Diagnosis, Management, and Treatment of Chronic Chagas' Heart Disease in Areas Where Trypanosoma cruzi Infection Is Not Endemic

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Chagas' disease, or American trypanosomiasis, is a parasitic zoonosis found only in the Americas. Under natural conditions, *Trypanosoma cruzi* is transmitted by insects belonging to different species of Triatoma. However, several routes of transmission that do not involve insect vectors have also been described, such as transmission via blood products or transplantation of infected organs, and vertical transmission. At present, the number of people infected with Chagas' disease worldwide is estimated to be about 10-12 million. The process of urbanization in Latin America and migratory population movements from endemic countries have led to the disease being diagnosed in non-endemic areas. It is estimated that 20%-30% of individuals infected with *T. cruzi* will develop symptomatic heart disease at some point during their lives. The specific differential characteristics of chronic chagasic cardiopathy, lack of knowledge of the disease among many healthcare workers, and the fact that arrhythmia or sudden death is frequently the first manifestation of disease all make it essential that diagnostic and therapeutic protocols for the disease are developed and disseminated. The aim should be to improve patient care by increasing understanding of the condition by physicians and other healthcare professionals who may be involved in its detection and treatment.

Key words: *Chagas' disease. Heart disease. Arrhythmia. Sudden death.*

Diagnóstico, manejo y tratamiento de la cardiopatía chagásica crónica en áreas donde la infección por *Trypanosoma cruzi* no es endémica

La enfermedad de Chagas o tripanosomiasis americana es una parasitosis originaria del continente americano. En la naturaleza, *Trypanosoma cruzi* se transmite vectorialmente a través de diversas especies de chinches triatominos. No obstante, se han descrito otros mecanismos de transmisión no vectorial, como la transmisión a través de productos sanguíneos o mediante el trasplante de órganos infectados, y la transmisión vertical. Actualmente, la enfermedad de Chagas afecta a unos 10-12 millones de personas en el mundo y el proceso de urbanización en América Latina y los movimientos migratorios desde los países endémicos han posibilitado que la enfermedad de Chagas sea diagnosticada en zonas donde la infec-

ción no es endémica. Se considera que un 20-30% de las personas infectadas por *T. cruzi* desarrollarán a lo largo de su vida alteraciones cardiacas. Las características diferenciales de la cardiopatía chagásica, el escaso conocimiento que se tiene de ella en nuestro medio y la elevada frecuencia de arritmias y muerte súbita como primeras manifestaciones potenciales de esta enfermedad hacen prioritarias la elaboración y divulgación de protocolos diagnósticos y terapéuticos para la atención de estos pacientes a fin de mejorar el conocimiento de esta patología por los profesionales sanitarios potencialmente implicados en su detección y manejo.

Palabras clave: *Enfermedad de Chagas. Cardiopatía. Arritmia. Muerte súbita.*

INTRODUCTION

Chagas' disease or American trypanosomiasis is a parasitosis originating on the American continent. Carlos Chagas described the disease at the beginning of the 20th century and it continues to represent one of the most significant public health challenges in Latin America.

The epidemiologic trends in the last 20 years clearly reveal a general reduction in vector transmission due to control programs and improvements in rural housing, as well as the interruption of vector transmission in Chile, Uruguay, and recently, Brazil, all of which has contributed to a reduction in the incidence of the disease throughout the continent.[1-3]

In the natural environment, *Trypanosoma cruzi* is transmitted through a variety of species of triatomine bugs, which act as vectors. However, other nonvector transmission mechanisms have been described via blood products, organ transplant, and vertical transmission. In regions where infection is endemic, oral transmission has also been described through ingestion of food contaminated with feces from infected bugs.[4,5]

Currently, Chagas' disease affects 10 to 12 million individuals worldwide.[6] Its geographic distribution extends from the 40th parallel north, in the southern part of North America, to 45th parallel south, in Argentina and Chile.[7] Latin American urbanization, which intensified in the second half of the 20th century, has altered the epidemiologic profile of the disease, and migratory movements from endemic countries have led to the diagnosis of Chagas' disease in regions in which it is not endemic.[8,9]

Spain has become one of the European countries that receive the largest number of immigrants from Latin American. As of December 31, 2005 close to a million individuals from Latin America were included in the records of foreign nationals holding a Spanish resident's identity card,[10] although municipal census records for the year 2005 indicated higher figures (1 445 796 individuals). Units and services specialized in tropical medicine and international health in Spain have already begun to diagnose and treat individuals with the disease.[11]

The recent meeting of the Pan-American Health Organization in Montevideo discussed this situation and in its final report mentioned the needs of countries receiving immigrants from endemic areas in order to deal with Chagas' disease and to be able to provide appropriate treatment to affected individuals, as well as to prevent vertical and bloodborne transmission of *T cruzi*.[12]

PATHOGENESIS AND NATURAL HISTORY OF HEART DISEASE IN CHAGAS' DISEASE

Following the acute phase of the infection, untreated Chagas' disease enters a chronic phase that is initially asymptomatic or unrecognized. Subsequently, 20%-30% of patients develop cardiac abnormalities (cardiac form), 10% digestive complaints (digestive form) or both (mixed form), and less than 5% of patients develop a neurologic form of the disease. The remainder will remain asymptomatic, with no clinical manifestations throughout their lifetime.[13]

Due to the potential severity of the cardiac complications of the disease and their frequency, the second workshop on imported Chagas' disease focused on the clinical characteristics of chronic Chagas' heart disease and the requirements for correct diagnosis, management, and treatment. The pathogenesis of the disease is not clear, although current understanding points towards a mixed etiology, in which the parasite would be directly involved in producing myocardial damage[14,15] and an associated autoimmune phenomenon.[16,17] Other described pathogenic mechanisms include microvascular alterations and autonomic denervation.[18-21]

Chagas' heart disease displays certain characteristics that differentiate it from other cardiac conditions more commonly seen in Spain:

– It is a fibrotic disease that is generally located in the posteroinferior and apical region of the left ventricle, the sinus node, and the conduction system below the bundle branch, and it leads to predominantly segmental abnormalities in contractility

– It is a dilated cardiomyopathy with a tendency towards the formation of aneurysms, particularly in the apical region

– It has powerful arrhythmogenic potential and ventricular arrhythmias are common, often associated with bradyarrhythmias (atrioventricular in origin or arising in the sinus node)

– It is associated with a high rate of thromboembolic events

– It can present as precordial pain, generally atypical although it can occasionally mimic ischemic heart disease.

In the natural course of the disease, the cardiac abnormalities appear progressively around 20 to 30 years following infection.[22] However, 5% to 10% of patients display myocarditis during the acute phase that progresses rapidly towards a severe form of Chagas' heart disease.[23,24] Less commonly, patients who are in the chronic phase of the disease, with mild cardiac involvement, can display sudden exacerbation with intense parasitemia and symptoms of acute heart failure; immunosuppressants also favor these exacerbations.[25]

ASSESSMENT OF PATIENTS WITH SUSPECTED CHAGAS' DISEASE AND CHAGAS' HEART DISEASE

Diagnosis of *T cruzi* Infection

Diagnosis of Chagas' disease in Spain was addressed in the consensus document from the first workshop on imported Chagas' disease.[26] In summary, it is based on 2 criteria being met:

– History compatible with the epidemiology of the disease: the patient's history should include at least 1 element that would have made transmission of *T cruzi* possible via any of the described routes of infection (individuals from endemic zones or children of mothers from endemic zones; travelers with stays in endemic regions and with a lifestyle that puts them at risk of infection)

– Microbiologic diagnosis: individuals are considered to be infected when they have a positive result in parasitology or 2 positive results with 2 serologic techniques that employ different antigens. In the case of ambiguous or inconsistent results, a third technique should be used. There are various serologic tests for diagnosis of Chagas' disease that use different techniques (enzyme-linked immunosorbent assay [ELISA], modified ELISA or ELISA with recombinant antigens, immunofluorescence, indirect hemagglutination, and immunochromatography). Polymerase chain reaction (PCR) is perhaps the most sensitive technique for parasitologic analysis of chronic Chagas' disease, but its use does not remove the need for serologic testing

Basic Cardiac Examination in Patients With *T cruzi* Infection

To rule out cardiac involvement in patients with *T cruzi* infection, a full history and complete physical examination should be performed along with electrocardiography, chest radiography, and echocardiography. The symptoms and signs of Chagas' heart disease seen on physical examination are the same as for cardiomyopathy in general and none are characteristic of the disease.

Medical History

The main aim of the history is to detect symptoms of possible underlying heart disease. Table 1 shows the signs and symptoms that are most often associated with heart disease due to *T cruzi*. It is also important to assess digestive disorders (dysphagia, constipation, etc), since both forms can sometimes coexist.

When the patient history is taken, it is important to remember that linguistic and cultural differences can interfere with communication between patient and doctor. Occasionally, patients do not apply the same meaning to particular words (for instance, terms used in Spanish for breathlessness [*ahogo*], dizziness [*mareo*], or palpitations [*palpitaciones*]) and it may be necessary to define what is referred to in each case. In addition, immigrants often suffer difficulties in adaptation, homesickness, and mood disorders relating to their social and family situation[27] that can cause problems in accurately identifying the cardinal symptom or reason for consultation. Finally, unfavorable working conditions must also be taken into account (long working hours, fear of losing a job, illegal contracts, etc) as they represent an additional obstacle to attending scheduled appointments. Since the disease is familiar to these patients and causes them to worry, notification of a positive result for infection or Chagas' disease requires a careful communication process through which trust is built.[12] Cultural mediators play an important role in this process.

Physical Examination

A detailed physical examination should be performed with particular attention to the cardiovascular system. Cardiac murmurs due to valvular dysfunction can appear as a result of dilation of the chambers. In more advanced

TABLE 1. **Signs and Symptoms Most Frequently Associated With Heart Disease Due to *T cruzi***

– Symptoms secondary to bradyarrhythmias or tachyarrhythmias:
   Palpitations,
   Syncope, presyncope, fainting
   Sudden death
– Symptoms of heart failure:
   Effort dyspnea
   Pain in the right hypochondriac region
    (due to hepatic congestion)
   Symptoms of pulmonary congestion such as orthopnea
    and paroxysmal nocturnal dyspnea.
– Symptoms secondary to venous and systemic thromboembolic events:
   Pulmonary or systemic emboli
   Cerebrovascular accident (generally ischemic)
– Microvascular (or esophageal) abnormalities
   Precordial or retrosternal pain

stages, the usual signs of congestion and peripheral hypoperfusion are observed. Cardiac cachexia is also an indicator of more advanced stages of Chagas' heart disease and has a high prognostic value.

Electrocardiogram

A conventional 12-lead electrocardiogram (ECG) with a long recording (30 seconds) in DII should be performed in all patients with *T cruzi* infection. In the chronic phase of the infection, ECG alterations appear a number of years before symptoms and cardiomegaly (Table 2). Although there is no characteristic pattern in the ECG, these changes, especially right bundle-branch block, in isolation or associated with left anterior hemiblock in patients with positive serology, can be considered indicators of chronic Chagas' heart disease.[28-30] Nevertheless, given their lack of specificity, the diagnosis requires confirmation, since its presence does not necessarily signify Chagasic etiology.

A normal ECG rules out the presence of moderate or severe left ventricular dysfunction, with a negative predictive value of close to 100%: On the other hand, the greater the number of ECG changes, the worse the ventricular function.[31]

Alterations in intraventricular conduction and widening of the QRS complex appear early in chronic Chagas' heart disease, when abnormalities in myocardial contraction are not yet present, meaning that they lack the prognostic value that they display in other heart disease.[32]

Chest Radiography

Chest radiography has a low sensitivity for the detection of Chagas' heart disease, since ventricular dysfunction can occur while still obtaining a normal radiograph. However, evidence of cardiomegaly could be predictive of sudden death in patients with chronic Chagas' disease.[33] It should be performed with the patient in a clinically compensated situation, assessing venous-capillary hypertension, expansion of the chambers, or a cardiothoracic index of more than 0.6 as positive signs.

Echocardiography

Given that echocardiography is a widely available noninvasive technique that is very useful for assessment of ventricular function, all patients with Chagas' disease are candidates for a baseline echocardiogram.

The most common echocardiographic alterations are summarized in Table 3.[34,35] The following recommendations are useful for echocardiography:

It is advisable to perform a conventional transthoracic echocardiography examination, following a specific system.

1. Use a high-frequency transducer.

2. Obtain a transverse echocardiogram (for segmental analysis of the inferoposterior region), an apical 2-chamber view, and intermediate views between 2 and 4 chambers, to detect possible apical aneurysms.

3. Particular attention should be paid to the posteroinferior region of the left ventricle, including the cardiac apex, in an effort to identify segmental hypokinesia or akinesia, along with apical aneurysms. It is also common to observe hyperechogenicity and wall shrinkage, similar to that described in ischemic heart disease; this is a substrate for the development of reentrant ventricular arrhythmias.

4. It is recommended that particular attention be paid to the search for spontaneous echo contrast and the existence of thrombi in the chambers.

5. Specifically assess diastolic function and right ventricular function in all patients with suspected Chagas' heart disease. Alteration of left ventricular diastolic function occurs early in Chagas' disease and its severity is usually correlated with the degree of systolic dysfunction.[36,37]

6. Transesophageal examination is indicated when the transthoracic window does not allow assessment of the left chambers.

Reduction of left ventricular ejection fraction, increased end-systolic diameter, and a restrictive mitral flow pattern are the best prognostic indicators obtained by

TABLE 2. Most Common Electrocardiographic Abnormalities in Chagas' Heart Disease

– Complete right bundle branch block, in isolation or associated with left anterior hemiblock
– Isolated or repeated ventricular extrasystoles
– Primary alteration of ventricular repolarization, which may mimic ischemic heart disease
– Electrically inactive zones (Q waves)
– Atrioventricular block
– Other more common abnormalities: left bundle-branch block, sinus node dysfunction, supraventricular tachyarrhythmia (particularly atrial fibrillation)

TABLE 3. Most Common Echocardiographic Findings in Chagas' Heart Disease

– Segmental abnormalities of myocardial contraction (75% of cases). The most commonly affected regions are the posteroinferior wall and the apex of the left ventricle
– Aneurysms in the apex of the left ventricle (of varying size and morphology, but with a narrow neck and frequently with wall thrombi)
– Hypokinesia or akinesia of the posteroinferior wall
– Involvement of the basal portion of the anterior septum, with akinesia and even formation of subaortic aneurysms
– Dilated cardiomyopathy
– Dilation and dysfunction of the right ventricle

echocardiography in patients with Chagas' heart disease.[38,39]

In advanced stages of the disease, when congestive heart failure is present, the predominant echocardiographic profile involves diffuse biventricular hypokinesia with enlargement of all 4 chambers.

Other Cardiologic Examinations in Patients With Suspected Chagas' Heart Disease

In addition to the basic studies mentioned, other complementary examinations may be useful in certain patients or circumstances:

24-Hour Holter Monitoring

Twenty-four hour Holter monitoring is recommended in patients with the following symptoms:

– Symptoms suggestive of cardiac arrhythmia (syncope, presyncope, or palpitations)
– The presence of certain cardiac arrhythmias in the ECG, such as sinus bradyarrhythmias (with a mean heart rate of less than 40 beats per minute and/or prolonged sinus pauses), second degree atrioventricular blocks, and frequent and/or repetitive (bursts) ventricular extrasystoles

Twenty-four hour Holter monitoring will allow assessment of the possible association of symptoms with an arrhythmia, identification of patients at risk of sudden death, and identification of autonomic dysfunction.[33,40] Episodes of nonsustained ventricular tachycardia are recorded in approximately 90% of patients with Chagas' heart disease and ventricular dysfunction or heart failure.[41]

Holter monitoring should be performed using a conventional technique, preferably with a 3-channel system. The sensitivity of Holter recording is low when episodes of arrhythmia are infrequent and other techniques such as implantable Holter can be used in these cases.

Electrophysiology Study

The aim of an electrophysiologic study in these patients is to identify atrioventricular and intraventricular conduction abnormalities and to assess induction of malignant ventricular arrhythmias. The indications are the same as for assessment of other disorders with a risk of sudden death:

– Patients with symptoms suggestive of arrhythmia (syncope or presyncope) not confirmed in previous studies
– Sustained ventricular tachycardia, with or without symptoms, irrespective of the degree of ventricular function
– Patient resuscitated from sudden death
– Patients who display alterations in the ECG or Holter monitoring that are associated with increased risk of sudden death: repeated or paired ventricular extrasystoles, episodes of nonsustained ventricular tachycardia, and increased spread of the QT interval associated with the presence of ventricular dysfunction.[42] In this subset of patients, if an electrophysiologic study is not possible, amiodarone can be administered empirically so long as there are no contraindications.

Exercise Testing

Exercise testing would mainly be indicated in the following cases:

– Assessment of functional capacity
– Assessment of the chronotropic response

In the presence of chest pain and Chagas' heart disease, exercise testing is of little use in determining the etiology of the pain; in those cases coronary angiography should be performed

Coronary Angiography

Coronary angiography is indicated according to the criteria of the Spanish Society of Cardiology,[43] taking into account the considerations regarding exercise testing.

Myocardial Biopsy

Myocardial biopsy is not currently considered a diagnostic technique in Chagas' heart disease as a result of its risk and limited specificity.

MANAGEMENT OF PATIENTS WITH *T CRUZI* INFECTION

Asymptomatic Patients With Normal Electrocardiogram and Chest Radiograph

The risk of Chagas' heart disease is greater during the second and third decades following infection.[44] In patients with evidence of *T cruzi* infection and with normal ECG or minimal abnormalities that are not suggestive of chronic Chagas' heart disease, the annual risk of progression to heart disease is between 2% and 5%.[45,46] As a result, baseline echocardiogram is recommended.

Asymptomatic Patients With ECG Abnormalities

Baseline echocardiography is recommended in asymptomatic patients with ECG abnormalities. The findings are highly variable, and left ventricular dysfunction (ejection fraction less than 40%) is detected in approximately 30% of cases. Table 4 shows the prevalence of left ventricular dysfunction according to

ECG pattern.[47] In general, prognosis is determined by the degree of ventricular dysfunction.[48]

The frequency with which echocardiography should be repeated will depend on the clinical condition of the patient. Although studies are unavailable, progression of the disease is slow in asymptomatic patients with a normal echocardiogram; consequently, it is sufficient to repeat the assessment within the following 5 years in this group, so long as symptoms do not appear. When the initial study reveals abnormalities it should be repeated in a period of 1 to 3 years, due to the increased risk of progression,[49] especially if there is significant ventricular dysfunction (ejection fraction less than 40%). In any patient, the appearance of new symptoms or ECG abnormalities should be considered an indication for a new echocardiogram.

The purpose of echocardiographic follow-up is to identify patients with moderate or severe dysfunction, who are often still asymptomatic but who could benefit from the early provision of drugs for the management of heart disease.[50]

Symptomatic Patients

Patients with symptomatic Chagas' heart disease (Table 1) should be considered to be at increased risk of sudden death. Such nonspecific symptoms as weakness or wobbliness have much more significance in this context as they could be predictive of an episode of syncope. It is important to remember that sudden death can often be the first manifestation of Chagas' heart disease.[51,52] Table 5 summarizes the main indications for diagnostic tests in assessment of Chagas' heart disease.

TREATMENT OF PATIENTS WITH CHAGAS' HEART DISEASE

Management of Ventricular Dysfunction and Heart Failure

In general, the management of these patients has much in common with that of other heart disease. It should also be taken into account that general measures are often applied to Chagas' heart disease that are not specifically validated for use in this disease. β-blockers (with the precautions mentioned in the following paragraph) and angiotensin converting enzyme inhibitors (ACEI) are the recommended drugs for use in patients with moderate or severe ventricular dysfunction (ejection fraction <40%). Despite the absence of scientific evidence of its beneficial effect, amiodarone is used in these patients due to the presence of complex arrhythmias.[53]

There are peculiarities in Chagas' heart disease that are important to take into consideration for the therapeutic management of these patients:

– Chronic Chagas' heart disease is associated with a high rate of bradyarrhythmias (atrioventricular block, sinus node dysfunction, etc). Consequently, drugs such as digitalis glycosides, β-blockers, some calcium channel antagonists, and amiodarone should be used with care, initiating treatment at low doses and carefully monitoring the possible appearance of complications

– Patients with refractory heart failure can be assessed as candidates for heart transplant. Despite the description of some cases of reactivation of Chagas' disease, published case series show satisfactory results and improved survival in these patients compared to patients with ischemic heart disease or idiopathic dilated cardiomyopathy[54]

– There is no indication for cardiomyoplasty or reconstructive surgery in this disease

– The usefulness of resynchronization therapy in these patients is still under discussion and echocardiographic and ECG criteria should be used to assess its indication

– Some preliminary unpublished results have been obtained on improvement of myocardial function through the use of stem cells in patients with Chagas' disease

TABLE 4. Rate of Moderate or Severe Left Ventricular Dysfunction (Ejection Fraction <40%) According to the Type of Electrocardiographic Abnormality*

Electrocardiogram	Echocardiographic EF <40% (% of Patients)
Isolated RBBB	12%
RBBB+LAH	36%
Isolated LAH	35%
Primary VR abnormality	43%
Ventricular extrasystoles	52%
LBBB	61%
Electrically inactive zone	71%

*EF indicates ejection fraction; RBBB, right bundle-branch block; LBBB, left bundle-branch block; LAH, left anterior hemiblock; VR, ventricular repolarization.

TABLE 5. Summary of the Main Indications for Diagnostic Tests in Chagas' Heart Disease

Electrocardiogram	All patients with evidence of Trypanosoma cruzi infection
Echocardiography	All patients with evidence of *T cruzi* infection
24-hour Holter monitoring	Symptoms of low cardiac output (syncope, presyncope, palpitations, etc) and/or electrocardiographic changes consistent with tachyarrhythmia or bradyarrhythmia
Electrophysiologic study	Undiagnosed syncope, symptomatic ventricular tachycardia, or ventricular tachycardia with ventricular dysfunction
Exercise testing	Assessment of functional response and/or chronotropic capacity
Cardiac catheterization	Chest pain with characteristics of angina

Management and Prevention of Thromboembolism

The high rate of thrombotic and embolic events should be taken into consideration in patients with Chagas' disease. Most of these events are cerebral ischemic accidents and many patients present cardiovascular causes that account for the phenomenon, although there are other factors involved.[55,56]

In a study performed in Brazil, 4 predictors of embolic cerebrovascular accident were identified in patients with underlying Chagas' heart disease: age above 48 years, primary abnormality in ventricular repolarization, apical aneurysm, and left ventricular ejection fraction of less than 50%.[57] The presence of these 4 predictors was associated with an annual incidence of cerebrovascular accident of 4%. In the absence of more definitive evidence, prevention of thromboembolism in patients with chronic Chagas' heart disease should nevertheless be guided by standard clinical recommendations: patients with atrial fibrillation, prior embolic events, and/or the existence of wall thrombi. The role of antiplatelet drugs in the prevention of thromboembolic events has yet to be determined.

Management of Bradyarrhythmias

Symptomatic bradyarrhythmias are sometimes candidates for implantation of a pacemaker. International guidelines on pacemaker implantation are useful in patients with Chagas' heart disease.

Management of Ventricular Arrhythmias

Patients with Chagas' heart disease often present ventricular extrasystoles and tachycardias, most commonly associated with myocardial damage that generates reentry phenomena. Most sustained ventricular tachyarrhythmias in patients with Chagas' heart disease do not arise from apical aneurysm of the left ventricle but rather from the inferolateral region.[58,59]

Since it involves progressive abnormality with multiple arrhythmogenic foci, radiofrequency ablation should not be considered a first choice technique.

In contrast, and despite the absence of specific studies in chronic Chagas' heart disease, implantation of an implantable cardioverter defibrillator is recommended to reduce the risk of sudden death in the following situations:

– Sustained ventricular tachycardia. In addition, in these patients it is advised that amiodarone is administered empirically in an effort to reduce the rate of discharge and lower the likelihood of electrical storm. If the patient receives too many discharges despite this treatment, radiofrequency ablation should be considered[60,61]

– Monomorphic sustained ventricular tachycardia during the electrophysiology study

Administration of amiodarone is a possibility in patients with nonsustained ventricular tachycardia and normal electrophysiologic study (noninducible).

Management of Angina Pain

Chest pain sometimes constitutes a clinical manifestation of Chagas' heart disease and even esophageal Chagas' disease. It is postulated that the pathophysiologic mechanism underlying this symptom is abnormal myocardial microvasculature.

If chest pain is the primary or predominant symptom of Chagas' heart disease, differential diagnosis should include assessment of associated ischemic heart disease by cardiac catheterization. Assessment of myocardial perfusion with techniques employing radioactive isotopes can be used, although their usefulness for differential diagnosis of angina pain is limited by the presence of areas of myocardial fibrosis in patients with Chagas' heart disease. No specific treatment is available for such cases.

ETIOLOGIC TREATMENT IN CHRONIC CHAGAS' DISEASE

It is known that in the chronic phase of the disease, the cure rate in adults ranges from 8% to 25%.[62] The reduction in the titer of serum antibodies is used as a marker of cure, but the slow rate at which serologic changes occur, possible repeat infections in endemic areas, and the lack of clinical markers have made it difficult to clearly determine the efficacy of the treatment. Consequently, and as a result of the potential adverse effects of the medication, there is no international consensus on etiologic treatment in this phase of the disease. However, a recent study showed a reduction in the progression of Chagas' disease in patients treated with benznidazole.[63] According to the 2005 consensus document,[26] patients with positive parasitology tests should receive etiologic treatment and it should be considered for others; an agreement should be established between doctor and patient and adequate information on the potential adverse effects of the drug provided.

ADDITIONAL CONSIDERATIONS

Chagas' disease should be suspected in all patients whose history is compatible with the epidemiology of the disease and who have symptoms of cardiac involvement. The differential characteristics of Chagas' heart disease, the limited information available on the disease in Spain, and the high rate of arrhythmias and sudden death as potential primary manifestations of the disease make it a priority to prepare and distribute diagnostic and treatment protocols for the care of these

patients in order to improve the understanding of the disease by health professionals involved in its detection and management.

In some settings, the necessary techniques may not be available for correct diagnosis and treatment of patients with suspected Chagas' disease or Chagas' heart disease. If a patient with a history compatible with the epidemiology of the disease displays signs and symptoms of heart disease, it is recommended that the individual is referred to a specialist in cardiology and a hospital specialized in imported diseases. In both cases, referral should not imply that the primary care physician, who is responsible for the initial assessment of the patient, does not obtain a good medical history and perform a clinical assessment, conventional ECG, and chest radiography prior to referring the patient.

Clearly, the management of chronic Chagas' heart disease has been, and continues to be, a topic of scientific discussion in endemic countries. For further information, readers are directed to the consensus reports of the Argentinian Society of Cardiology and the Brazilian Society of Cardiology[64,65]; these documents are available in the internet.

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