

Brief original

Chronic Chagas Cardiomyopathy at a Peruvian National Referral Hospital: A Case Series

Karen Alejandra Serrano Carmen ^{1,a}, Diego Davila-Flores ^{2,b}, Paola Gisella Oliver Rengifo ^{3,a}

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Author affiliations

- ¹ Universidad Peruana Cayetano Heredia, Lima, Peru.
 - ² Instituto Nacional Cardiovascular, INCOR-EsSalud, Lima, Peru.
 - ³ Hospital Nacional Arzobispo Loayza, Lima, Peru.
- ^a Clinical cardiologist.
^b Cardiologist.

Correspondence

Karen Alejandra Serrano Carmen
Av. Ignacio Merino 1772 Dpto. 601,
Lima, Peru.

Email

karen.serrano@upch.pe

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None.

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ABSTRACT

Objectives: To describe the cardiovascular manifestations and clinical course of patients with chronic Chagas cardiomyopathy at a Peruvian national hospital. **Materials and methods:** Descriptive retrospective case series (2021-2025). Nine patients with serologically confirmed *Trypanosoma cruzi* infection were assessed by electrocardiography, echocardiography, and/or 24-hour Holter monitoring; a predominant cardiovascular phenotype was assigned to each. **Results:** The mean age was 50.1 ± 6.8 years; 55.6% were male, and 66.7% came from the Peruvian Amazon. The heart failure phenotype predominated (55.6%), with ejection fractions of 15-39%, followed by ventricular arrhythmias (22.2%) and conduction disorders (22.2%). Two patients (22.2%) received permanent pacemakers, one (11.1%) received an implantable cardioverter-defibrillator, and two (22.2%) died. **Conclusions:** The three classic phenotypes coexisted, with advanced disease at diagnosis. Chagas disease should be considered cases of nonischemic dilated cardiomyopathy or conduction disorders.

Keywords: Chagas Cardiomyopathy; Chagas Disease; Heart Failure; Cardiac Conduction System Disease (Source: MeSH-NLM)

RESUMEN

Miocardopatía chagásica crónica en un hospital nacional peruano: serie de casos

Objetivos: describir las manifestaciones cardiovasculares y la evolución de pacientes con miocardopatía chagásica crónica en un hospital nacional peruano. **Materiales y métodos:** serie de casos descriptiva y retrospectiva (2021-2025). Se incluyeron nueve pacientes con infección por *Trypanosoma cruzi* confirmada por serología, evaluados con electrocardiograma, ecocardiografía y/o Holter de 24 horas; se les asignó un fenotipo cardiovascular predominante. **Resultados:** la edad media fue de $50,1 \pm 6,8$ años; el 55,6% fueron varones y el 66,7% procedían de la Amazonía peruana. Predominó el fenotipo de insuficiencia cardíaca (55,6%), con fracción de eyección de 15-39%, seguido de arritmias ventriculares (22,2%) y trastornos de conducción (22,2%). Dos pacientes (22,2%) recibieron marcapasos definitivo, uno (11,1%) un cardiodesfibrilador implantable, y dos fallecieron (22,2%). **Conclusiones:** los tres fenotipos clásicos coexistieron con enfermedad avanzada al diagnóstico. Debe considerarse la enfermedad de Chagas ante miocardopatía dilatada no isquémica o trastornos de conducción.

Palabras clave: Cardiomiopatía Chagásica; Enfermedad de Chagas; Insuficiencia Cardíaca; Trastorno del Sistema de Conducción Cardíaco (Fuente: DeCS-BIREME).

Introducción

Chagas disease, caused by *Trypanosoma cruzi*, affects approximately 10.5 million people worldwide, most of whom live in Latin America, and remains a major public health problem in the region ^(1,2). Approximately 20-30% of infected patients develop chronic Chagas cardiomyopathy, considered the most severe manifestation of the disease ⁽³⁾.

This condition is characterised by progressive ventricular remodelling, heart failure, conduction abnormalities, ventricular arrhythmias, and thromboembolic events, and is associated with substantial cardiovascular morbidity and mortality ⁽⁴⁾. Sudden cardiac death and progressive heart failure are the leading causes of death ^(1,5).

Clinical evidence on this condition and the outcomes of affected patients remains limited in Peru. We present a case series of patients treated at a Peruvian national hospital between 2021 and 2025, aiming to describe their clinical manifestations, cardiovascular findings, and clinical course.

Materials and methods

Study design

We conducted a retrospective descriptive case series in the Cardiology Department of Hospital Nacional Arzobispo Loayza, Lima, Peru, between January 2021 and December 2025.

Study population

All patients treated during the study period with *Trypanosoma cruzi* infection confirmed by two serological methods (ELISA and indirect immunofluorescence) and cardiac involvement attributed to Chagas disease were included. Patients with alternative causes that could explain cardiac involvement, such as ischaemic heart disease, primary valvular disease, or cardiomyopathy of another aetiology, were excluded, as were those with incomplete clinical information. All eligible cases were included, and no sample size calculation was performed.

Variables

We recorded demographic variables (age, sex, and geographical origin) and cardiovascular findings obtained through electrocardiography, echocardiography, and 24-hour Holter monitoring. Assessments included cardiac rhythm, QRS duration, and conduction abnormalities; left ventricular ejection fraction (LVEF), left ventricular end-diastolic diameter, intraventricular thrombus, and the probability of pulmonary hypertension; and premature ventricular contraction burden, non-sustained or sustained ventricular tachycardia, and sinus pauses. Indications for or implantation of cardiac devices and the clinical course were also recorded. For descriptive purposes, patients were classified into three groups according to their predominant cardiovascular manifestation: heart

failure, ventricular arrhythmias, or conduction system abnormalities. When manifestations coexisted, classification was based on the manifestation that predominated in the clinical presentation and guided therapeutic management.

Procedures

Data were obtained through retrospective review of medical records and reports of cardiovascular investigations (ECG, transthoracic echocardiography, and Holter monitoring) performed as part of routine care.

Ethical aspects

Informed consent was obtained from patients for the use and publication of clinical information and images. Data were anonymised, and no information that could identify patients was included. The study was approved by the Institutional Research Ethics Committee of Hospital Nacional Arzobispo Loayza.

Statistical analysis

Data were analysed using descriptive statistics in Stata version 19 (StataCorp LLC, College Station, TX, USA). Continuous variables were summarised as means and standard deviations (SDs), or as medians and interquartile ranges (IQRs); categorical variables were summarised as counts and percentages. No inferential statistical analyses were performed.

Results

General characteristics

Nine patients with chronic Chagas cardiomyopathy were included. The mean age was 50.1 years (SD: 6.8), and five (55.6%) were men. Six patients (66.7%) were from the Peruvian Jungle (**Table 1**). In seven (77.8%), infection was identified during the investigation of cardiovascular manifestations; in one woman, the diagnosis was made through blood donation screening, and in another, during the evaluation of an arrhythmia detected in the perioperative period of a cholecystectomy. One patient (11.1%) had received antiparasitic treatment with nifurtimox.

At the initial cardiological assessment, median LVEF was 29% (IQR: 19.0-46.5), and seven patients (77.8%) had an LVEF of < 40%. All patients had an intraventricular or atrioventricular conduction abnormality. Ventricular arrhythmias were documented in eight patients (88.9%); premature ventricular contraction burden, quantified in four patients, ranged from 8.5 to 29%. Individual findings and clinical outcomes are detailed in **Table 2**.

Heart failure phenotype

Five patients (55.6%) had heart failure as their predominant manifestation. Three required hospitalisation for acute decompensation, including two with cardiogenic shock. LVEF ranged from 15 to 39%, with left ventricular dilatation

Table 1. Baseline, electrocardiographic, and echocardiographic characteristics of patients with chronic Chagas cardiomyopathy.

Characteristics	(n = 9)
Age (years), mean (SD)	50.1 (6.8)
Male sex, n (%)	5 (55.6)
Region of origin, n (%)	
Loreto	4 (44.4)
San Martín	2 (22.2)
Ayacucho	2 (22.2)
Cajamarca	1 (11.1)
Intraventricular conduction disorder, n (%)	
Bifascicular block (right bundle branch block + fascicular block)	3 (33.3)
Complete left bundle branch block	1 (11.1)
Incomplete bundle branch block	3 (33.3)
No intraventricular conduction disorder	2 (22.2)
Atrioventricular conduction disorder or sinus node dysfunction, n (%)	
First-degree atrioventricular block	4 (44.4)
Complete atrioventricular block	1 (11.1)
Sinus node dysfunction	2 (22.2)
No atrioventricular conduction disorder or sinus node dysfunction	2 (22.2)
Echocardiographic findings	
LVEF (%), median (IQR)	29 (19.0-46.5)
LVEF < 40%, n (%)	7 (77.8)
LVEDD (mm), median (IQR)	65 (56-75)
Left ventricular thrombus, n (%)	1 (11.1)
Predominant cardiovascular phenotype, n (%)	
Heart failure	5 (55.6)
Ventricular arrhythmias	2 (22.2)
Conduction system disorders	2 (22.2)

LVEDD: left ventricular end-diastolic diameter. SD: standard deviation. LVEF: left ventricular ejection fraction. IQR: interquartile range.

(end-diastolic diameter: 58-85 mm) and global hypokinesia; four patients had a high echocardiographic probability of pulmonary hypertension. One patient had eccentric left ventricular hypertrophy, an intraventricular thrombus, and right-sided hemiparesis and received anticoagulation. Holter monitoring documented non-sustained ventricular tachycardia in three patients and sustained ventricular tachycardia with electrical storm in one. Imaging findings are shown in **Figure 1**.

Ventricular arrhythmia phenotype

Two patients (22.2%) had ventricular arrhythmias as their predominant manifestation. The first was a 52-year-old woman whose ECG showed bifascicular block and first-degree atrioventricular block, with a QRS duration of 160 ms. Her LVEF was 29%, and her premature ventricular contraction burden was 19%. She received optimal medical therapy and had an indication for cardiac resynchronisation therapy with a defibrillator (CRT-D) for primary prevention. The second was a 53-year-old man with HIV infection receiving antiretroviral therapy. His LVEF declined from 68 to 29% during follow-up, and he was admitted with electrical storm and resuscitated sudden cardiac arrest. Holter monitoring also showed sinus node dysfunction, and a dual-chamber implantable cardioverter-defibrillator (ICD) was implanted for secondary prevention (**Figure 2A, B**).

Conduction system abnormality phenotype

Two patients (22.2%) had advanced conduction abnormalities as their predominant manifestation. Both were 43-year-old women with preserved systolic function. The first presented with palpitations and angina; her ECG showed third-degree atrioventricular block with intermittent episodes of Mobitz type II second-degree atrioventricular block. The second, who was in the third trimester of pregnancy, presented with dizziness, syncope, and bradycardia. Holter monitoring documented sinus pauses of up to 5.2 s, a premature ventricular contraction burden of 24%, and episodes of sustained ventricular tachycardia. Both underwent permanent dual-chamber pacemaker implantation. In the second patient, implantation was performed under echocardiographic guidance because an ICD was unavailable (**Figure 2C-F**).

Interventions and clinical outcomes

Two patients (22.2%) received permanent dual-chamber pacemakers, and one (11.1%) received a dual-chamber ICD for secondary prevention. Two were considered candidates for ICD implantation for primary prevention and one for CRT-D. One of these patients was also referred for heart transplantation assessment. Two patients (22.2%) died during hospitalisation, both with the heart failure phenotype: one from mixed cardiogenic and septic shock with respiratory failure, and the other from refractory electrical storm and cardiogenic shock. The remaining seven patients continue to receive outpatient follow-up and optimal medical therapy.

Discusión

In this series of nine patients with chronic Chagas cardiomyopathy (CCC) treated at a Peruvian national hospital, conduction system involvement was universal: all nine had an intraventricular or atrioventricular conduction abnormality, and ventricular arrhythmias were documented in eight (88.9%). Seven patients (77.8%) had an LVEF of < 40% at their initial cardiological assessment, and two (22.2%) died during hospitalisation. The

Table 2. Cardiovascular characteristics and clinical outcomes of patients with chronic Chagas cardiomyopathy.

N.º	LVEF (%)	LVEDD (mm)	PH (Probability)	LV thrombus	Baseline ECG	QRS (ms)	Conduction disorder	Ventricular arrhythmia	Device	Clinical outcome
1.	18	85	High	No	Sinus rhythm	160	Complete LBBB + first-degree AV block	PVCs	No	Died
2.	28	67	High	No	Sinus rhythm	90	Incomplete RBBB + first-degree AV block	NSVT	ICD candidate	Outpatient follow-up
3.	39	58		No	Sinus rhythm	120	Complete RBBB + LAFB	NSVT	No	Outpatient follow-up
4.	15	67	High	No	Sinus rhythm	90	Incomplete LBBB	Sustained VT and electrical storm; PVC burden, 29%	No	Died
5.	20	65	High	Si	Sinus rhythm	100	Incomplete LBBB + first-degree AV block	NSVT; PVC burden, 8.5%	ICD candidate	Outpatient follow-up
6.	29	62	High	No	Sinus rhythm	160	Complete RBBB + LPFB + first-degree AV block	PVC, 19%	Awaiting CRT-D implantation	Outpatient follow-up
7.	29	54	Low	No	Ventricular tachycardia	160	Complete RBBB + LAFB	VT/VF	Dual-chamber pacemaker-ICD	Aborted sudden cardiac death; follow-up
8.	66	51	Low	No	Idioventricular rhythm	160	Third-degree AV block	None documented	Dual-chamber pacemaker	Seguimiento Outpatient follow-up
9.	54	83	Low	No	Sinus rhythm/ junctional rhythm	90	Significant pauses	VT and sinus pauses lasting up to 5.2 s; PVC, 24%	Dual-chamber pacemaker	Outpatient follow-up

AV: atrioventricular. CRT-D: cardiac resynchronisation therapy with defibrillator. ECG: electrocardiogram. ICD: implantable cardioverter-defibrillator. LAFB: left anterior fascicular block. LBBB: left bundle branch block. LPFB: left posterior fascicular block. LV: left ventricle. LVEDD: left ventricular end-diastolic diameter. LVEF: left ventricular ejection fraction. NSVT: non-sustained ventricular tachycardia. PH: pulmonary hypertension. PVCs: premature ventricular contractions. RBBB: right bundle branch block. VF: ventricular fibrillation. VT: ventricular tachycardia.

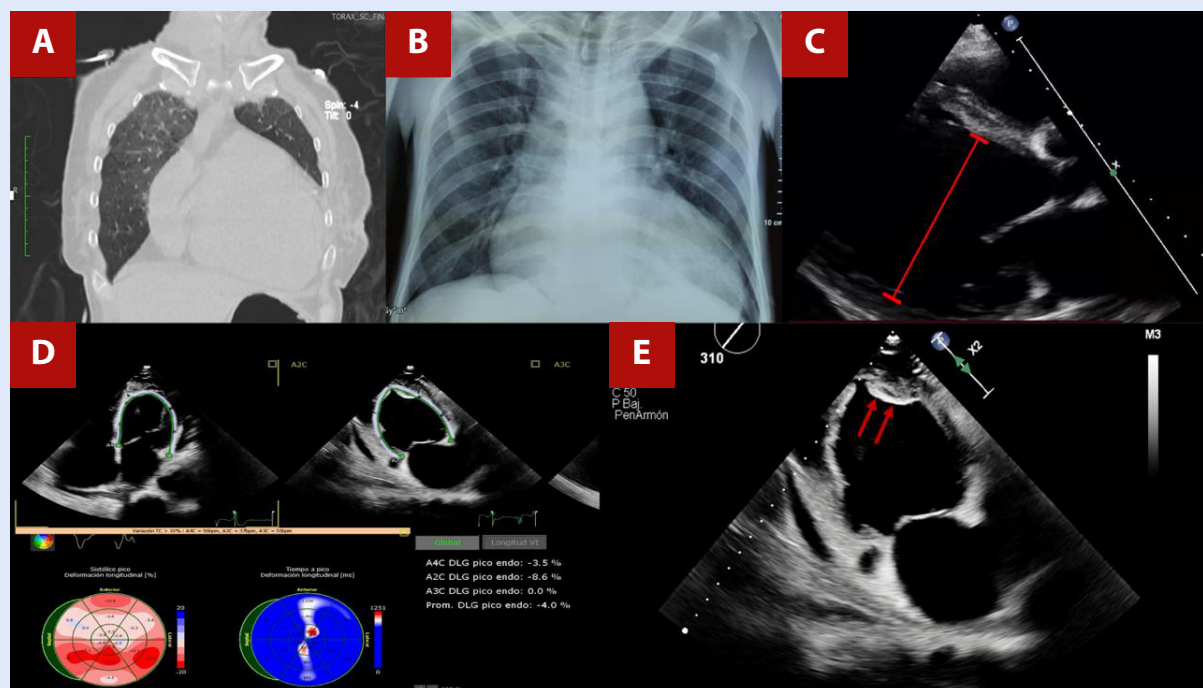


Figure 1. (A) Chest CT of patient 1 showing severe cardiomegaly due to left ventricular dilatation. (B) Chest radiograph of patient 4 showing severe cardiomegaly. (C) TTE of patient 4 showing severe eccentric left ventricular dilatation. (D) Left ventricular global longitudinal strain assessment of patient 4 showing markedly reduced myocardial deformation and dilatation of all cardiac chambers. (E) Apical two-chamber TTE view of patient 5 showing a left ventricular apical thrombus.

TTE: transthoracic echocardiography. CT: computed tomography

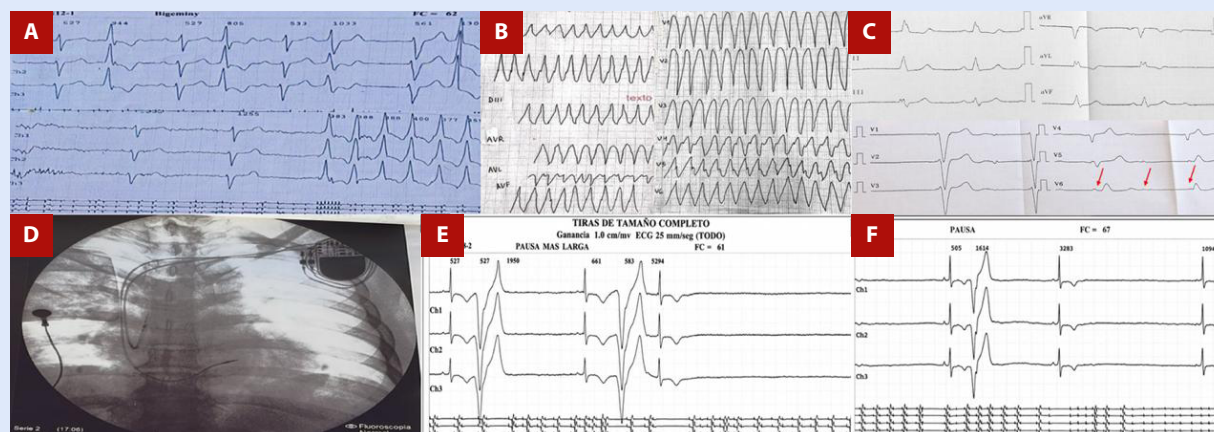


Figure 2. (A) Twenty-four-hour Holter recording of patient 6 showing sinus rhythm, a high burden of premature ventricular contractions, and episodes of non-sustained ventricular tachycardia. (B) ECG recording of patient 7 on admission to the coronary care unit, consistent with sustained ventricular tachycardia. (C) ECG of patient 8 showing complete atrioventricular block. (D) Chest radiograph of patient 8 following permanent dual-chamber pacemaker implantation. (E, F) Twenty-four-hour Holter recordings of patient 9 showing sinus rhythm with premature ventricular and supraventricular contractions, as well as significant sinus pauses.

PVCs: premature ventricular contractions. NSVT: non-sustained ventricular tachycardia. ECG: electrocardiogram.

three classic phenotypes coexisted, and infection was recognised in seven patients only after cardiovascular involvement was established.

This study provides a cardiovascular characterisation of a Peruvian CCC case series in a setting where national evidence is limited to epidemiological surveillance data (6), with no published clinical series. The disease profile has been defined primarily by cohorts from endemic areas of Brazil and other countries in the region (7-9). In community-based cohorts, median LVEF is as high as 63%, and only 13% of patients have systolic dysfunction (10), compared with a median LVEF of 29% in our series.

Heart failure was the most common phenotype, occurring in five patients (55.6%). The most severely affected patients had marked left ventricular dilatation and systolic dysfunction, with LVEF ranging from 15 to 39%, consistent with the ventricular remodelling described in CCC (3). A left ventricular thrombus associated with hemiparesis also illustrates the thromboembolic risk of this condition (1,3). Systolic dysfunction and intracardiac thrombus are independent predictors of cerebrovascular events in CCC, whose incidence remains high even with anticoagulation (11,12). Heart failure is a major manifestation and prognostic determinant of advanced CCC (7,8); both deaths in our series occurred in this group.

Arrhythmic manifestations and advanced conduction system abnormalities were the predominant features in four patients (44.4%). As reported in international series, complex ventricular arrhythmias coexisted with advanced conduction abnormalities, findings considered characteristic of CCC (4). Chagas disease tends to affect the conduction system early through chronic inflammation and myocardial fibrosis, which promote conduction block and create a substrate for re-entrant ventricular arrhythmias (4,13). Of the three patients with complete right bundle branch block, two also had left anterior fascicular block, the combination classically described in this condition (13,14).

The severity of electrical involvement was reflected in a high burden of complex ventricular arrhythmias, substantial sinus pauses, sustained ventricular tachycardia, electrical storm, and one case of resuscitated sudden cardiac arrest, consistent with the arrhythmogenic profile of CCC (4,15). Sudden cardiac death is a leading cause of death in CCC (4,16), and arrhythmic risk stratification and device indications require disease-specific criteria (17). Two cases illustrate scenarios rarely described in the national literature: a patient with HIV receiving antiretroviral therapy who developed progressive LVEF decline and resuscitated sudden cardiac arrest, in whom reactivation of infection should be considered (17); and a pregnant woman with symptomatic bradyarrhythmia, a condition associated with increased maternal morbidity and mortality in Chagas disease (18).

Although the disease burden has been described mainly in southern departments of Peru, the Amazonian origin of most patients is consistent with emerging transmission in the Peruvian Jungle, where circulation of *Trypanosoma cruzi* in triatomine bugs in Iquitos and infection among pregnant women have recently been documented (6,19,20). The diagnosis was incidental in two patients, one through blood donation screening (21) and the other during perioperative assessment. In the remaining seven, infection was identified when cardiovascular involvement was already clinically apparent, highlighting the need to strengthen early detection in endemic areas.

These findings support considering Chagas disease in patients from endemic areas who present with non-ischaemic dilated cardiomyopathy or conduction abnormalities, and incorporating ECG and Holter monitoring into the follow-up of seropositive patients, including those without symptoms. Only one patient had received antiparasitic treatment, although its benefit in established disease is limited (22). The unavailability of an ICD for one patient also illustrates an access gap that warrants attention within the Peruvian health system.

This study has several limitations. Its retrospective design, small number of cases, and single national referral centre setting introduce selection bias: referred patients represent the severe end of the disease spectrum, probably explaining why 77.8% had an LVEF of < 40% and none were free of electrical involvement. These proportions should not be interpreted as population prevalence estimates. Formal prognostic risk stratification was not performed, and standardised follow-up was unavailable. Nevertheless, these limitations do not invalidate the description of the observed clinical spectrum, which was the study objective.

In conclusion, this series documents the coexistence of the three classic cardiovascular phenotypes of CCC in Peruvian

patients, most of whom originated from the Jungle and had established cardiovascular involvement. These findings highlight the importance of early diagnosis of *Trypanosoma cruzi* infection and its cardiovascular manifestations.

Author contributions

KSC and DDF: conceptualisation, investigation, writing-original draft, writing-review and editing. **POR:** writing-original draft, writing-review and editing.

Ethical aspects

Informed consent and institutional ethics committee approval were obtained.

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