BRIEF COMMUNICATION

Infective Endocarditis in Hypertrophic Cardiomyopathy

Endocarditis infecciosa en la Miocardiopatía Hipertrófica

J. HORACIO CASABÉ[MTSAC], ADRIÁN FERNÁNDEZ[MTSAC], MARÍA F. RENEDO[†], EDUARDO GUEVARA[MTSAC], LILIANA E. FAVALORO[MTSAC], ROBERTO R. FAVALORO[MTSAC]

ABSTRACT

Background: Infective endocarditis (IE) is a well-known complication of hypertrophic cardiomyopathy (HCM). Intracardiac device implantation for the treatment of HCM is an additional factor that increases the risk of IE.
Objective: The aim of this study was to assess the clinical manifestations and prognosis of IE in patients with HCM.
Methods: A retrospective, descriptive and observational study assessed the occurrence of IE and the clinical characteristics of a population with HCM from June 1992 to January 2014, with median follow-up of 7.5 years.
Results: The study evaluated 646 patients with HCM. Left ventricular outflow tract obstruction (LVOTO) was present in 38.5% (n=230) of patients and 22% (n=129) had an intracardiac device (ID). The incidence of IE was 1.9%. Twelve episodes were confirmed, 7 valvular [7/230 (3.04%)] and 5 in ID, 3 in pacemakers and 2 in implantable cardioverter defibrillators [5/129 (6.45%)]. Patients with valvular IE had resting mean gradient of 48±37 mmHg and during Valsalva maneuver of 126±44 mmHg, responding to medical treatment in all cases. Infective endocarditis in ID was resolved with percutaneous removal in 5 patients. One patient of the valvular group (8%) required valve replacement. No deaths were reported.
Conclusions: The incidence of IE in HCM is low. There are two defined populations: left valvular IE confined to patients with LVOTO and IE for ID. Patients with HCM without LVOTO or ID did not present IE.

Key words: Endocarditis, Bacterial - Cardiomyopathy, Hypertrophic - Pacemaker, Artificial - Defibrillators, Implantable

RESUMEN

Introducción: La endocarditis infecciosa (EI) es una complicación reconocida de la miocardiopatía hipertrófica (MCH); el implante de dispositivos intracavitarios (DI) para el tratamiento de la MCH agrega un factor que incrementa el riesgo de EI.
Objetivo: Analizar la incidencia, las manifestaciones clínicas y el pronóstico de la EI en pacientes con MCH.
Material y métodos: Estudio retrospectivo, descriptivo y observacional. Se evaluaron la ocurrencia de EI y las características clínicas de una población con diagnóstico de MCH desde junio de 1992 hasta enero de 2014, con una mediana de seguimiento de 7,5 años.
Resultados: Se evaluaron 646 pacientes con MCH. El 38,5% (n = 230) presentó obstrucción al tracto de salida del ventrículo izquierdo (OTSVI) y el 22% (n = 129) tenía un DI. La incidencia de EI fue del 1,9%. Se evidenciaron 12 episodios, 7 valvulares [7/230 (3,04%)] y 5 en DI, 3 en marcapasos y 2 en cardiodesfibrilador [5/129 (6,45%)]. Los pacientes con EI valvular presentaban un gradiente promedio de 48 ± 37 mm Hg en reposo y de 126 ± 44 mm Hg durante Valsalva. Todos respondieron al tratamiento médico. En 5 pacientes con EI en el DI se efectuó la extracción percutánea. Un paciente (8%) del grupo valvular requirió reemplazo; ningún paciente falleció.
Conclusiones: La EI en la MCH tiene una incidencia baja. Existen dos poblaciones definidas: EI valvular izquierda, confinada en pacientes con OTSVI y EI por DI. Los pacientes con MCH sin OTSVI ni DI no presentaron EI.

Palabras clave: Cardiomiopatía hipertrófica - Endocarditis bacteriana - Marcapaso artificial - Desfibriladores implantables

Abbreviations

HCM	Hypertrophic cardiomyopathy	**LA**	Left atrial
ICD	Implantable cardioverter defibrillator	**LVOTO**	Left ventricular outflow tract obstruction
ID	Intracardiac device	**PM**	Pacemaker
IE	Infective endocarditis		

Rev Argent Cardiol 2015;83:333-336. http://dx.doi.org/10.7775/rac.v83.i4.5476

Received: 11/11/2014 - *Accepted:* 12/01/2014

Address for reprints: Dr. J. Horacio Casabé - Hospital Universitario Fundación Favaloro - Av. Belgrano 1746 - (C1093AAS) Buenos Aires, Argentina - Tel. (5411) 4378-1200 - Fax (5411) 4378-1333 - e-mail: jhcasabe@ffavaloro.org

Hospital Universitario Fundación Favaloro - Buenos Aires, Argentina.
[MTSAC] Full Member of the Argentine Society of Cardiology
[†] To apply as Full Member of the Argentine Society of Cardiology

INTRODUCTION

Infective endocarditis (IE) is a well-known complication of hypertrophic cardiomyopathy (HCM). (1-4) In recent years, use of intracardiac devices (ID), as pacemakers (PM) and mainly implantable cardioverter defibrillators, has added to the risk of infection in these patients.

The aim of this study was to analyze the incidence, clinical manifestations and long-term prognosis of IE in a population with HCM followed-up in a tertiary referral center.

METHODS

A retrospective, descriptive and observational study evaluated the clinical characteristics of IE in a population diagnosed with HCM according to clinical and phenotypic criteria. (1, 2) The diagnosis of IE was done according to the modified Duke criteria. (3).

RESULTS

Six hundred and forty-six patients diagnosed with HCM followed-up from June 1992 to January 2014 (median 7.5 years) were studied (Tables 1 and 2). Among these patients, 38.5% (n=230) presented left ventricular outflow tract obstruction (LVOTO) and 22% (n=129) had ID implantation. The incidence of IE was 1.9%. Twelve cases of IE were observed in 12 patients. In 7 of these patients (58%), IE was valvular (7/230; 3.04%) and in 5 (42%) in the ID, 3 in PM and 2 in ICD (5/129; 6.45%). All patients with valvular IE presented with LVOTO (gradient at rest 48±37 mmHg, and during the pressure phase of the Valsalva maneuver 126±44 mmHg). Infective endocarditis landed on the mitral valve in 3 patients (43%), the aortic valve in 2 (29%), both valves in 1 (14%) and the tricuspid valve in 1 patient (14%). Blood culture was positive in 5 patients (75% of cases): Streptococcus viridans (3 cases), methycyllin-sensitive Staphylococcus aureus + Streptococcus viridans (1 case), and Diplococcus pneumoniae (1 case). All patients presented with vegetation in the echocardiogram. One patient (14%) presented with central nervous system embolism and none with heart failure. All patients responded to medical treatment, without requiring surgical intervention in the active phase of the disease. In the 5 patients with IE associated with ID [2 ICD (40%) and 3 DDD PM (60%)], blood cultures were positive for methycyllin-sensitive Staphylococcus aureus (4 cases) and Staphylococcus epidermidis (1 case). Transesophageal echocardiography detected vegetations in these 5 patients. Two patients (40%) presented with tricuspid involvement and 2 (40%) with pulmonary embolism. They all

Table 1. Valvular infective endocarditis. General population characteristics

Patient	Gender	Age (years)	Gradient At rest (mmHg)	MV Gradient (mmHg)	LA (Area, cm^2)	ID	Vegetation	Pathogen	Affected valve	CHF	Embolism	SxT	Death
1	M	68	68	186	33 cm^2	No	Yes	SV	AoV	No	No	No	No
2	M	64	64	141	33 cm^2	No	Yes	SV	AoV - MV	No	Yes (CNS)	No	No
3	M	76	76	117	47 cm^2	No	Yes	D. pneum	AoV	No	No	No	No
4	F	36	36	81	23 cm^2	No	Yes	Negative	MV	No	No	No	No
5	M	72	72	120	20 cm^2	No	Yes	SV	MV	No	No	No	No
6	M	72	72	70	39 cm^2	No	Yes	Negative	MV	No	No	No	No
7	M	39	39	173	35 cm^2	No	Yes	MSSA - SV	TV (1°)AoV(2°)	No	No	No	No

M: Male. F: Female. VM: Valsalva maneuver. LA: Left atrium. ID: Intracardiac device. SV:Streptococcus viridans. D pneum: Diplococcus pneumoniae. MSSA: methycyllin-sensitive Staphylococcus aureus. AoV: Aortic valve. MV: Mitral valve. TV: Tricuspid valve. CHF: Congestive heart failure. CNS: Central nervous system. SxT: Surgical treatment.

Table 2. Infective endocarditis associated with intracardiac devices. General population characteristics

Patient	Gender	Age (years)	Gradient At rest (mmHg)	MV Gradient (mmHg)	LA (Area, cm^2)	ID	Vegetation	Pathogen	CHF	Embolism	SxT	Death
1	M	35	14	20	23	VVI-ICD	Yes	MSSA	No	Yes (lung)	Yes	No
2	M	26	15	27	30	VVI-ICD	Yes	MSSA	No	No	Yes	No
3	M	68	13	21	35	DDDR-PM	Yes	MSSA	No	Yes (lung)	Yes	No
4	M	84	14	24	44	DDD-PM	Yes	MSSA	No	No	Yes	No
5	M	61	18	25	26	DDD-PM	Yes	CoNS	No	No	Yes	No

M: Male. VM: Valsalva maneuver. LA: Left atrium. ID: Intracardiac device. ICD: Implantable cardioverter defibrillator. PM: Pacemaker. MSSA: methycyllin-sensitive Staphylococcus aureus. CoNS: Coagulase-negative Staphylococcus. CHF: Congestive heart failure. SxT: Surgical treatment.

required device removal through specially designed leads. During follow-up, one patient (8%) of the valvular IE group required combined mitral and aortic valve replacement for heart failure. No deaths were reported.

DISCUSSION

Infective endocarditis is a well/known complication of HCM with high morbidty and mortality. In addition to numerous communications of isolated cases (4-6), Spirito et al. (7) published in 1999 the first important series emphasizing the prevalence and risk of this entity. During 27 years, they evaluated the occurrence of IE in a cohort of 810 patients, detecting 10 cases of valvular IE (7 mitral and 3 mitral and aortic), all with LVOTO and 7 with significant left atrial (LA) dilatation. Among the 224 patients with LVOTO, the incidence of calculated IE was 3.8 per 1,000 individuals per year (95% CI 1.6-8.9), which increased to 9.2% per 1,000 individuals per year (95% CI 2.5-23.5) if LA dilatation was also present. In addition to describing their characteristics, they suggested performing IE prophylaxis only in those patients presenting LVOTO. Moreover, we now know that ICD is the only effective treatment for primary and secondary prevention of sudden death in patients with HCM, having led to an exponential growth of its implantation since 2003. (8) Therefore, today, a considerable number of patients with HCM carries an ICD, and hence, another factor increasing the risk of IE. It should also be kept in mind that some of these patients need a definitive PM due to conduction system abnormalities, and some very symptomatic patients with LVOTO unresponsive to pharmacological therapy may require dual-chamber pacing to decrease this obstruction.

In our series of 12 patients, 7 had valvular IE (3 in the mitral valve, 2 in the aortic valve, 1 in both valves and 1 in the aortic and tricuspid valves). In agreement with the previously mentioned study, all patients presented LVOTO and also had LA dilatation [average 32.86 cm2, (20-47)].

The 5 remaining patients presented IE on an ID (3 PM and 2 ICD). In 18 published studies, the overall incidence of IE in these devices in patients without HCM ranged between 0.5% and 2.2%, with follow-up between 6 weeks and 11 years. (9) The prevalence in our country is unknown. As already described for this type of infection, (10), Staphylococcus was the predominant pathogen (4 cases with S aureus and 1 case with coagulase-negative Staphylococcus) which was resolved in all cases after removal of the whole system with specially designed leads and antimicrobial treatment. No in-hospital mortality was reported in either valvular or ID cases.

The incidence of IE in HCM continues to be low; the percentage observed in our cohort (1.9%) is similar to that observed in two multi-center studies performed in our country during the 90s and 2000s (EIRA trials) with percentages under 2%. (11-12)

Regarding IE prophylaxis in patients with HCM, the American and European guidelines prior to 2007 considered its administration for dental or gastrointestinal interventions in patients presenting with LVOTO. (13) The 2014 European guidelines state that “similar to valve disease patients, a thorough oral hygiene is suggested, but no routine antibiotic prophylaxis is recommended in patients with obstructive gradients in the left ventricular outflow tract”. (14) However, some experts in HCM do not agree with this advice as they understand that IE morbidity and mortality is high in HCM and severe anaphylaxis by antibiotics is not suitably documented. (15)

CONCLUSIONS

The incidence of IE in MHC continues to be low. At present, there are two clearly identified populations. Infective endocarditis in the left valves is confined to patients with LVOTO, whereas IE on ID has a growing prevalence. Patients with HCM and neither LVOTO nor ID did not present IE.

Conflicts of interest

None declared
(See author´s conflicts of interest forms in the web / Supplementary Material)

REFERENCES

1. Elliott P, Andersson B, Arbustini E, Bilinska Z, Cecchi F, Charron P, et al. Classification of the cardiomyopathies: a position statement from the European Society of Cardiology working group on myocardial and pericardial diseases. Eur Heart J 2008;29:270-6. http://doi.org/cvgv98
2. Casabé JH, Acunzo R, Fernández A, Gabay J, Galizio N, Hita A y cols. Consenso Argentino de Miocardiopatía Hipertrófica. Rev Argent Cardiol 2009;77:151-66.
3. Li JS, Sexton DJ, Mick N, Nettles R, Fowler VG Jr, Ryan T, et al. Proposed modifications to the Duke criteria for the diagnosis of infective endocarditis. Clin Infect Dis 2000;30:633-8. http://doi.org/fhc6jq
4. Chagnac A, Rudniki C, Loebel H, Zahavi I. Infectious endocarditis in idiopathic hypertrophic subaortic stenosis: report of three cases and review of the literature. Chest 1982;81:346-9. http://doi.org/fhf3ns
5. Alessandri N, Pannarale G, Del Monte F, Moretti F, Marino B, Reale A. Hypertrophic obstructive cardiomyopathy and infective endocarditis: a report of 7 cases and a review of the literature. Eur Heart J 1990;11:1041-8.
6. Roberts WC, Kishel JC, McIntosh CL, Cannon RO III, Maron BJ. Severe mitral or aortic valve regurgitation, or both, requiring valve replacement for infective endocarditis complicating hypertrophic cardiomyopathy. J Am Coll Cardiol 1992;19:365-71. http://doi.org/czw28s
7. Spirito P, Rapezzi C, Bellone P, Betocchi S, Autore C, Conte MR, et al. Infective endocarditis in hypertrophic cardiomyopathy: prevalence, incidence, and indications for antibiotic prophylaxis. Circulation 1999;99:2132-7. http://doi.org/4xv
8. Maron BJ, Spirito P, Shen WK, Haas TS, Formisano F, Link MS, et al. Implantable cardioverter defibrillators and prevention of sudden cardiac death in hypertrophic cardiomyopathy. JAMA 2007;298:405-12. http://doi.org/b8nzb3
9. Sandoe T, Barlow G, Chambers JB, Gammage M, Guleri A, Howard P, et al. Guidelines for the diagnosis, prevention and management of implantable cardiac electronic device infection. Report of a joint Working Party project on behalf of the British Society for Antimicrobial Chemotherapy (BSAC, host organization), Brit-

ish Heart Rhythm Society (BHRS), British Cardiovascular Society (BCS), British Heart Valve Society (BHVS) and British Society for Echocardiography (BSE). J Antimicrob Chemother 2015;70:325-59. http://doi.org/4xw

10. Salmo F, Guevara E, Casabé JH, Torino A, Deschle H, Cortés C y cols. Endocarditis infecciosa asociada con dispositivos electrónicos implantables intracardíacos. Nuestra experiencia. Rev Argent Cardiol 2007;75:279-82.

11. Casabé JH. Endocarditis infecciosa, una enfermedad cambiante. Medicina (Buenos Aires) 2008;68:164-74.

12. Ferreiros E, Nacinovich F, Casabé JH, Modenesi JC, Swieszkowski S, Cortes C, et al. Epidemiologic, clinical, and microbiologic profile of infective endocarditis in Argentina: A national survey. The Endocarditis Infecciosa en la República Argentina-2 (EIRA 2) Study. Am Heart J 2006;151:545-52. http://doi.org/bvbstk

13. Wilson W, Taubert KA, Gewitz M, Lockhart PB, Baddour LM, Levison M, et al. Prevention of infective endocarditis: guidelines from the American Heart Association: a guideline from the American Heart Association Rheumatic Fever, Endocarditis, and Kawasaki Disease Committee, Council on Cardiovascular Disease in the Young, and the Council on Clinical Cardiology, Council on Cardiovascular Surgery and Anesthesia, and the Quality of Care and Outcomes Research Interdisciplinary Working Group. Circulation 2007;16:1736-54. http://doi.org/czktxc

14. Elliott PM, Anastasakis A, Borger MA, Borggrefe M, Cecchi F, Charron P. 2014 ESC Guidelines on diagnosis and management of hypertrophic cardiomyopathy: the Task Force for the Diagnosis and Management of Hypertrophic Cardiomyopathy of the European Society of Cardiology (ESC). Eur Heart J 2014;35:2733-79. http://doi.org/4xx

15. Maron BJ, Lever H. In defense of antimicrobial prophylaxis for prevention of infective endocarditis in patients with hypertrophic cardiomyopathy. J Am Coll Cardiol 2009;54:2339-40. http://doi.org/c3h5x5