter and transesophageal EchoCG. Since 2015, in order to reduce the period of myocardial ischemia, distal anastomoses were formed on a working heart without cardiopulmonary bypass (14-7 cases) or under conditions of parallel perfusion (10 cases). The index of revascularization was 2.6 ± 0.7 .

Thus, CABG combined with plastic MV - in 25 (71.4%). The nature of plastic surgery on mitral valve was as follows: valvuloplasty edge to edge - in 4 (16%) patients, papillotomy - in 2 (8%), resection of the posterior cusps in 3 (12,%), implant-free annuloplasty - in 6 (24 %), annuloplasty on the support ring - in 13 (52%). We consider that reconstructive interventions on MV should be justified by a high probability of a satisfactory end result and functional stability of the valve in the long-term period after the operation. It is important to accurately represent the anatomy of vice and possible ways to eliminate it. The correction should be fairly simple and easily accomplished, since an increase in the time of myocardial anoxia and artificial blood circulation has a negative effect on the result. All reconstructive interventions on the leaflets and subvalvular structures of MV were completed by annuloplasty of the fibrous ring. For this purpose, 19 (76%) patients used the Annulo Flo semi-rigid support ring ("Carbomedics", USA), 5 (20%) used a suture technique, the meaning of which was to "shrink" the back of the fibrous ring with the thread etibond 2 – 0.

Discussion

According to some researchers, the results of valve replacement operations with preservation

of annulopapillary continuity are comparable to reconstructive interventions, which is especially important for patients with reduced myocardial myocardial reserves [1, 2, 4]. Results of surgical correction of ischemic mitral insufficiency depends on the experience of treating this pathology, existing in the clinic, the volume of surgical interventions and approaches to the choice of the MV lesion correction method. In the 70s of the XX century, mortality in the correction of ischemic mitral insufficiency and resection of LV aneurysm averaged 45%. In the 80s, this indicator dropped to 25% and currently varies from 6 to 17% [5, 7, 9, 10]. The differences in the results reflect the difference in the experience of such operations, as well as in the tactics of performing the combined interventions [1, 9]. The most frequent perioperative complications in our study were acute cardiovascular insufficiency, cardiac arrhythmias, and respiratory failure, which required prolonged artificial respiration. According to a comparative analysis of the direct results of plastics MV revealed advantage of acb + valvuloplasty operations. The clinical picture of acute cardiovascular and respiratory failure was statistically significantly more common in patients undergoing isolated CABG + valvuloplasty. Mortality among these patients was also higher than e - 3 (12%) versus 1 (10%) ($p > 0.05$). The prevalence in the study group was 11.4%. In most cases ($n = 3$), acute cardiovascular insufficiency due to initially low functional reserves of the myocardium. Evaluating the original the clinical condition of the deceased patients, it should be noted that they have pronounced post-infarction remodeling of the LV cavity and a decrease in contractility myocardium (Table 1).

Practically, all of their deceased patients (5 out of 6) had a combined correction of coronary disease, mitral insufficiency and remodeling of the LV cavity. In 2 patients, the operation was of an emergency nature. The results confirm the opinion most researchers that low myocardial functional reserves are one of the key risk factors for death in patients undergoing ischemic remodeling of the LV cavity, and with mitral insufficiency [3, 4, 7, 10, 12]. Evaluating the results of EchoCG after surgery, it is necessary to note a statistically significant decrease in the LV cavity and an increase in the ejection fraction, and in patients after the MV plasty, a

Table 1.
Preoperative clinical characteristics of patients died

| | |
|---|------------|
| Class of angina (CCS) | 3.2±0.6 |
| Functional class (by NYHA) | 3.3±0.4 |
| Emission fraction LV, % | 29.6±3.5 |
| Degree of immoral failure | 2.5±0.3 |
| End diastolic volume index LV, m l / m ² | 131.4±29.3 |
| End systolic volume index LV, m l / m ² | 84,5±23,1 |

significant improvement in the spatial-geometric ratios of LV and MV by reducing the tension forces acting on the flaps. The result of the geometric reconstruction of the LV and the valve apparatus is the restoration of the normal function of MV.

Conclusion

Surgical treatment IMI is a complex section of cardiac surgery. The need to take into account many structural and functional reasons makes it difficult development of a single algorithm in the provision of surgical care to patients in this dif-

ficult category. Effective performing IMI operations from surgeons requires mastering all modern methods and restoring coronary blood flow, correcting post-infarction remodeling of the LV cavity and mitral insufficiency. It is necessary to consider justified the natural desire of surgeons to preserve their own patient valve with the possibility of reliable reconstruction. Despite the increased risk associated with combined surgery, the results of postoperative examination objectively indicate the normalization of MV function and a significant improvement in intracardiac hemodynamics.

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