ture rise (sensitivity, 72%; specificity, 68%; area under the curve, 0.75). There were no atrial fibrillation recurrences in 92% of patients over a median follow-up of 12 months (Holter monitoring and electrocardiograms at 3, 6, 9, and 12 months). A blanking period of 3 months was used, and antiarrhythmic treatment was maintained in all cases until the first visit.

PVI with a radiofrequency balloon catheter produces very antral lesions and an isolation area occupying 52% of the posterior wall. Our study shows that radiofrequency balloon catheter ablation results in more extensive lesions and posterior wall isolation than cryoballoon ablation.[1] Similar or larger extents have been reported for electroporation.[2,5] The influence on PVI with radiofrequency balloon ablation on atrial fibrillation recurrence remains unclear. Both impedance drop and temperature rise predicted single-shot isolation, confirming recent findings.[6]

FUNDING

This study received no funding.

ETHICAL CONSIDERATIONS

This study was approved by the local health care ethics committee (Ref. CI 22/548-P_NoEC). Informed consent was obtained from all patients for the conduct and publication of this study. Sex and gender were reported in accordance with the Spanish Sex and Gender Equity in Research (SAGER) guidelines.

STATEMENT ON THE USE OF ARTIFICIAL INTELLIGENCE

Artificial intelligence was not used in this study.

AUTHORS' CONTRIBUTIONS

E. Martínez Gómez: protocol design, data collection, statistical analysis, and manuscript drafting. Salgado protocol design, statistical analysis, and manuscript revision; D. Calvo Cuervo: manuscript revision. C. Sánchez Vallejo: data collection. D. Filgueiras-Rama: manuscript revision. N. Pérez-Castellano: protocol design, statistical analysis, and manuscript review.

CONFLICTS OF INTEREST

D. Filgueiras-Rama is associate editor of *Revista Española de Cardiología*. The journal's editorial procedure was followed to guarantee the impartial handling of the manuscript.

The other authors do not report any conflicts of interest.

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Neurochagas in post-heart transplant: clinical and epidemiological analysis of this entity based on a series of cases

Neurochagas tras el trasplante cardiaco: análisis clínico y epidemiológico de esta entidad en una serie de casos

To the Editor,

The prevalence of Chagas disease (CD) has been increasing globally.[1] In the United States, CD was reported in approximately 300 000 people, while cases have also been identified in Europe.[1,2] The reactivation rate of CD in transplant recipients displays variability, ranging from 40% to 61%.[3,4] This reactivation is determined through positive polymerase chain reaction (PCR) results, endomyocardial biopsy (EMB) findings, or symptomatic disease. Here we describe 4 clinical cases of Neurochagas (NCh) from a single center. Notably, our hospital does not routinely adopt immunosuppressive induction therapy. Nonetheless, a uniform approach was observed across all cases, involving the administration of preoperative intravenous corticosteroids. The standard immunosuppressive regimen used for maintenance includes cyclosporine or tacrolimus, sodium mycophenolate, and prednisone. However, the patients diagnosed with CD deviated from this regimen, with azathioprine substituting mycophenolate.[4] Informed consent was obtained from all 4 patients.

The first case is a 45-year-old male presenting with CCM (CCM) and advanced heart failure (HF) criteria, who underwent bicaval orthotopic heart transplant (BOHT) in 2014. Following discharge, he received tacrolimus, prednisone, and mycophenolate due to an inability to tolerate azathioprine. However, 3 months after discharge, he was admitted to hospital due to frontal headache and a single episode of generalized seizures (GS). Upon physical

Table 1
Clinical features and radiological characteristics at the time of presentation

	Clinical features						
	Chagas serology	Seizures	Headache	Hemiplegia	Level of consciousness	Dysarthria	Extraneurological presentation
Case 1	√	√	√			√	√ (panniculitis)
Case 2	√	√		√	√	√	
Case 3	√	√		√	√	√	
Case 4	√	√		√	√		

	Radiological characteristics				
	Tomography findings		*Resonance findings*		
	Enlargement of cisterns	Hypoattenuating area	Ventricles dilation	Enhance post contrast	White matter lesion
Case 1	√	√	√	√	√
Case 2	√	√	√		√
Case 3		√			√
Case 4		√			√

	Pre- and postreactivation data								
	CMV PCR	*EMB/PCR test*	*TTE*	*Fungus, toxoplasmosis*	*Immunosuppression before reactivation*	*Background rejection > 2R*	*Pulse therapy*	*Serum level ng/ml*	*Immunosuppression after reactivation*
Case 1	Negative	0R/PCR (-)	Normal	Negative	MMF 720 mg bid Tacrolimus 5 mg bid Prednisone 20 mg qd	No	No	22	AZT 50 mg bid Tacrolimus 4 mg bid Prednisone 10 mg qd
Case 2	Negative	0R/PCR (+)	Normal	Negative	AZT 50 mg bid CSA 200 mg bid Prednisone 40 mg qd	Yes	Yes	391	AZT 50 mg bid CSA 175 mg bid Prednisone 10 mg qd
Case 3	Negative	1R/PCR (+)	Normal	Negative	AZT 50 mg bid CSA 175 mg bid Prednisone 20 mg qd	No	No	425	AZT 50 mg bid CSA 150 mg bid Prednisone 5 mg qd
Case 4	Negative	1R	Normal	Negative	MMF 500 mg bid CSA 200 mg bid Prednisone 10 mg qd	Yes	No		MMF 500 mg bid CSA 200 mg bid Prednisone 10 mg qd

AZT, azathioprine; CMV, cytomegalovirus; CSA, cyclosporine; EMB, endomyocardial biopsy; MMF, mycophenolate; PCR, polymerase chain reaction; bid, twice a day; qd, once a day; TTE, transthoracic echocardiogram.

examination, an inflammatory nodule was observed in the left lower limb, which was positive for Chagas panniculitis in a biopsy. Cranial computed tomography (CT) showed a hypoattenuating left frontal area. Cranial magnetic resonance imaging (MRI) exhibited a cortico-subcortical area of heterogeneous signal in the same region. Consequently, the diagnostic hypothesis of NCh was considered. Benznidazole was promptly initiated, accompanied by a reduction in immunosuppressants. The patient made favorable progress, with no further episodes of GS reported.

The second case is a 48-year-old male, meeting the criteria for advanced HF due to CCM, who underwent BOHT in 2020. Within the first month after theart transplant (HT), he experienced ventricular dysfunction (40%) while taking the drugs detailed in table 1. EMB indicated grade 2R cellular rejection, leading to the administration of methylprednisolone therapy, which subsequently resulted in improved ventricular function. However, he showed GS controlled with anticonvulsants. Imaging from both CT and MRI suggested posterior reversible encephalopathy syndrome, and CSA was replaced with tacrolimus. Three weeks later, he had another GS, accompanied by dysarthria, reduced level of consciousness, and left hemiparesis. An MRI scan was performed, revealing a cerebral lesion. Cerebral spinal fluid (CSF) analysis revealed the presence of trypomastigotes (video 1 of the supplementary data). Benznidazole was introduced, coupled with a reduction in CSA. The patient is currently undergoing rehabilitation with partial improvement.

The third case is a 47-year-old male diagnosed with CCM, and advanced HF who underwent BOHT in 2022. On the third postoperative day, he experienced a GS. A CT scan revealed a hypoattenuating frontal subcortical area on the left. One month after HT, another GS occurred. Despite initiation of anticonvulsant therapy, the GS persisted. Subsequent cranial MRI exhibited a lesion consistent with chagoma. Further, *Trypanosoma cruzi* was detected in CSF. The dose of CSA was decreased and benznidazole was started, resulting in the absence of subsequent GSs.

The fourth case is a 46-year-old male meeting the criteria for advanced HF due to CCM, who underwent BOHT in 2002. Five months following the HT, he was hospitalized due to GS accompanied by lowered level of consciousness and left hemiplegia. The immunosupression drugs are detailed in table 1. A CT scan identified a subarachnoid hemorrhage. Unfortunately, the patient progressed to brain death and an autopsy was performed. Amastigote nests were evident in the excisional brain biopsy (figure 1).

The clinical presentation of CD may manifest asymptomatically or even as myocarditis or encephalitis with stroke. The most frequently used diagnostic methods are blood PCR analysis, CSF analysis, and EMB.[3] According to our data, the incidence of NCh was of 4 cases (2.9%) from 2013. The prevalence of reactivation with neurological compromise has not been extensively documented, and a retrospective trial reported a prevalence of 3.1%.[4] This reactivation rate is not commonly reported, including in transplants of other organs.[5,6] At our institution, pretransplant PCR monitoring is not part of our routine practice. However, posttransplant PCR monitoring is conducted when specific risk

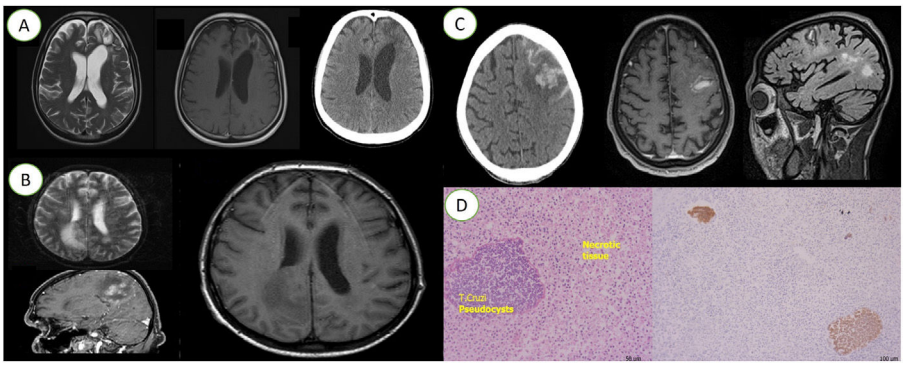

Figure 1. A. From left to the right; cranial magnetic resonance image with dilatation of ventricles and subcortical area of heterogeneous signal in the left frontal region; T_1 sequence, with hyposignal in the same region; cranial computed tomography scan with hypoattenuating left frontal area.
B. From left to the right; cranial magnetic resonance imaging with hypersignal in the frontoparietal transition; T_2 flair magnetic resonance imaging scan shows hypersignal in the same region; axial magnetic resonance imaging scan showing hyposignal.
C. From left to the right; cranial computed tomography with hyperdensity in the left frontal cortical sulci; magnetic resonance imaging scan showing a chagoma in the same region; magnetic resonance imaging scan showing the same chagoma.
D. From left to the right; histological section with the presence of *Trypanosoma cruzi* pseudocysts; immunostaining for *Trypanosoma cruzi* showing the presence of pseudocysts.

factors are present, in cases of clinical suspicion, or even in asymptomatic patients, along with each EMB. A PCR test for CD was performed in 3 patients reported in table 1.

The neurological clinical symptoms observed in our series were hemiplegia, seizures, dysarthria, and altered level of consciousness. Among the radiological features, the most frequent were hypoattenuating areas, enlargement of the cisterns, and dilation of the ventricles. In our center, treatment with benznidazole is immediately started and the immunosuppressant dose is reduced. Benznidazole is used for 60 days, but there have been no reports of the treatment and duration of reactivation with central nervous system involvement.[2] There is no consensus on the benefits of using prophylactic benznidazole in patients with CD who undergo HT.

The main recommendations of this study are as follows: identify risk factors predisposing to reactivation, establish a lower threshold when deciding on the degree of immunosuppression, and frequently monitor these patients during follow-up through clinical suspicion and complementary analyzes (EMB, PCR).

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ETHICAL CONSIDERATIONS

Informed consent was obtained from all 4 patients. The present manuscript has received approval from the ethics committee of our institution. The manuscript was prepared in accordance with the SAGER guidelines and the potential variables related to sex and gender were not relevant.

STATEMENT ON THE USE OF ARTIFICIAL INTELLIGENCE

The artificial intelligence did not play a role in the creation of this work.

AUTHORS' CONTRIBUTIONS

C. Espinoza Romero, D. Catto de Marchi, F.G. Marcondes-Braga, S. Mangini, M. Samuel Avila and F. Bacal contributed to all aspects of this manuscript including study planning and design, model development, performing experiments, data collection and analysis, preparation, and review of the manuscript.

CONFLICTS OF INTEREST

None.

APPENDIX. SUPPLEMENTARY DATA

Supplementary data associated with this article can be found in the online version, at https://doi.org/10.1016/j.rec.2023.09.006

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Orthotopic transcatheter tricuspid coaptation valve system for severe tricuspid regurgitation: preliminary experience with CroíValve

Sistema ortotópico percutáneo de coaptación de la válvula tricúspide para la insuficiencia tricuspídea grave: experiencia preliminar con CroíValve

To the Editor,

Severe tricuspid regurgitation (TR) is a highly prevalent clinical entity with high morbidity and mortality rates that predominantly affects women. Given the high surgical risk, treatment has traditionally been medical. However, when left untreated, TR shows rapid progression and a grim prognosis.[1–4] Thus, less invasive strategies are being developed, with transcatheter edge-to-edge repair (TEER) being the most frequent percutaneous procedure. However, not all anatomies are suitable for this procedure and, therefore, some orthotopic valves have been studied with good technical success, although the selection criteria remain very strict, and the complication rate is higher than with TEER.[4]

To address these challenges, the CroíValve DUO Tricuspid Coaptation Transcatheter Valve System (CroíValve, Ireland) was developed. The system comprises 2 integrated components (figure 1): *a)* A 1-size-fits-all coaptation valve (CV) that, unlike previous alternative concepts, incorporates a valve inside to prevent valvular stenosis. The valve has a nitinol frame covered with a porcine pericardium skirt for the native leaflets to coapt against. *b)* A transjugular system that includes a 22-Fr delivery sheath (through a 26-Fr introducer); a nitinol self-expanding superior vena cava (SVC) stent that anchors the CV in place (available in 3 sizes); an adjustable implant catheter that connects the CV to the SVC stent and remains implanted in the patient; and a delivery system that remains connected to the implant catheter until the end of the procedure, when it is fully disconnected. This design is intended to accommodate any annular diameter and a wide range of right atrial (RA) sizes, while avoiding contact with the atrioventricular node and the right ventricular (RV) free wall.

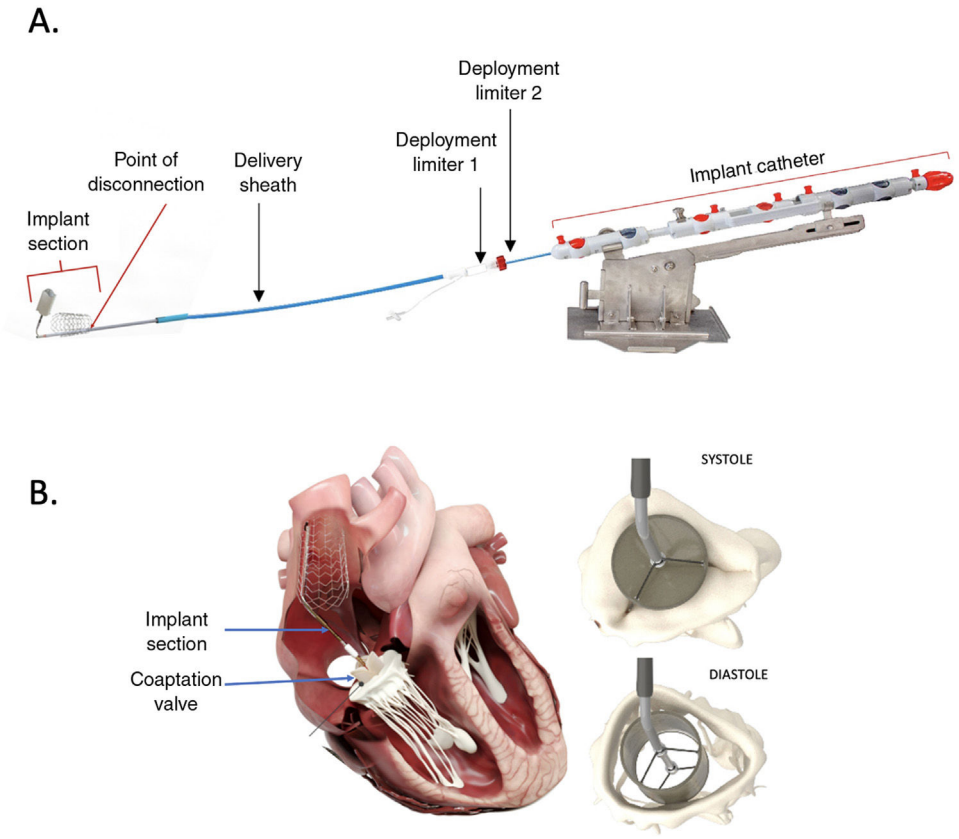

Figure 1. CroíValve system. A: delivery system. B: correct position and schematic illustration of the mechanism of action of the CroíValve system.