EP CASE REPORT

Electroanatomical mapping of coronary artery anatomy to guide epicardial ventricular tachycardia ablation

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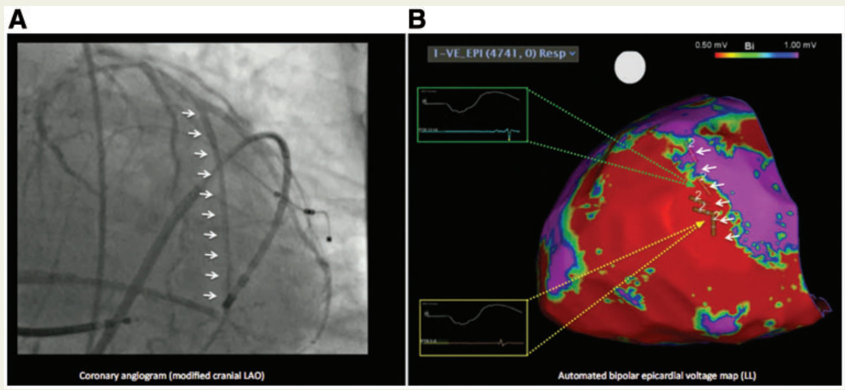

Radiofrequency ablation (RF) in the left ventricular (LV) epicardium is generally preceded by a coronary angiogram to access the anatomical relation of the coronary arteries with the ablation zone.[1,2] Integrating coronary anatomy into the 3D eletroanatomical map might improve the procedural safety.

A 58-year-old male with heart failure NYHA II due to non-ischaemic dilated cardiomyopathy with severely depressed left ventricular systolic function (left ventricular ejection fraction = 23%) and previous implanted cardiac resynchronization therapy and defibrillator (CRT-D) underwent ventricular tachycardia (VT) ablation for recurrent electrical storm.

Epicardial and endocardial mappings were performed using CARTO3-version4^{TM} and a *Pentarray*^{TM} catheter (Biosense Webster). An automated bipolar voltage map (ConfiDENSE^{TM}) was collected from the epicardial surface of the LV and right ventricle (4741 points); and endocardial surface of the LV (1686 points). A large (204 cm^2) low-voltage area (<1.0 mV) was present in the LV epicardium and a smaller (108 cm^2) but significant low-voltage area (<1.5 mV) was present in the endocardium. However, highly fractionated and late (128 ms post-QRS) local abnormal ventricular activities (LAVAs) were only identified in the epicardial mid-region of the antero-lateral and infero-lateral walls. As no VTs were inducible, a substrate directed approach was chosen. High output pacing (20 mA) excluded phrenic nerve stimulation within the area of interest.

As no CT scan was available to integrate coronary artery anatomy to the electroanatomical map and to avoid coronary artery lesion from RF ablation a thorough evaluation of their anatomical location was performed. A Smart Touch^{Tm} ablation catheter (Biosense Webster) was placed in the previously identified ablation zone and a coronary angiogram was performed, revealing that an obtuse marginal artery (OMA) intersected the ablation area (Panel A—white arrows). To accurately access the relation between the OMA and the ablation site, a new methodology was applied. The left main was catheterized with a XB 3.5 intervention catheter and a non-hydrophilic angioplasty wire (Balance Middle Weight) was placed in the distal segment of the OMA, under systemic non-fractionated heparin (ACT 200–250 s). The proximal extremity of the wire was connected to a bipolar claw cable, which was connected to the CARTO system. The system was manually programed so it would recognize the wire as a bipolar catheter with 10 mm spacing. As so, the wire tip was represented in the 3D mapping system. Thereafter, successive acquisition of catheter shadows allowed to define the coronary artery trajectory and its relationship with the proposed ablation area (Panel B—white arrows). The artery intersected the central LAVAs area, restricting the application of RF energy in that region. After removal of the wire for safety reasons, RF was only applied in the entry and exit sites. The ablation was complemented with endocardial RF application in the corresponding epicardial LAVAs central area. No complications were documented during the procedure.

The described methodology illustrates de possibility of integrating the coronary artery anatomical position in a 3D electroanatomical map to guide epicardial ventricular tachycardia ablation. This new technique is easy to preform and it may increases the safety of the procedure.

Conflict of interest: none declared.

References

1. Della Bella P, Brugada J, Zeppenfeld K, Merino J, Neuzil P, Maury P *et al*. Epicardial ablation for ventricular tachycardia: a European multicenter study. *Circ Arrhythm Electrophysiol* 2011;**4**:653–9.
2. Boyle NG, Shivkumar K. Epicardial interventions in electrophysiology. *Circulation* 2012;**126**:1752–69.