

SURGICAL TREATMENT OF MULTI-VALVE HEART DISEASE OF INFECTIVE ENDOCARDITIS

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ABSTRACT

Peculiarities of diagnosis and results of surgical treatment of multi-valve heart disease in infective endocarditis. Analyze data and clinical results operated 156 patients with infective endocarditis, of which 85 were men (56.5%), and women - 71 (45.5%). Age Our patients ranged from 12 to 68 (mean 32.76 ± 1.6) years. Diagnosis was based on the classification and criteria Durack D.T. The patients were divided into 2 groups: group 1, 89 (57.4%) patients who underwent a complex developed by the authors of antibiotic therapy, treatment and preventive measures. 2-group 67 (42.6%) patients who underwent the traditional surgical treatment scheme. The diagnosis used: electrocardiography (ECG), X-rays from Skopje, transthoracic echocardiography (TTEHOKG) - all patients, transesophageal echocardiography (TEHOKG) - at 40.5%; coronaroveniculography (CVG) and angiocardiology (ACG) - at 12.65%; blood culture study in 38.6% of patients, with light gistrology electron microscopy (LEM) - in 47.5% of patients. Intraoperative treatment - preventive measures (TPM) were as follows; mechanical and chemical sanitation of the infected area of the heart; valve implantation antibakteriyalnymi properties; hyperthermic perfusion; anti microbial therapy, including anti-fungal agents. Application of the above measures could reduce mortality in the study group and 5.1% in the control group - 9.3%. In dynamics, declined to 3.9% in the last Godi mortality in the study group.

Key words: multivalve acquired heart diseases, complications of infectious endocarditis, the development of therapeutic and preventive measures, reducing mortality study group of patients



INTRODUCTION

Objective

Infective endocarditis, being quite common etiological factor in the development multi-valve heart defects, has a number of features in the diagnosis, definition of surgical tactics and perform the surgery in this group of patients (1; 2; 3; 4).

The valve infective endocarditis - septic disease caused by pathogenic or conditionally pathogenic microflora, which is the morphological substrate polypous-destructive ulcerative endocarditis, heart valve, manifested acute valvular insufficiency and systemic embolic events (authors). At the heart of embolic complications are encountered vegetation on heart valves. Vegetation composed of fibrin overlay, blood clots, blood cells, damaged heart tissue and microorganisms. According to statistics, the incidence of this disease within 2 - 6.5 cases per 100,000 population in the Russian Federation According to (1) . According to various authors, the dynamics of the disease varies from 2% - up to 18% of patients and age - from 20 to 50 years, ie, the employed adult population (3). There is a practice in Cardiology and the attempts of conservative treatment of infective endocarditis. Thus, according to some authors, the mortality rate in the conservative treatment is 50 - 90% (5). The effectiveness of surgical treatment over medical treatment is clear obvious. However, good early and late results of surgical treatment of multi-valve infective endocarditis is largely dependent on the correct definition of surgical tactics and lethality is reduced to 8,3-11,2% (4, 10). Thus, the apparent urgency of the chosen theme of the message is not in doubt. In this article, we decided to discuss their own experiences of diagnosis, choice of tactics and execution of multi-valve surgical correction of heart defects in infective endocarditis.

MATERIAL AND METHODS

Study design and population

Statistical analysis of the result was carried out and studied on a PC Toshiba L-300 with using of a software packages Windows 7, Microsoft Office Excell 2007 with Statistical Version 6.0.

Statistical analysis included:

- Calculation primary statistics. Result was showed as mean and standard, minimum, maximum deviation with percentages of categorical variables.

- The accuracy of differences performance compared groups was evaluated by means of parametric Student's (t) criteria. The degree of accuracy is determined at the level of significance $p < 0,05$.

- All events associated with each other factor time and took place with patients in the hospital and distant period were evaluated by pressing actuarial curves built by the method of Kaplan-Meier.

The material of the clinical examination and analysis of the results of surgical correction of multi-valve heart disease in infective endocarditis served as operated in our hospital 156 patients, of whom 85 were men (54.5%), and women - 71 (45.5%). The age of our patients ranged from 12 to 68 (mean 32.76 ± 1.6) years. Diagnosis was based on the classification criteria and Durack D.T. (2004) Duke University.

The patients were divided into 2 groups: group 1 consists of 89 (57.4%) patients who underwent we have developed a comprehensive anti-bacterial treatment and preventive measures. 2- group consists of 67 (42.6%) patients who underwent the traditional scheme of prevention and surgical treatment.

It is not defined diagnostic criteria for signs of valve infective endocarditis (IE):

- High frequency of systemic embolism
- High mortality in the treatment of infective endocarditis (IE)
- The dilemma of the optimal operation period
- Imperfect system of prevention
- Aspects of the antimicrobial therapy

In our department we developed comprehensive measures for the prevention and treatment of IE in these patients. They have the following objectives:

1. The elimination of infectious focus
2. Hemodynamic wrinkle correction
3. Reliable fixation of the prosthesis
4. Prevention of relapse of IE

CLINICAL EXAMINATIONS

We have used highly informative methods: general clinical tests, electrocardiography (ECG), chest X-ray, transthoracic echocardiography (TTE) - all patients, transesophageal echocardiography (TEE) - at 40.5%; coronary angiography and heart catheterization - at 12.65%; Study blood culture - in 38.6% of patients, histology with light electron microscopy (SEM) - 47.5% of the operated patients. Surgical treatment consisted in an "open" correction affected valves, with carrying out complex measures on liquidation of intracardiac foci of infection and prevention of postoperative septic complications. All patients underwent surgery with cardiopulmonary bypass (CPB) and cardioplegia (CP). If execution of the multi-valve heart defects correction performed by the conventional protocol, the features of the main phase of the operation and application of the developed therapeutic and preventive measures differed from those used in other clinics.

RESULTS

In the surgical treatment of heart disease multivalve with infective endocarditis are many problems, the solution of which can affect the results of surgical treatment.

Applications developed by our therapeutic and preventive measures aimed at significantly improving the immediate and long-term results of our operations.

The nature of operations performed in our patients is provided in Table №1. The most commonly performed Mitral valve replacement plus aortic valve with tricuspid valve repair (MVR+AVR with TV repair). Other types of operations listed in Table №1: MV repair - mitral valve repair AV - aortic valve AVR - aortic valve replacement, OTC - tricuspid open commissurotomy, TPV - tricuspid prosthetic valve, MVR - mitral valve replacement. Other operations - a combination of any operation with thrombectomy of the left atrium.

Table №1
The nature of operations performed in patients with multi-valve heart defects with infective endocarditis

Name the transactions	Number of	Percent
MVR+AVR with PI TC	78	50%
TV repair with PI MK and AK	26	16.7%
MVR with PI TK and AK	21	13.4%
AVR with PI TK and MK	7	4.5%
MVR with PI TC	6	3.8%
MVR+AVR with OTC	4	2.5%
MVR to PTK AVR and	2	1.3%
MVR to PTK	2	1.3%
Other operations	10	6.4%
MVR+AVR with TV repair	78	50%
PI TV with PI MV and AV	26	16.7%
PMV with TV repair and AV	21	13.4%
PAV with TV repair and MV	7	4.5%

PMV with PI TC	6	3.8%
MVR+AVR with OTC	4	2.5%
PMV to PTV PAV and	2	1.3%
PMV to PTV	2	1.3%
Other operations	10	6.4%

* PMAV- prosthetics of mitral and aortic valves,
 TV repair – tricuspid valve repair,
 Pl.MV - plasty of mitral valve,
 Pl.AV - plasty of aortic valve,
 PMV - prosthetics of mitral valve,
 PMV - prosthetics of mitral valve,
 PAV – prosthetics of aortic valve,
 PTV - prosthetics of tricuspid valve,
 OTC - open tricuspid commissurotomy.

Intraoperative treatment and preventative measures (LSM) were as follows:

1. Mechanical and chemical sanitation of infected heart area
2. Valve Implants with antibacterial properties
3. Hyperthermic Perfusion
4. The antimicrobial therapy, including anti-fungal agents.

As we know from the literature, the use of specially produced artificial mechanical heart valves, can prevent the further development or activation of the infection. Impregnated antibiotic cuff artificial prosthesis retains its activity for 2 weeks, which reduces the recurrence of IE (8). In addition, as our experience with hyperthermic perfusion in these patients, the impact on micro and macro-organism is as follows: after removal of the clamp from the aorta of the patient is necessary to keep the temperature within $t = 38,5-39\text{ C}$ for 15-20min. This results in “impact on the macro-organism”: restoring the patient immunobiological properties (7). “The impact on the micro-organism”: the intensification of the pathogen metabolism and enhancing the effectiveness of antibiotics.

(6) From laboratory studies of particular importance was attached to

Table №2
Microbiological examination

Microorganisms	Frequency allocation,%
Gram (-) negative bacillus	8,8
Gram (+) positive bacillus	2,5
Staphylococcus aureus	7
Pseudomonas aeruginosa	6,3
St.epidermidis	5
Candida spp.	5
Klebsiella pneumoniae	4
in total	38,6

microbiological tests, the results of which were prescribed antibiotic therapy. Table №2 shows the results of microbiological tests, where in contrast to literature data, 5% of the surveyed identified fungal lesions of the heart valves - Candida spp. In other positions of these studies: in 38.6% of cases had a blood culture positive, of which 8.8% of the cases detected in multidrug-resistant Gram-negative antibiotic therapy flora, 7% - Staphylococcus aureus, and in 6.3% of cases detected Pseudomonas aeruginosa . Given these data, in the protocol of conducting our patients in addition to conventional antibiotic therapy were included antifungals.

In a survey of our patients for an adequate definition of surgical tactics, particular importance was attached to echocardiography data. Indicators TTE with Doppler in relation to the clinical criteria were the basis of indications for surgical correction of multi-valve defect with infective endocarditis. An examination of our patients the following results were obtained data echocardiography preoperatively (Table.№2). The peculiarities of defect anatomy of this disease complications, presence of comorbidities

surgical tactics of the operation has been identified. At intraoperative preparation was carried even further TEE which refined the tactics adopted by the performance of surgical correction and evaluation of the adequacy of the operation.

Table №2

Clinical characteristics of patients according to the TT echocardiography preoperatively

Options LV	group I	group II	Overall	Meaning P1-2
	M±m	M±m	M±m	
EDD (ml)	5,88±0,15	6,16±0,18	6,01±0,12	>0,05
EDV (ml)	181,8±9,81	194,55±13,4	187,3±8,01	>0,05
ESD (ml)	3,88±0,12	7,05±1,65	5,3±0,76	<0,05
ESV (ml)	83,64±12,1	81,86±6,82	82,8±7,44	>0,05
SV (ml)	111,24±5,9	116,45±7,5	113,5±4,69	>0,05
EF (%)	63,21±1,96	60,3±1,19	61,83±1,23	<0,05

- *LV – left ventricle,
- EDD – end – diastolic dimension,
- EDV – end – diastolic volume
- ESD – end – systolic dimension
- ESV – end – systolic volume
- SV – stroke volume
- EF – ejection fraction

Indications for surgical treatment in our patients, in most cases, was progressive heart failure. As can be seen from the table №3 importance and other life-threatening complications of infective endocarditis, the main of which is a progressive heart failure, which is marked by the overwhelming number of cases. Thus, the indications for the implementation of urgent (sometimes urgent) for “health reasons” operations are listed below indications for surgical treatment of severe patients (Table 3).

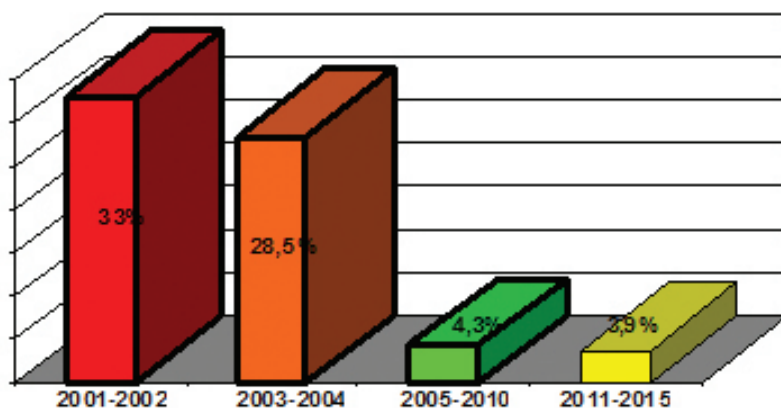
At the same time, we are sure to achieve lower inflammatory activity using a complex cardiac and antibiotic therapy. The combination of the preoperative preparation, using the developed therapeutic and preventive measures, subsequently, was the basis decrease in mortality in the short and long periods of observation.

Table №3

Indications for the implementation of multi-valve defect surgery with infective endocarditis

Indications for surgery	Number	percent
Progressive heart failure	96	(61,4%)
The ineffectiveness of antibiotic therapy	20	(12,9%)
floating vegetation	14	(8,9%)
Embolism	17	(10,9%)
abscess	9	(5,9%)
Total operated	156	(100%)

Analysis of the nearest results of our operations in the two groups showed that there was 5.1% in the first group, mortality rate, and in the second group - 9.3%. Thus, the overall hospital mortality was 6.9%. With the development of diagnostic criteria for multi-valve defect with infective endocarditis, choosing the right surgical technique and the use of therapeutic and preventive measures developed in the department (LPM), we managed to reduce the rate of hospital mortality. The dynamics of the reduction of hospital mortality can be seen in the Diagram №1.

Diagram №1**Dynamics of hospital mortality data****Dynamics echocardiographic parameters****Table №4**

Echocardiographic data	The periods of observation		
	Before surgery	At discharge	3 years later
I-group			
EDD (ml)	5,88±0,15	5,03±0,13	4,65±0,16
EDV (ml)	181,8±9,81	133,63±8,12	105,4±7,43
ESD (ml)	3,88±0,12	3,67±0,11	3,3±0,21
ESV (ml)	83,64±12,12	67,58±6,56	45,4±5,76
SV (ml)	111,24±5,97	65,8±2,97	60,01±3,32
EF (%)	63,21±1,96	51,05±1,48	61,45±2,5
P II-group	<0,03		
EDD (ml)	6,16±0,18	5,34±0,17	5,14±0,15
EDV (ml)	194,5±13,39	147,13±11,21	125,71±8,07
ESD (ml)	5,25±1,01	5,1±1,22	3,3±0,21
ESV (ml)	81,86±6,82	73,16±7,05	47,93±5,91
SV (ml)	116,45±7,55	73,63±4,95	77,6±6,06
EF (%)	60,0±1,19	52,34±1,57	58,36±3,16
P	<0,05		

*LV-left ventricle,
 EDD – end-diastolic dimension,
 EDV – end-diastolic volume
 ESD – end –systolic dimension
 ESV – end –systolic volume
 SV-stroke volume
 EF-ejection fraction

CONCLUSION

Thus, a brief analysis of the results of surgical treatment of multi-valve heart defects with infective endocarditis showed the importance of preoperative measures to prepare for the implementation of the “open” at the correction of this severe group of patients. Morphological studies found that during the formation of microbial vegetation dominated by a mixed infection, which in 41.7% of cases is caused by the addition of fungal microflora. This demonstrates the feasibility of the combined use of antibiotics and antifungal drugs in the complex treatment of KIE. The combination of therapeutic and preventive measures and surgical treatment of KIE is an effective method, and has allowed us to reduce hospital mortality from 9.3% to 5.1%. If we analyze the mortality rates over the years, the hospital mortality rate was reduced to 3.9% in recent years. On the basis of our data the following conclusions:

1. In patients with multi-valve heart disease, verified diagnosis of IE is advisable to perform transesophageal echocardiography to determine the indications for surgical treatment at the earliest timing, to the development and spread of destructive phenomena in the heart structures.
2. Regardless of the type of the pathogen of endocarditis, treatment protocol and in the perioperative management of patients with IE must enable antifungal therapy.
3. In the surgical treatment of multi-valve heart defects with IE recommend the use of complex therapeutic and preventive measures, which can significantly improve the results.

4. Patients operated in the active phase of infective endocarditis prophylaxis for endocarditis prosthetic and achieve consistently good results in the long term need to continue a course of antibacterial and antifungal therapy.

5. Patients who had undergone open-heart surgery on the IE has a high risk of prosthetic endocarditis.

This new treatment approach is associated with significant improvement of left ventricular function and low mortality rate as compared to other methods above.

CONFLICT OF INTERESTS

The authors declare that there are no conflict of interests.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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None.

STUDY ASSOCIATION

This study is not associated with any thesis or dissertation work.

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XÜLASƏ

Çox Qapaqlı İnfektiv Endokarditin Cərrahi Müalicəsi

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Diaqnostikanın xüsusiyyətləri və yoluxucu endokarditdə çoxklapanlı ürək xəstəliyinin cərrahi müalicəsinin nəticələri. Təhlil məlumatları və kliniki nəticələrə əsasən, yoluxucu endokarditi olan 156 pasient cəlb olunmuşdur ki, bunlardan 85 nəfəri kişi (56.5%) və 71 (45.5%) nəfəri qadın olmuşdur. Bizim pasientlərin yaş həddi 12- 68 (orta 32.76 ± 1.6) arasında dəyişmişdir. Diaqnostika təsnifatlandırma və meyarlara əsaslanmışdır. Pasientlər iki qrupa ayrılmışdır: 1-ci qrupda, 89 (57.4%) pasient antibiotik terapiya müəlliflərinin işləyib hazırladıqları mürəkkəb müalicə və profilaktika tədbirləri keçmiş pasientlər, 2-ci qrupda isə ənənəvi cərrahi müalicə proqramı keçmiş 67 (42.6%) pasient olmuşdur. İstifadə edilmiş diaqnostika: bütün pasientlər üçün elektrokardiografiya (ECG), "Skopje"dən olan Rentgen şüa spektrləri, transsorakik exokardiografiya (TTEHOKG) istifadə edilmişdir, 40.5% pasientə transesofageal exokardiografiya (TEHOKG); 12.65% pasientlərdə koronaventrikuloqrafiya (CVG) və angiokardiografiya (ACG); 38.6% pasientlərdə qan kulturasının araşdırılması, 47.5% pasientə işıq histologiya elektron mikroskopiyası (LEM) edilmişdir.

Qeyri-operativ müalicə - profilaktiki tədbirlər (TPM) aşağıda verildiyi kimi olmuşdur: ürəyin yoluxmuş nahiyəsinin mexaniki – kimyəvi sanitasiyası; klapan implantasiya antibakterial xassələri; hipodermik perfuziyası, anti mikrobioterapiya, o cümlədən göbələyə qarşı vasitələr. Yuxarıda verilmiş tədbirlərin həyata keçirilməsi araşdırma qrupunda ölüm səviyyəsini 5.1 % və nəzarət qrupunda 9.3% azalda bilər. Dinamikada araşdırma qrupunda son Qodi ölüm səviyyəsi 3.9% azalmışdır.

Açar sözlər: Çox qapaqlı qazanılmış ürək xəstəlikləri, yoluxucu endokardit ağırlaşmaları, terapevtik və profilaktiki tədbirlərin işlənilib hazırlanması, araşdırılan qrup pasientləri arasında ölüm səviyyəsinin azaldılması

РЕЗЮМЕ**Хирургическое Лечение Многоклапанного Инфекционного Эндокардита****Хамидулла АБДУМАДЖИДОВ***Республиканский Специализированный Научно-Экспериментальный Лечебный Центр Хирургии имени академика В. Вахидова, Ташкент, Республика Узбекистан***Хиджран БУРАНОВ***Республиканский Специализированный Научно-Экспериментальный Лечебный Центр Хирургии имени академика В. Вахидова, Ташкент, Республика Узбекистан***Искендер БАЙБЕКОВ***Республиканский Специализированный Научно-Экспериментальный Лечебный Центр Хирургии имени академика В. Вахидова, Ташкент, Республика Узбекистан***Боис САДЫХАНОВ***Республиканский Специализированный Научно-Экспериментальный Лечебный Центр Хирургии имени академика В. Вахидова, Ташкент, Республика Узбекистан***Абдулла АЛИМДЖАНОВ***Республиканский Специализированный Научно-Экспериментальный Лечебный Центр Хирургии имени академика В. Вахидова, Ташкент, Республика Узбекистан*

Особенности диагностики и результаты хирургического лечения многоклапанного порока сердца при инфекционном эндокардите. По данным анализа и клиническим результатам, было вовлечено 156 больных инфекционным эндокардитом, 85 (56,5%) из которых были мужчин, а 71 (45,5%) – женщины. Возрастной диапазон наших пациентов колебался от 12 до 68 лет (в среднем $32,76 \pm 1,6$). Диагноз ставился на основании классификации и критериев. Пациенты были разделены на две группы: в 1-й группе было 89 (57,4%) пациентов, прошедших комплексные лечебно-профилактические мероприятия, разработанные авторами антибактериальной терапии, а во 2-й группе - 67 (42,6%) пациентов, перенесших традиционную программу хирургического лечения.

Используемые методы диагностики: для всех пациентов была проведена электрокардиография (ЭКГ), спектральное рентгеновское излучение от Скопье, трансоракальная эхокардиография (ТЭХКГ), а для 40,5% пациентов использована чреспищеводная эхокардиография (ЧПЭХКГ); 12,65% пациентов -Коронавентрикулография (КВГ) и ангиокардиография (АКГ); у 38,6% пациентов исследована культура крови, световая гистологическая электронная микроскопия (ГЭМ) же применена к 47,5% пациентам.

Ниже изложено показаны безоперационные лечебно-профилактические мероприятия (ЛПМ): механически-химическая санация инфицированного участка сердца; антибактериальные свойства клапанной имплантации; подкожная перфузия, антимикробная терапия в том числе, противогрибковые средства. Реализация вышеперечисленных мер может снизить уровень смертности в исследуемой группе на 5,1%, а в контрольной группе на 9,3%. Динамика уровня недавней смертности Godi в группе исследования снизилась на 3,9%.

Ключевые слова: Многоклапанный приобретенный порок сердца, осложнения инфекционного эндокардита, разработка лечебно-профилактических мероприятий, снижение летальности среди исследуемой группы пациентов