FUNDING

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ETHICAL CONSIDERATIONS

This study was approved by the Ethics Committee of *Hospital Universitario y Politécnico La Fe de Valencia*. Informed consent was obtained from patients for publication of their case. This study adheres to the SAGER guidelines.

STATEMENT ON THE USE OF ARTIFICIAL INTELLIGENCE

Artificial intelligence was not used in the development of the present study.

AUTHORS' CONTRIBUTIONS

All authors contributed, to a greater or lesser extent, to all the following tasks: study conception and design; data acquisition, analysis, and interpretation; drafting the article and critically revising the intellectual content; and approving the version to be published. All authors agree to take responsibility for all aspects of the article and to investigate and resolve any issues related to the accuracy of its parts.

CONFLICTS OF INTEREST

None.

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Characterization of lesions produced by pulmonary vein isolation with radiofrequency balloon

Caracterización de las lesiones producidas por el aislamiento de venas pulmonares con balón de radiofrecuencia

To the Editor,

Pulmonary vein isolation (PVI) is the cornerstone of invasive atrial fibrillation treatment. Robust evidence, however, is lacking on the influence of lesion size after isolation of pulmonary veins in the posterior left atrial wall and fibrillation recurrence. Several studies have analyzed lesion extent following PVI performed with a range of techniques, including cryoballoon and laser balloon ablation.[1,2] The Heliostar radiofrequency balloon catheter system (Biosense Webster Inc, USA) can achieve single-shot PVI and integrates with the CARTO 3 navigation system for full visualization (Biosense Webster, Israel). The Heliostar combines 10 longitudinal electrodes for tailored energy delivery and a module for real-time visualization of temperature and local impedance (figure 1A). The extent and characteristics of lesions following PVI with radiofrequency balloon ablation are unknown.

The aims of this study were to characterize lesions produced by PVI with the Heliostar radiofrequency balloon catheter and to analyze potential predictors of lesion size and quality. This observational, nonrandomized, noncomparative study was approved by the local health care ethics committee (Ref. CI 22/548-P_NoEC). Signed informed consent was obtained from all patients.

We studied 25 consecutive patients with a history of paroxysmal or persistent atrial fibrillation of less than 1 year who underwent PVI with the Heliostar radiofrequency balloon catheter using a methodology described elsewhere.[3] Baseline patient characteristics, procedural details, and outcomes are summarized in table 1. The CARTO 3 navigation system (Biosense

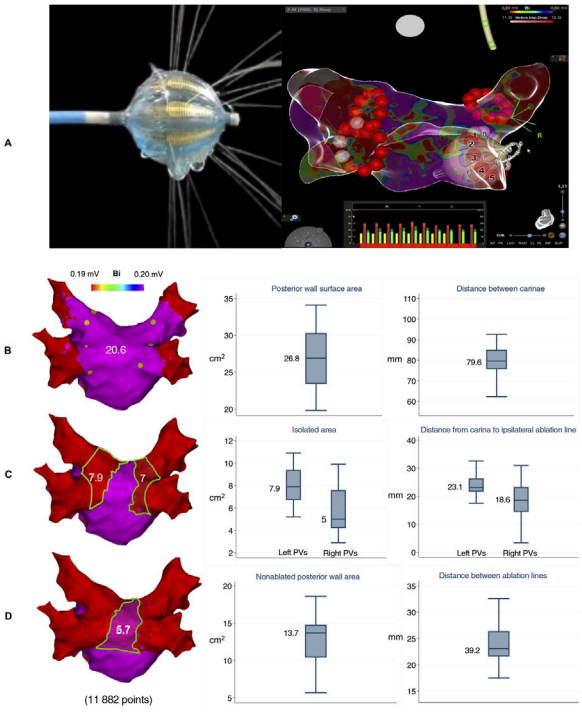

Figure 1. A: left, the Heliostar radiofrequency balloon catheter during maximum irrigation; right, voltage map from the CARTO 3 electroanatomic mapping system showing posterior view of the left atrium during delivery of radiofrequency energy to the right inferior pulmonary vein (note the ablation lines encircling the other veins); bottom, ablation panel showing real-time impedance, temperature and voltage data for each electrode. B: left, preablation voltage map (posterior view of left atrium) for 1 of the patients studied; the yellow dots show the anatomically and electrically defined pulmonary vein ostium and enclose the entire surface area of the posterior wall (20.6 cm^2 in the example shown); right, box plots showing posterior wall surface area and distance between carinae for the total population (median, interquartile range, minimum, and maximum). C: left, postablation voltage map, with green lines showing the isolated posterior wall area at the antra of the left and right veins; right, box plots showing posterior wall surface area and distance from carina to the ipsilateral ablation line for total population. D: left, postablation voltage map, with green lines showing nonablated posterior wall area; right, box plots showing nonablated posterior wall area and distance between ablation lines at the level of the carinae. The maps shown included 11 882 points. Bi, bipolar; PVs, pulmonary veins.

Table 1
Baseline patient characteristics and procedural details and outcomes

Baseline patient characteristics	
Age, y	56,7 [51-64,2]
Sex	18 (72)
Male	7 (28)
Female	
Hypertension	12 (48)
Diabetes mellitus	5 (20)
COPD	2 (8)
Obstructive sleep apnea syndrome	3 (12)
Structural heart disease	9 (36)
LVEF, %	61.6 [58-68]
Left atrium diameter, mm (PLAX)	3.9 [3.5-4.4]
Left atrial volume, mL	57.9 [49.9-83.8]
CHA_2DS_2-VASc	1 [1-2]
Type of atrial fibrillation	
Paroxystic	17 (68)
Persistent	8 (32)
Procedural details and outcomes	
Patients with left troncus arteriosus	4 (16)
Blocked veins	96 (100)
Radiofrequency applications per patient, No.	6 [5-7]
Single-shot isolations, %	64.1
Single-shot isolations according to vein, %	
LSPV	42.8
LIPV	76.2
RIPV	68
RSPV	68
Balloon dwell time in left atrium, min	35 [27-49]
Mapping time, min	15 [8-16]
Time to isolation, s	10 [9-12.5]
LSPV	14.5 [11-15.5]
LIPV	11 [9-12]
RSPV	9 [7-11]
RIPV	10 [9-11]
Fluoroscopy time, median, min	12
Total procedure time, min	134 [120-150]
Complications	0

CHA_2DS_2-VASc, acronym for congestive heart failure; hypertension, age ≥ 75 y (double score), diabetes mellitus, stroke (double score) vascular disease, age 65-74 years and sex (female); COPD, chronic obstructive pulmonary disease; LIPV, left inferior pulmonary vein; LSPV, left superior pulmonary vein; LVEF, left ventricular ejection fraction; PLAX, parasternal long axis; OSA, obstructive sleep apnea syndrome; RIPV, right inferior pulmonary vein; RSPV, right superior pulmonary vein.
Unless otherwise indicated, values are expressed as No. (%) or median [interquartile range].

Webster) was used to generate a high-density electroanatomic map of the left atrium before and after ablation. The median [interquartile range (IQR)] number of points acquired was 3219 [2294-4633 points].

The electroanatomic maps were processed using a previously described method.[1,2] The ostium of each pulmonary vein was anatomically and electrically defined prior to ablation.[4] The generated maps were used to define the isolation areas on the left and right posterior walls between the respective ostia and ipsilateral ablation lines. Voltage areas of > 0.2 mV were used to identify healthy tissue (figure 1B-D). The isolated surface area accounted for a median of 52.2% [IQR, 45%-56.6%] of the total posterior wall.

We analyzed atrial volume, distance between carinae, and the angle of the pulmonary veins with respect to the plane of the posterior wall. None of these variables was significantly associated with the isolated atrial segments.

Single-shot PVI was achieved in 64.1% of cases. Significant predictors of single-shot PVI in the univariate analysis using multilevel or mixed effects logistic regression were impedance drop (odds ratio [OR], 0.1 per drop of 1 Ω; 95%CI, 0.002-0.2; $P = .045$) and temperature rise (OR, 0.17 per 1-C° rise; 95%CI, 0.017-0.33; $P = .03$). Minimum voltage recorded by the balloon electrodes after PVI showed a tendency to predict single-shot isolation, but the association did not reach statistical significance (OR, –0.9 for 1-mV increase; 95%CI, –2 to 0.3; $P = .1$). The model that best predicted single-shot isolation included atrial volume, mean impedance drop, maximum impedance drop, and mean tempera-

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