

# Frequent ventricular extrasystole ablation with CARTO system in complex congenital heart disease

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## Abstract

Ventricular arrhythmias are an important cause of morbidity and mortality and come in a variety of forms, from single premature ventricular complexes to sustained ventricular tachycardia and fibrillation. Rapid developments have taken place over the past decade in our understanding of these arrhythmias and in our ability to diagnose and treat them. The field of catheter ablation has progressed with the development of new methods and tools, and with the publication of large clinical trials <sup>1</sup>. A 48-year-old male with complex congenital heart disease (CCHD) and reduced LVEF, with the presence of frequent ventricular extrasystoles (VE) from the right ventricular outflow tract (RVOT), which is why he was taken to radiofrequency catheter ablation. The aim of the authors is to describe the technique of ablation of VE of the RV outflow tract in complex congenital heart disease.

## Introduction

A 48-year-old man attends a review, in functional class I NYHA, in optimal medical treatment for heart failure (HF). No alterations in physical examination. Holter monitoring (2018) with arrhythmic load of 33.9% of monomorphic EVs and paroxysms of non-sustained monomorphic ventricular tachycardia (VT) that required electrophysiological study and EV ablation of RVOT (Figure 1).

**Past medical history:** Closure of ventricular septal defect (VSD) in 1997 with residual VSD small perimembranous of 5 mm with maximum gradient of 90mmhg, without pulmonary hypertension. LVEF 30%. Magnetic resonance imaging (NMR) reported dextrocardia with dextroapex, LVEF 32%. Right ventricular (RV) systolic dysfunction, DVEF 27%. Double superior vena cava by persistence of the left vena cava drains to the unroofed coronary sinus (CS).

**Differential diagnosis:** idiopathic ventricular tachycardia with origin in the coronary cusps.

**Administration:** four previous years with amiodarone and metoprolol at maximum dose without having been successful elimination of these.

## Methods

Guided catheter ablation was performed with CARTO system (Bio sense – Webster, Diamond Bar, California). A quadripolar catheter was positioned to the His region and a decapolar catheter in the CS. By left femoral venous approach, the SMART TOUCH SF catheter was advanced, which proceeded to perform electro anatomical mapping of the RVOT. Electro-anatomical reconstruction began with isochronal EV map supported by the algorithm, locating the highest precocity of -50ms in the septal region of the RVOT (Figure 2). Using this ablation catheter, power-controlled radiofrequency ablation (25W) was applied for 60 seconds,

during application in this region VT was induced (Figure 3) and spontaneous cessation was observed during the application and absence of extrasystole.

## Results

After the application of radio frequency was achieved to eliminate the automatic focus responsible for the EVs. A new electro-anatomical reconstruction was performed with an activation map and stimulated after 30 minutes without observing recurrence. A patient was reassessed at 30 days, where the patient did not report symptoms, in 24-hour Holter monitoring, no ventricular ectopic activity was observed.

## Discussion

The presence of surgical scars along with viable, but slow-conducting myocardial tissue results in the creation of discrete isthmus that provide the substrate for reentry VT<sup>2</sup>.

Although the survival of patients with CCHD has been significantly prolonged, many experience complications such as rhythm disorders into adulthood<sup>3</sup>. These arrhythmias can cause a wide range of symptoms, ranging from palpitations to even sudden cardiac death.

Many of these late postoperative tachyarrhythmias are not sufficiently controlled with antiarrhythmic drugs<sup>4</sup>. Lifetime use of class III antiarrhythmic drugs such as amiodarone may result in fewer recurrences<sup>5</sup>, but also increases the risk of adverse effects in the relatively young adult patient with congenital heart disease (CHD).

Invasive electrophysiological studies have been performed to locate the VT substrate in adults with CHD as VSD<sup>6,7</sup>. These studies showed that crucial pathways were often bordered by non-excitabile tissue around surgically corrected areas, such as the infundibulotomy scar, the RVOT, and the ventricular septum patch. It has been observed that VT in these patients originates mainly in the right ventricle.

The introduction of electro anatomical mapping techniques allowed 3D visualization of activation patterns, making it easier to select appropriate target sites for ablation. The use of this technology resulted in better outcomes from ablative therapy. New techniques facilitated navigation to the target site and the use of irrigated tip catheters improved lesion formation and further increased the success rate<sup>8</sup>.

## Conclusion

Radiofrequency catheter ventricular extrasystoles ablation has been reserved for patients with frequent persistent vena cava whose quality of life is altered by bothersome symptoms, or for patients with sustained VT.

## References

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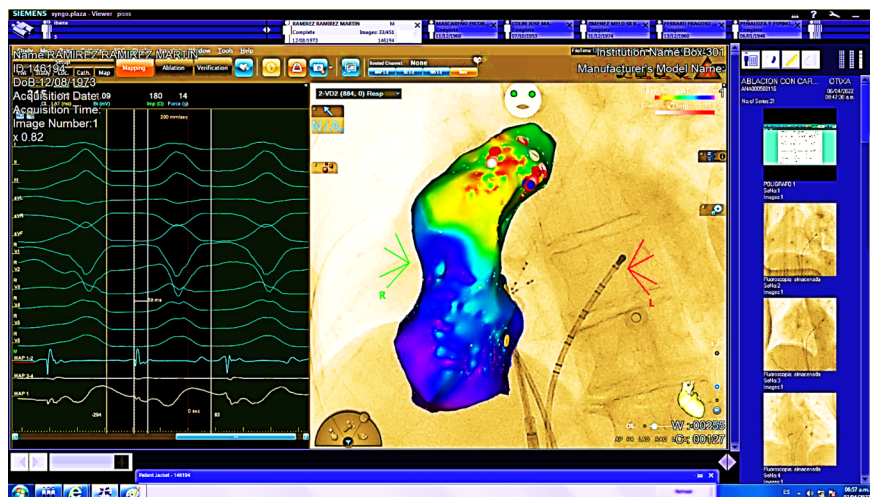
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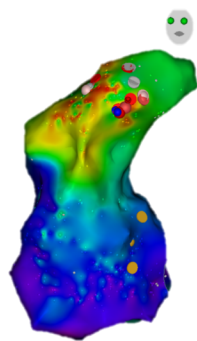
## Figure legends

**Figure 1: Initial electrogram.** Polygraph image showing ventricular extrasystole of the posterior right ventricle outflow tract.



**Figure 2: Pre-ablation position.** we note the point of greatest annealing in -50ms .





**Figure 3: CARTO.** Activation map in the region of the right ventricular outflow tract after application of ablation points.