RIGHT VENTRICULAR OUTFLOW TRACT ACTIVATION SPEED: DECELERATION ZONES ASSOCIATED WITH LOW VOLTAGE AREAS

Parreira Leonor[1,2], Carmo Pedro[2], Mesquita Dinis[1], Marinheiro Rita[1], Gonçalves Ana[1], Marinescu Catalin[2], Farinha José[1], Esteves Ana[1], Amador Pedro[1], Lopes Artur[1], Fonseca Marta[1], Cavaco Diogo[2], Galvão Santos Pedro[2], Adragão Pedro[2] **1. Hospital da Luz Lisboa; 2. Centro Hospitalar Setúbal**

BACKGROUND AND AIMS

Activation wavefront is rapid and uniform in normal myocardium. Fibrosis is associated with deceleration zones (DZ) and late activated zones. The presence of low voltage areas (LVAs) in the right ventricular outflow tract (RVOT) of patients with premature ventricular contractions (PVCs) from this origin has been described previously.

The aim of this study was to evaluate in sinus rhythm, the RVOT endocardial activation duration (EAD) and the presence of DZs, in patients with PVCs and in controls.

METHODS

POPULATION

We studied consecutive patients with frequent (>10.000/24 h) idiopathic PVCs with inferior axis that underwent catheter ablation and had an activation and voltage map of the RVOT in sinus rhythm.

We also studied a control group of patients without PVCs that underwent ablation of supraventricular arrhythmias.

Patients with structural heart disease, previous ablation or conduction disease were excluded.

3D ELECTROANATOMICAL MAPPING IN SINUS RHYTHM

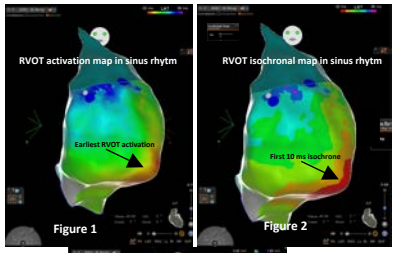
The 3D electroanatomical map in sinus rhythm was performed with the Carto 3 or Ensite Precision systems in a point-by-point manner. Fig 1 and Fig 2

Activation map : Evaluated parameters

- Total RVOT EAD was measured as the time interval between the earliest and the latest activated region.
- Number of 10 ms isochrones throughout the RVOT
- Maximal number of 10 ms isochrones within 1 cm radius
- Presence of DZs defined as a zone with>3 isochrones within 1 cm radius

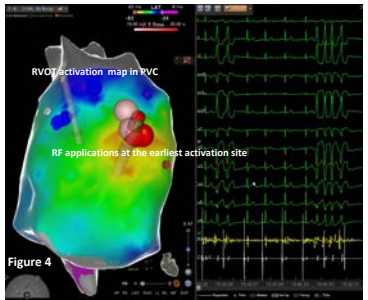
Voltage map

- A 3D electroanatomical bipolar voltage map of the RVOT was performed in sinus rhythm (0.5 mV-1.5 mV color display)
- Presence of low voltage areas (LVA) defined as areas with local electrogram amplitude <1.5 mV was assessed. Fig 3



3D ELECTROANATOMICAL MAPPING IN PVC AND ABLATION

The activation map was created by mapping several points during PVC while using a surface ECG lead as reference. Ablation site at the earliest endocardial activation site (Fig 4) in relation to the onset of the surface QRS, with a QS pattern at the unipolar electrogram and confirmed by the pace mapping that provided at least 11 /12 matches



STATISTICAL ANALYSIS

Categorical variables presented as number (%) and continuous as median (Q1-Q3).

RESULTS

- 42 patients, 29 in the PVC group and 13 control subjects.
- The two groups did not differ in relation to age, gender number of points in the map.
- The site of origin of the PVCs was the RVOT in 23 patients and the LVOT in 6.
- Activation duration and number of 10 ms isochrones in the RVOT were significantly higher in the PVC group, (Table)
- LVAs and DZs were more frequent in the PVC group, respectively 21 (72%) vs 0 (0%), p<0.0001 and 20 (69%) vs 0(0%), p<0.0001.
- LVAs were more frequent in PVCs from the RVOT than from the LVOT (83% vs 33%, p=0.033).
- Patients with LVA had longer EAD 60 (52-67) vs 36 (34-40) ms, p<0.0001 (Fig 5) and more DZ than patients without LVA 95% vs 0%, p<0.0001 (Figure 6)

	Total sample (N-42)	PVC group (N-29)	Control group (N-13)	p value
Age in years	56 (35-65)	58 (38-66)	53 (28-67)	0.648
Male gender	19 (45)	14 (48)	5 (39)	0.401
Nº of points in sinus rhythm map	410 (338-589)	467 (345-660)	345 (333-465)	0.056
LVAs, n (%)	20 (49)	20 (71)	0(0)	**<0.0001**
Activation duration in ms	42 (36-61)	57 (41-66)	39 (35-41)	**0.001**
Nº 10 ms isochrones in the RVOT	4 (4-6)	5 (4-6)	4 (4-4)	**0.037**
Max nº isochrones per 1cm radius	4 (3-5)	4 (3-5)	3 (3-3)	**<0.0001**
Presence of DZs	20 (48)	20 (69)	0(0)	**<0.0001**
Presence of LVAs	21 (50)	21 (72)	0(0)	**<0.0001**

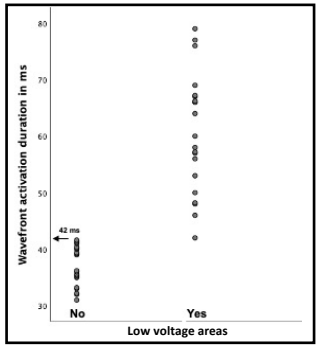


Figure 5

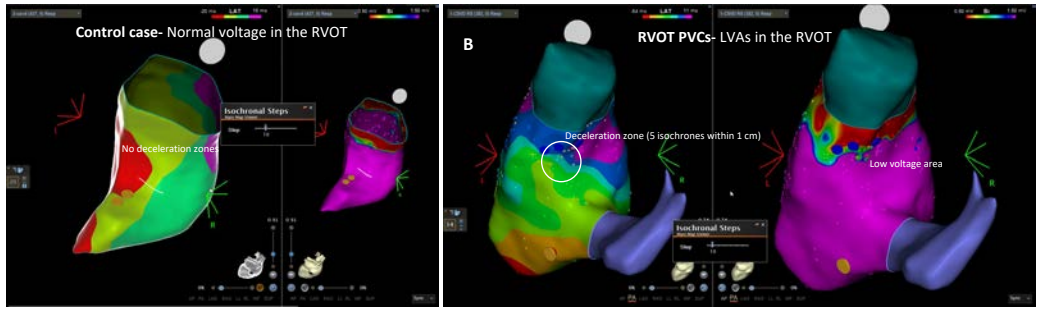


Figure 6

CONCLUSION

The velocity of the wavefront propagation was slower and DZs were more frequently present in patients with PVCs and were associated with the presence of LVAs.