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Infective valve endocarditis treated by surgery: analysis of 64 cases

Endocardite infecciosa valvar submetida a tratamento cirúrgico: análise de 64 casos

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Abstract

Objective: **To identify some aspects of infective valve endocarditis treated by heart surgery, as well as antibiotic therapy, in a public hospital in the city of Fortaleza, Ceará state, Brazil, from 1988 to 2003.**

Method: **A retrospective and observational study was performed of 64 patients with infective valve endocarditis who required aortic and/or mitral valve replacement, tricuspid vegectomy and repair or pulmonary valve valvulectomy, as well as antibiotic therapy, during their in-hospital stay. They were analyzed in respect to gender, age, time elapsed from hospital admission to the surgery, time elapsed from hospital admission to hospital discharge, valve lesion, blood culture result, surgical treatment and mortality.**

Results: **Infective valve endocarditis treated by heart surgery was more frequent in the third decade of life. Most of patients (81.2%) were males. The patients who died spent a shorter time from hospital admission to the surgery than the patients who survived. The aortic valve was affected in 65% of cases. Positivity blood cultures were seen in 42% and *Staphylococcus aureus* was isolated in 52.4% of these cases. Valve replacement was necessary in 93.7% of cases. The in-hospital mortality rate was 14.1% which was not influenced by the age of the patient or the blood culture result.**

Conclusion: **Infective valve endocarditis treated by heart surgery was more frequent in men and in the third decade of life. It mostly affected the aortic valve. *Staphylococcus aureus* was the more common pathogen found. Almost all the patients needed replacement of the infected valve and the in-hospital mortality rate was 14.1%.**

Descriptors: **Endocarditis, surgery. Heart valve diseases. Bacterial infections. Staphylococcal infections.**

Resumo

Objetivo: **Identificar aspectos clínico-laboratoriais da endocardite infecciosa valvar, tratada com cirurgia, no Hospital de Messejana, Fortaleza, CE, no período de 1988 a 2003.**

Método: **Estudo observacional, retrospectivo, da fase hospitalar, de 64 pacientes portadores de endocardite infecciosa, submetidos à substituição valvar aórtica e/ou mitral, vegectomia e plastia da tricúspide e excisão da valva pulmonar,**

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como parte do tratamento. Analisados o sexo, a idade, o tempo decorrido entre a internação e a cirurgia e entre a internação e a alta hospitalar, a valva acometida, o resultado da hemocultura, o procedimento cirúrgico efetuado e a mortalidade.

Resultados: **A endocardite infecciosa valvar, tratada com cirurgia, preponderou na terceira década, 81,2% dos pacientes eram masculinos. O tempo decorrido entre a internamento e a cirurgia foi menor nos pacientes que faleceram. A valva aórtica, de modo isolado ou associado, foi acometida em 65% dos casos. Hemoculturas foram positivas em 42%; em 52,4% delas, isolou-se Estafilolococo aureus. Necessitaram de substituição valvar 93,7% dos pacientes. Houve mortalidade de 14,1%, não influenciada pela idade nem pelo resultado da hemocultura.**

Conclusão: **Endocardite infecciosa valvar, submetida ao tratamento cirúrgico, foi mais freqüente em homens e na terceira década. Acometeu preferencialmente a valva aórtica. Estafilolococo aureus foi o patógeno mais comum. Na quase totalidade dos casos, procedeu-se substituição valvar e a mortalidade hospitalar foi de 14,1%.**

Descritores: **Endocardite, cirurgia. Doenças das valvas cardíacas. Infecções bacterianas. Infecções estafilocócicas.**

INTRODUCTION

Infectious valvar endocarditis (IVE) does not always evolve satisfactorily with medicinal treatment. Sometimes, in its active phase, it requires heart surgery and repair of the valvar defect [1]. As a matter of fact, heart surgery is necessary in the active phase of the disease in around 30% of patients [2]. The most common determinants of this conduct are severe heart failure (HF), the presence of uncontrollable fungal infection, repetitive embolic phenomena and the occurrence of peri-valvar abscesses [3].

Over the last few years, infectious endocarditis has presented important changes in its clinical, laboratorial and therapeutic aspects. Among them, a tendency to affect older patients, predominantly male, an increase in the acute cases, a reduction of the cases caused by streptococcus (parallel to the increase of the cases caused by staphylococcus, negative gram bacteria and fungus), an increase in cases related to the use of endovenous drugs, an increase in cases of patients with valvar prosthesis and an increase in cases related to HIV should be stressed. Finally, we should observe the increasing role of the echocardiogram in diagnosis and of an earlier surgical intervention of the disease [1].

Up to what point are these changes also occurring in Brazil, particularly in its poorer communities is a matter which needs to be discussed.

Ceará State is very representative of Northeastern Brazil, with a GDP per capita of approximately half of the country's average and a human development index of 0.700, much less than the national mean (0.777) and similar to other states in the Northeast.

In Fortaleza, capital of Ceará State, the Messejana Hospital of the State Health Secretary (MH-HS-CE) is the main tertiary center of cardiovascular care treating Government Healthcare Plan patients. This work aimed at identifying some clinical- laboratorial aspects of IVE in patients who underwent operations in the active phase of the disease in the period from 1998 to 2003. Analysis of the gender and age of patients, the time between hospitalization and surgery, the valves involved, the procedures performed, the result of the blood culture, the microorganisms which caused the disease, the mortality and any factors reported about the disease were considered.

METHOD

A retrospective and observational study was performed of 64 patients from the MH-HS, who were submitted to heart surgery, with repair or valvar replacement, as part of treatment for active IVE from 1st January 1998 to 31st December 2003. The data were obtained from an analysis of the surgical records from the MH-HS and from a review of report cards of patients submitted to heart surgery for IVE.

Because histopathologic and microbiologic analysis of the valves and excised vegetations was impossible, similar to another report [4], active IVE was defined when the patients presented, not only clinical-laboratorial diagnosis of the disease, but valve vegetation identified during surgery. The review of the patients' report cards analysed the gender, age, presence of a vegetation or perivalvar abscesses, the echocardiogram, results of the blood culture, time elapsed from hospital admission to the surgery, hospitalization time, injured valve, surgical conduct and mortality and related parameters.

Fisher and Mann-Whitney tests, when appropriate, were associated to the descriptive analysis of the data. A p-value > 0.05 was considered significant [5].

As this is a retrospective study, approval of the ethics in research committee was not necessary.

RESULTS

All patients presented, to a greater or lesser degree, the recognized clinical-laboratorial changes of an infective and inflammatory process, suggestive of infective endocarditis [2], accompanied by valve vegetation or perivalvar abscess seen by transthoracic or transesophageal echocardiogram. These findings proved the necessity of the surgery.

Table 1 summarizes the main clinical-laboratorial characteristics and the evolution of the series.

Table 1. Main clinical-laboratorial characteristics and the evolution of the analysed series

	%
Total	64 (100%)
Men [a]	52 (81.2%)
Women [a]	12 (18.8%)
Age [b]	27
Time from hospital admission until surgery [c] (patients released from hospital)	15
Time from the hospital admission until surgery [c] (patients who died)	7
Hospital time [c]	45
Aortic IVE [a]	26 (40.1%)
Mitral IVE [a]	16(25.0%)
Mitral-aortic IVE [a]	15 (23.4%)
Tricuspid IVE [a]	6 (9.4%)
Pulmonary IVE [a]	1 (1.6%)
Positive blood culture [d]	21(42%)
Valvar replacement [a]	60(93.7%)
Hospital mortality [e]	9(14.1%)

a - number and percentage, b - mean in years, c – mean in days, d - found result in 50 patients (number and percentage), e- number of dead patients and percentage of deaths

There was a higher rate of male patients, mean age of 27 years and in the third decade. The youngest patient was three months old suffered tricuspid IVE, caused by candida in the postoperative period of colostomy with central venous catheters and during prolonged parenteral nutrition. The oldest was 81 years old also with tricuspid IVE, caused by infection of a definitive pacemaker bag and of its electrode.

The aortic valve was the most commonly involved valve. It was an isolated injury in 40.1% of the patients and in 63.5% cases it was associated to a simultaneous involvement of the mitral valve. The mitral valve was the second most frequently injured – 25% of the cases in isolation and 48.4% associated to the aortic valve.

IVE of the tricuspid valve was observed in 9.4% of the cases. In two patients it resulted from an infection of the endocardial pacemaker bag and of its electrode, requiring the system to be changed with the implantation of an epicardial electrode. In two other cases, tricuspid IVE was associated with an interventricular communication (IVC). In one patient, the Ebstein anomaly was identified and in the other, as previously described, it was a complication of prolonged parenteral nutrition.

Involvement of the pulmonary valve was observed in one patient with just one ventricle and pulmonary stenosis and that one year previously had been submitted to the Glenn procedure.

Fifty patients' report cards showed the results of blood cultures. The culture was positive in 21 (42%) of the cases and negative in 29 (58%) and the most common infectious agent identified was staphylococcus aureus – Table 2.

Table 2. Positive blood cultures – Isolated microorganisms *

Microorganisms	%
Staphylococcus aureus	11 (52.4%)
Streptococcus viridans	6 (28.6%)
Staphylococcus epidermidis	1 (4.8%)
Streptococcus beta-hemolytic	1 (4.8%)
Pseudomonas sp	1 (4.8%)
Candida sp	1 (4.8%)
Total	21 (100%)

*number and percentage

In the patients who died, the mean time between hospital admission and surgery was half the time of those who were discharged from hospital. The mean hospital stay was three times greater than the mean time between hospital admission and surgery.

In 60 patients, 93.7% of the cases, the IVE surgery resulted in valve replacement. In 38 of them (63.3%) metallic prostheses were employed and in 22 (36.7%) bioprostheses were used.

In 57 patients only valvar replacement was necessary and in three this was followed of plasty or vegectomy of another injured valve.

Four patients did not require prostheses. Three were submitted to plasty and tricuspid vegectomy and one the resection of the pulmonary valve.

Nine patients died giving a mortality rate of 14.1% and the cause of death was generally low cardiac output syndrome, complications of the central nervous system or a systemic infection.

There were no significant differences in the ages between the dead patients and the patients discharged from hospital - Table 3.

Additionally, there was a significant association between the possibility or not of the blood culture being positive, the type of microorganism isolated and the mortality – Table 4.

Table 3. Relationship between the age and mortality or hospital discharge

Patient	N	mean age	SD	minimum	mean	maximum
Discharged	55	30.72	17.89	0.25	27.00	81.00
Dead	9	29.54	15.58	7.00	24.00	65.00
Total	64	30.49	17.36	0.25	27.00	81.00

(Mann-Whitney test: P-value = 0.8846)

Table 4. Relation between the result of blood culture and mortality.**

		Number of Patients	Released	Death
Blood culture	Positive	21 (100%)	17 (81.00%)	4 (19.00%)
	Negative	29 (100%)	24 (82.80%)	5 (17.20%)

** number and percentage. (Fisher exact test: P-value = 1.00)

DISCUSSION

Patients with IVE treated by surgery during the active phase of the disease are different of those who exclusively receive clinical treatment [1,6].

However, in this work, in respect to the gender and age, the disease was four times more frequent in men and there was a higher rate in the third decade of life, not disagreeing in this aspect to previously published reports on infective endocarditis, independently of the conduct adopted [7,8]. The higher numbers for men, at least in operated patients, is similar to previous research [8,9] confirming the greater involvement of the male population. In respect to the age range, our study differs in relation to a tendency, described in the North-American literature, of an increase in the mean age [1]. In this case, it is easy to mistake the presence of chronic rheumatic heart disease, still endemic in Fortaleza in low-income populations and which is the main cause of the predisposing valvar anomalies of endocarditis in our studies [8,10].

The mitral valve, in general, is the most frequently involved heart structure in endocarditis [11]. In this work, however, analyzing IVE treated by surgery, the aortic valve was the most commonly involved valve. Thus, our results are similar to previously published studies [9,12]. The fact is explained by the severity of the disease when this structure is involved, frequently requiring valve replacement, in spite of the antibiotic therapy [1,3,13].

No patients of the six cases of tricuspid IVE was a result of the use of illegally injected drugs. In two cases, the disease resulted from infection of a definitive endocardial pacemaker bag which spread to an electrode. The change of the "pacemaker system" with the implantation of a new pulse generator in another position and of an epicardial electrode, followed by vegectomy and plasty of the tricuspid valve, as recommended in the literature, resulted in a good evolution [3,14].

The patient with IVE of the pulmonary valve with just one ventricle and of pulmonary stenosis, one year after undergoing the Glenn procedure, did not receive a prosthesis but was discharged from hospital.

A sufferer of IVC, with IVE of the mitral and tricuspid valves was submitted to a ventricular-septum repair surgery, implantation of a mitral bioprosthesis and had the tricuspid valve preserved after vegectomy and plasty. Even the patient with tricuspid IVE infected by Candida sp., as a complication of prolonged parenteral nutrition, was submitted to plasty/tricuspid vegectomy and to therapy using B amphotericin and fluconazole had good evolution.

Thus, the real possibility of achieving a conservative approach to IVE of the tricuspid or pulmonary valves was demonstrated, avoiding the implantation of prostheses [3,15]. This is a possible conduct for other valves also according to the literature [3,15,16]. In two other patients with mitral and aortic IVE, only aortic prostheses were implanted and the mitral valves were preserved. However, in almost all the patients valve replacement for metallic or biologic prostheses was necessary.

The low positivity of blood cultures with the identification of microorganisms in only 42% of the cases is a common fact in the medical practice for whom works with infective endocarditis [6,8,9]. Several explanations may exist. One of them would be related with the deficiency of the clinical pathology laboratories in the institution. Although plausible, we prefer to use antibiotics before an adequate collection of blood cultures, which is frequently observed by us in the routine treatment of these patients. This occurs, even in teaching institutions, due to the excessive anxiety of physicians to start the treatment of endocarditis. Additionally, the frequent utilization of antibiotics by patients, before going to hospital, does not cure the infection, but impedes isolation of the germ which caused the disease, may be more significant than any other factor

in reducing the positivity of blood cultures in Brazilian public hospitals [3,17].

The finding of staphylococcus aureus as the commonest agent identified and almost two times more frequent than streptococcus viridans conferred a specific characteristic to this group of patients with IVE treated by surgery. The recognized aggressive behavior of staphylococcus aureus brings a greater morbidity to this disease and determines a more severe evolution, frequently requiring in its control, surgical intervention simultaneously with the adequate use of antibiotics [4,13].

The time between hospital admission and surgery for the patients who died, when compared to the patients who were discharged from hospital, is related to the bad evolution of these patients, with the intrinsic severity and not to the possible benefit in delaying surgical intervention after hospital admission. On the other hand, the three times longer hospital stay when compared to the time between hospital admission and surgery, resulted from the necessity of completing the correct antibiotic therapy period, because valve replacement or vegectomy were not sufficient to heal the IVE [1].

The hospital mortality was 14.1%, a lower rate compared to previous studies which were performed by us in state teaching hospitals and similar to published reports [1,3,12,13]. We can speculate that a more aggressive conduct of indicating surgery, in respect to previous studies resulted in reduction of the mortality. Curiously, the mortality was not influenced by the age of the patients, by the results of the blood culture or by the type of isolated microorganism. According to the literature [1,3], which determined the final determinants of death were the severity of the cardiocirculatory involvement, the involvement of the central nervous system and the severity of the infection.

CONCLUSION

In this work, active IVE treated by surgery was more frequent in men and in the third decade of life. The aortic valve was the most frequently involved valve. The commonest etiological agent identified was staphylococcus aureus. Valvar replacement was necessary in the almost all cases. The hospital mortality of 14.1% was not influenced by the age of the patient or by the identification of a microorganism as cause.

The observational character and retrospective nature and the size of sample limit the external validity of these findings. However, the inclusion criterion of patients, defined by the union of valve vegetations with surgery in association with the clinical-laboratorial state of IVE, strengthens these results.

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