Electrical anatomy of the left atrium during atrial fibrillation

Adragao P.; Nascimento Matos D.; Costa F.; Galvao Santos P.; Rodrigues G.; Carmo J.; Carmo P.; Cavaco D.; Morgado F.; Mendes M.

Hospital Santa Cruz, Cardiology, Carnaxide, Portugal

Funding Acknowledgements: Type of funding sources: None.

Introduction: Twenty years ago, pulmonary veins (PV) ostia were identified as the left atrium (LA) areas with the shortest refractory period during sinus rhythm. Pulmonary veins isolation (PVI) became standard of care, but clinical results are still suboptimal. Today, a special tool using the Carto® electroanatomical mapping (EAM) allows for AF cycle length mapping (CLM), to identify the areas in the left atria with shortest refractory period, during atrial fibrillation. Using this EAM tool, our study aimed to find the LA areas with the shortest refractory period to better recognize electrical targets for catheter ablation.

Methods: Retrospective analysis of an unicentric registry of individuals with symptomatic drug-refractory AF who underwent PVI with Carto® EAM. CLM was performed with a high-density mapping Pentaray® catheter before and after PVI and in 4 redo procedures. We assessed areas of short cycle length (SCL) (defined as 120 to 250ms), and their relationships with complex fractionated atrial electrograms (CFAE), and low-voltage zones (from 0.1 to 0.3mV).

Results: A total of 18 patients (8 men, median age 63 IQR 58-71 years) were included. Most patients presented with persistent AF (n = 12, 67%), and 4 patients (22%) had a previous PVI. The mean shortest measured cycle length in AF was 140ms (SD ±27ms). All patients presented areas of SCL located in the PVs or their insertion, 70% in the posterior/roof region adjacent to the left superior pulmonary vein (LSPV) (figure 1) and 60% in the anterior region of the right superior pulmonary vein (RSPV). These two areas remained the fastest even after PVI. The anterior mitral region rarely presented SCL (17%). SCL were related to low-voltage areas in 94% and were adjacent to CFAE. Low-voltage areas and CFAE were more frequent and had a larger LA dispersion than SCL.

Conclusion: We confirmed in 3D mapping that PVs are the LA zones with shortest refractory period, not only in sinus rhythm but also during AF. The persistence of SCL areas in the border zones of the PVI lines suggest the benefit of a more extensive CLM guided ablation. Larger studies are needed.

Abstract Figure 1