Surgical Treatment of Acute Infective Valvular Endocarditis (18 Years Experience)

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ABSTRACT Background: Infective endocarditis morbidity remains high: 3 to 8 cases per 100,000 of population. Antibiotic therapy is ineffective. Its surgical treatment experience is relatively limited. Aim: To share the surgical treatment experience of 855 patients with acute infective valvular endocarditis (AIVE) treated during 1982 to 2000 in the Institute of Cardiovascular Surgery AMS, Ukraine. Materials and Methods: 855 (75.4%) of 1128 hospitalized patients with AIVE were operated upon. Surgical interventions included removal of diseased tissues, heart chambers treatment with antiseptic solutions, wash out with normal saline solution, replacement or plastic procedure of valves. Results: Heart abscesses were found in 132 (15.5%) patients. Hospital mortality was after aortic valve replacement 12.6%; mitral valve replacement 9.7%; plastic procedure on mitral valve 0%; aortic and mitral valve replacement 30%; tricuspid valve replacement 15.4%; and plastic procedure on tricuspid valve 6.1%. Recurrences of infective process occurred in 51 (6.0%) patients. Infections were observed more frequently in patients with heart abscesses: 10.6% versus 5.7% (p < 0.02). Results: 716 (96.7%) patients were studied 2 to 194 (87.4 ± 39.4) months postoperatively. Tenth year postoperative survival was $62.1 \pm 27.7\%$ including hospital mortality. *Conclusions:* (1) AIVE has become one of the most frequent causes of acquired heart lesions in the postChernobyl nuclear power station catastrophe era. (2) Heart failure development in postoperative period is stipulated by the disease duration. (3) Presence of heart abscesses favors recurrence of development of infective endocarditis. (4) Postoperative antibiotic therapy for more than 3 weeks does not help in prevention of recurrences. (J Card Surg 2001;16:388-391)

Problems connected with surgical treatment of active valvular infective endocarditis, continue to attract the attention of cardiac surgeons. Infective endocarditis morbidity remains quite high—in the majority of countries, it constitutes 3 to 8 cases per 100,000 of population per year.¹⁻³ Inefficient antibiotic therapy or development of complications demand surgical treatment of the pathology.⁴⁻⁶ However, the results of surgical treatment of infective endocarditis are worse than the results of surgical treatment of rheumatic valvular heart lesions.⁷⁻¹⁰

Because most cardiac surgery clinics possess relatively limited experience with surgical treatment of infective endocarditis, the treatment of this group of patients remains more difficult.

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In this study we aim to share our experience in this field and to determine the factors which increase the risk of surgical treatment of infective endocarditis.

MATERIALS AND METHODS

During the period between January 1982 and May 2000, 1128 patients with infective endocarditis were hospitalized in the Institute of Cardiovascular Surgery of the Academy of Medical Sciences of Ukraine. Criteria of Van Reyn et al.¹¹ and Duke Criteria¹² were used for the diagnosis of infective endocarditis. Of all hospitalized patients with a diagnosis of an infective endocarditis, 851 (75.4%) were operated upon.

Indications for operations were the following:

- Absence of the effect of antibiotic therapy; presence of paravalvular abscesses, septic embolism: 98 (11.5%) cases;
- Hemodynamic disturbances-as a result of the appearance of new heart valve lesions or as a result of progression of old lesions due to valve destruction by an infection (leaflet rupture or perforation or chordae damages): 272 (31.9%) cases;
- Combination of uncontrolled sepsis and heart failure in 481 (56.5%) cases.

The percentage of operations performed for indications of infective endocarditis among all openheart operations which were fulfilled in patients with acquired heart valve lesions were 1.4% in 1982, 11.5% in 1992, 18.6% in 1996, and 20.4% in 1999(Fig.1).

The most obvious increase in the frequency of infective endocarditis occurred after 1986-the year of the Chernobyl nuclear power station catastrophe.

Operations were performed on 671 (78.8%) males and 180 (21.2%) females. Patient age ranged from 1 to 75 years (mean age was 41.7 \pm 18.2 years). The mean interval from the onset of illness to the time of operation was 4.1 ± 2.1 months, during which time patients were treated by cardiologists until they were hospitalized in our Institute. The mean duration of antibiotic therapy was 3.2 ± 1.9 months. After entering the Institute, patients were operated upon without delay. Preoperative echocardiography (TTE) was performed in 818 (96.1%) cases , vegetations were found in 642 (75.4%) cases. In addition to TTE, in 78 cases TEE was used: in this group vegetations were found in 76 (97.5%) patients. The mean preoperative New York Heart Association (NYHA) functional class was 2.9 ± 1.3 .

All operations were performed with the use of cardiopulmonary bypass and systemic hypothermia. Operations on the valves of the left side of the heart (aortic or mitral) were performed with the use of a crystalloid (675 [88.0%] cases), and blood cardioplegia (129 [15.2%] cases).

Operations on the valves of the right side of the heart were performed under conditions of a crystalloid cardioplegia in 18 (2.1%) cases and in conditions of artificial fibrillation with moderate 32[°]C hypothermia in 29 (3.4%) cases.

Surgical intervention included: removal of all diseased tissues, heart chamber treatment with antiseptic solutions, their irrigation and wash out with a saline solution and the following suction removal of these solutions on discard, replacement or plastic procedure on the valves. The types of valve operations is listed in Table 1.

The most frequent additional procedures in cases of aortic valve replacement were: mitral valve repair, VSD closure, plastic procedure of an aneurysm of the sinus of Valsalva, plastic procedure



Figure 1. Percentage of operations due to infective endocardititis among all open heart valve operations.

TABLE 1 Types of Valve Operations	

Types of operations	N	%
Aortic valve replacement	593	69.7
Mitral valve replacement	134	15.7
Double valve replacement	63	7.4
Tricuspid valve repair	31	3.6
Mitral valve repair	14	1.6
Tricuspid valve replacement	13	1.5
Tricuspid valve resection	2	0.2
Pulmonary artery valve resection	1	0.1
Total	851	100

TABLE 2			
Procedures	Additional to	Aortic Valve	Replacement

Types of procedures	N	%*
Mitral valve repair	26	4.3
VSD closure	18	3.0
Coronary artery bypass grafting	17	2.8
Plastic repair of the sinus of Valsalvae aneurysm	16	2.7
Bentall operation	7	1.18
ASD closure	7	1.18
Left ventricle to right atrium communication closure	3	0.5
Tricuspid valve repair	2	0.3
Mitral and tricuspid valve repair	1	0.17
Tricuspid valve replacement	1	0.17
Mitral valve repair + VSD closure + Tricuspid valve resection + Pulmonary artery valve resection	1	0.17
PDA closure	1	0.17
Additional pathways cryoablation	1	0.17
Plastic prosedure on the Tricuspid valve + ASD closure	1	0.17

*% to all aortic valve replacements (N = 593)

of the ascending aorta aneurysm (Bentall operation), and coronary artery bypass grafting (Table 2).

Additional procedures in cases of mitral valve operations were the following: aortic valve repair, coronary artery bypass grafting, VSD closure, ASD closure, tricuspid valve repair, De Vega annuloplication of the tricuspid valve (Table 3).

Heart abscesses were found in 132 (15.0%) cases.

Surgical techniques for aortic valve repair were the following: patch closure of the perforation was done in 3 cases, complete replacement of one or two leaflets using autopericardium in 3 cases

Surgical techniques for mitral valve repair included patch closure of the perforation, suture closure of the perforation, leaflet resection, chordae transfer, shortening of the chordae, Reed's procedure (Table 4).

Surgical techniques for tricuspid valve repair included: removal of the diseased posterior leaflet

TABLE 3
Procedures Additional to Mitral
Valve Replacement

Types of procedures		%*
Aortic valve repair	3	2.2
Coronary artery bypass grafting	2	1.5
VSD closure	3	2.2
ASD closure	3	2.2
Tricuspid valve repair	3	2.3
De Vega annuloplication of the tricuspid valve	6	4.4

*% to all mitral valve replacements (N = 134)

 TABLE 4

 Surgical Techniques for Mitral Valve Repair

Types of techniques	N	%
Patch closure of the leaflet perforation	8	19.0
Suture closure of the leaflet perforation	13	31.0
Leaflet resection	7	16.7
Chordae transfer	5	11.9
Shortening of the chordae	5	11.9
Reed's procedure	4	9.5
Total	42	100.0

and bicuspidalization or resection of one or two leaflets and their replacement using autopericardium. In all cases plastic procedures on tricuspid valve were combined with De Vega plastic procedure.

All patients received antibiotic therapy during the postoperative period in the following manner: 1.5 to 3 months during 1982-1995 in 471 patients; and for 2-3 weeks during 1996-2000 in 380 patients.

Hospital mortality includes every death occurring during hospitalization regardless of the length of the time from the intervention itself or within 30 days of the patients being discharged.

RESULTS

Seventy-five patients (12.6%) died in the group of aortic valve replacement, 13 (8.8%) patients died in the group of operations on the mitral valve, including 9.7% mortality in cases of mitral valve replacement and zero mortality in cases of mitral valve repair; after combined mitral and aortic valve replacement 19 (30.1%) patients died. In cases of plastic procedures on the tricuspid valve, hospital mortality was 6.1%, and in cases of tricuspid valve replacement: 15.4% (2 cases of 13).

Causes of death were low cardiac output syndrome: 54 (48.6%) cases; neurological complications: 31 (27.9%) cases; recurrence of a septic process: 18 (16.2%) cases; renal insufficiency: 2 (1.8%) cases; and multiorgan failure in 6 (5.5%) cases.

Correlation between the different factors of preoperative conditions and early results of surgical treatment of infective endocarditis were studied. Presence of a septic emboli, indications (elective, urgent, emergent), presence of additional procedures, illness duration, presence of heart abscesses, duration of antibiotic therapy, and other factors were analyzed. In the majority of cases no significant correlation was observed. However in cases where illness duration did not exceed 3 months, low cardiac output was noted in the postoperative period in 28.8% of patients. When the disease lasted from 3.1 to 6 months, low cardiac output occurred in 33.5% of patients. In those cases where illness duration was more than 6 months low cardiac output occurred in 41.2% of cases.

Recurrence of infective endocarditis was noted in 51 (6.0%) patients. When heart abscesses were present, recurrences occurred in 14 of 132 (10.6%) of cases; when heart abscesses were absent, in 37 of 719 (5.7)% patients (p < 0.02).

When antibiotic therapy after operation lasted 1.5 to 3 months, recurrences of a septic process occurred in 36 (7.6%) patients of 471 patients. When postoperative antibiotic therapy lasted 2 to 3 weeks, recurrences occurred in 15 of 380 (3.9%) patients.

Remote results: 716 (96.7%) of discharged patients were observed from 2 to 194 months postoperatively (mean 87.4 \pm 39.4 months).

Survival to the 10th year after operation was $62.1 \pm 27.7\%$ (including hospital mortality). Among surviving patients, 87.6% of patients were transferred to a higher functional class of NYHA classification.

CONCLUSIONS

Infective endocarditis is one of the most frequent causes of acquired heart lesions in Ukraine. This became most evident after the Chernobyl nuclear power station catastrophe. Development of a cardiovascular insufficiency in the postoperative period to a certain degree is stipulated by the duration of the disease. The presence of heart abscesses favors development of the recurrences of infective endocarditis. Antibiotic therapy for over 3 weeks does not help in prevention of recurrences.

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