

ORIGINAL ARTICLE

# Usefulness of multidetector computed tomography before and after pulmonary vein isolation<sup>☆</sup>



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## KEYWORDS

Imaging;  
Computed tomography;  
Atrial fibrillation;  
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Veins;  
Stenosis

## Abstract

**Objective:** To analyze the usefulness of multidetector computed tomography (MDCT) in the preprocedural evaluation and follow-up of patients undergoing radiofrequency ablation of pulmonary veins and the impact of the MDCT findings on the approach to treatment.

**Method:** We retrospectively analyzed 92 consecutive MDCT studies done in 80 patients between January 2011 and June 2013; 70 (76%) studies were done before a first ablation procedure and 22 (24%) were done in patients who had undergone an ablation procedure.

**Results:** Findings were useful in 34% of the patients who underwent MDCT before the first ablation procedure and in 68% of the studies done after a procedure. The incidence of stroke associated with the ablation procedure was 3%, similar to the incidence recorded in our center before we started to use MDCT to evaluate the anatomy of the left atrium. All symptomatic patients had some pulmonary vein stenosis, and 80% had significant stenosis. Furthermore, the stenoses progressed very rapidly; treatment with balloon angioplasty was associated with early restenosis. Stenting was an alternative in cases of failed angioplasty.

**Conclusion:** In the preprocedural evaluation and postprocedural follow-up of patients undergoing pulmonary vein isolation, MDCT is useful for guiding treatment and detecting complications.

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**PALABRAS CLAVE**

Imagen;  
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Venas;  
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## Utilidad de la tomografía computarizada multidetector en la evaluación previa y el seguimiento de los pacientes sometidos a ablación de venas pulmonares

**Resumen**

**Objetivo:** Estudiar la utilidad de la tomografía computarizada multidetector (TCMD) en la evaluación previa y el seguimiento de los pacientes sometidos a ablación de venas pulmonares mediante radiofrecuencia, y la actitud terapéutica basada en los hallazgos.

**Método:** Análisis retrospectivo de 92 estudios de TCMD consecutivos realizados entre enero de 2011 y junio de 2013 en 80 pacientes; de ellos, 70 (76%) antes de un primer procedimiento de ablación y 22 (24%) en pacientes que ya habían recibido algún procedimiento de ablación.

**Resultados:** Se encontraron hallazgos relevantes en el 34% de los pacientes en quienes se realizó el estudio antes del primer procedimiento de ablación y en el 68% de los estudios realizados tras algún procedimiento. La incidencia de ictus asociado al procedimiento de ablación fue del 3%, similar a la registrada en nuestro centro antes de utilizar la TCMD para la evaluación de la anatomía de la aurícula izquierda. Todos los pacientes sintomáticos tenían algún grado de estenosis de las venas pulmonares, significativa en el 80%. Además, la progresión de estas fue muy rápida; el tratamiento con angioplastia-balón se asoció a reestenosis precoz. El implante de *stent* fue una alternativa en los casos de angioplastia fallida.

**Conclusión:** La TCMD en la evaluación previa y el seguimiento de los pacientes sometidos a un procedimiento de ablación de venas pulmonares permite guiar el tratamiento y detectar complicaciones.

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**Introduction**

The ablation of pulmonary veins (PV) is a more and more widely used technique in electrophysiology laboratories (EPL).<sup>1</sup> It is an effective treatment in patients with drug-resistant symptomatic atrial fibrillation, or contraindications or side effects to medication.<sup>2,3</sup>

Imaging modalities are essential in the assessment of the left atrium and pulmonary vein anatomy, both for the selection of eligible candidates (description of PV anatomy) and in the detection of complications.<sup>4-6</sup> The detection of a blood clot in the left atrial appendage contraindicates the ablation procedure due to the impossibility of removing the clot, with the corresponding risk of systemic stroke.<sup>7</sup> Traditionally, the clinical guidelines discuss the detection of thrombi with the use of transesophageal echocardiograms (TEE),<sup>1</sup> but the multidetector computed tomography (MDCT) scan is a very good alternative modality that may be used as a diagnostic tool for its detection.<sup>8</sup> Also, there are possible long-term contraindications derived from PV ablation like the development of stenoses that may be symptomatic.

Traditionally, the imaging modality of choice for assessment before and after performing one ablation procedure was the TEE. The introduction of the magnetic resonance imaging (MRI) and the MDCT scan, both imaging modalities of higher resolution, allows 3D reconstructions and a better anatomical assessment of left atrium. The integration of data and information from these modalities and anatomical and electrophysiological information obtained through the specific navigation systems used in electrophysiology units has made it possible to reduce the ablation procedure time and increase safety and effectiveness, since the application of radiofrequency inside the PVs is no longer necessary

(beyond the ostium, which is the target of ablation), and all these reduces the chances of PV stenosis.<sup>6,9</sup>

The goal of our study is to assess the utility of the MDCT scan in the preliminary assessment and posterior follow-up of patients who undergo PV ablation procedures through radiofrequency, and the therapeutic attitude based on the findings.

**Method****Patients**

Retrospective analysis of 92 MDCT scans conducted between January 2011 and June 2013 for PV assessment in 80 patients; 70 MDCT scans (76 per cent) were conducted before the first ablation procedure, and 22 (24 per cent) in patients who had already undergone one ablation procedure. The patients' average age was  $60 \pm 10$  years old, and 58 patients (73 per cent) were males.

**Technique**

Studies were conducted using the General Electric Light-Speed VCR<sup>®</sup> MDCT scan machine (64 detectors) (General Electric Healthcare, Waukesha, WI, USA) with cardiac synchronization, total rotation time 330 ms, and 40 mm coverage by rotation. IV betablockers were administered at the study ward when needing to achieve heart rate target <65 bpm (esmolol, average dose 60 mg, in 11 patients). The protocol with the least possible radiation exposure was picked (prospective), even in the absence of low cardiac rates (<65 bpm). Using two (2) orthogonal projection

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