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BRIEF COMMUNICATION

Catheter Ablation of Ventricular Arrhythmias Arising from the Distal Great Cardiac Vein

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Catheter ablation of idiopathic ventricular arrhythmias arising from the distal great cardiac vein represents a great challenge. We report data regarding the electrocardiographic and electrophysiologic characteristics in two patients with ventricular arrhythmias arising from the distal great cardiac vein. The technical difficulties to advance and navigate the ablation catheter within the coronary venous system as well as the close proximity to the major coronary vessels are discussed.

Keywords Ventricular arrhythmia • Great cardiac vein • Ablation.

Introduction

The coronary venous system has been linked to the origin of idiopathic ventricular arrhythmias (VAs) [1–4]. We describe two patients with VAs originating from the distal great cardiac vein (GCV). The electrocardiographic and electrophysiologic characteristics of the arrhythmias as well as the technical aspects and safety issues regarding the ablation procedure are discussed.

Case 1

A 65-year-old male with frequent premature ventricular contractions was referred for catheter ablation. Structural heart disease was ruled out. The premature ventricular contractions displayed RBBB-like morphology (Rs pattern in lead V1) with inferior axis and rS pattern in lead I (Figure 1A). The maximum deflection index (MDI) was greater than 0.55, and this was indicative of an epicardial origin [5]. Activation mapping within the aortic cusps was initially performed. The earliest ventricular activation within the left coronary cusp (LCC) preceded the surface QRS onset by only 10 ms (Figure 1A). Discrete mid-diastolic potentials were also present in this area. However, pace-mapping from the LCC showed a good match (Figure 1B). Catheter ablation at this site failed to terminate the arrhythmia. Mapping from the endocardial left ventricular outflow tract failed to show any earliest activation. Activation mapping within the coronary sinus with the multipolar catheter (DecaNav, Biosense Webster) revealed the earliest activation at the distal GCV preceding the QRS complex by 30 ms (Figure 1C, magnification). Pace mapping was not feasible from this site. Fluoroscopy (Figure 1D) and 3-D electroanatomic map (Carto 3, Biosense Webster) (Figure 1E) in LAO projections revealed the close anatomic proximity between the distal cardiac vein and the LCC (16 mm). Coronary angiography was performed to delineate the ostium of the left coronary artery and the course of left anterior descending (LAD) and left circumflex (LCX) arteries prior to ablation (Figure 1F). Due to the close proximity between the ablation catheter tip and the LCX, irrigated radiofrequency energy (NaviStar, ThermoCool, Biosense Webster) was delivered at 20 W for 60 sec, and led to successful elimination of the premature ventricular contractions (Figure 1E). Three months after the procedure, the patient is free from VAs.

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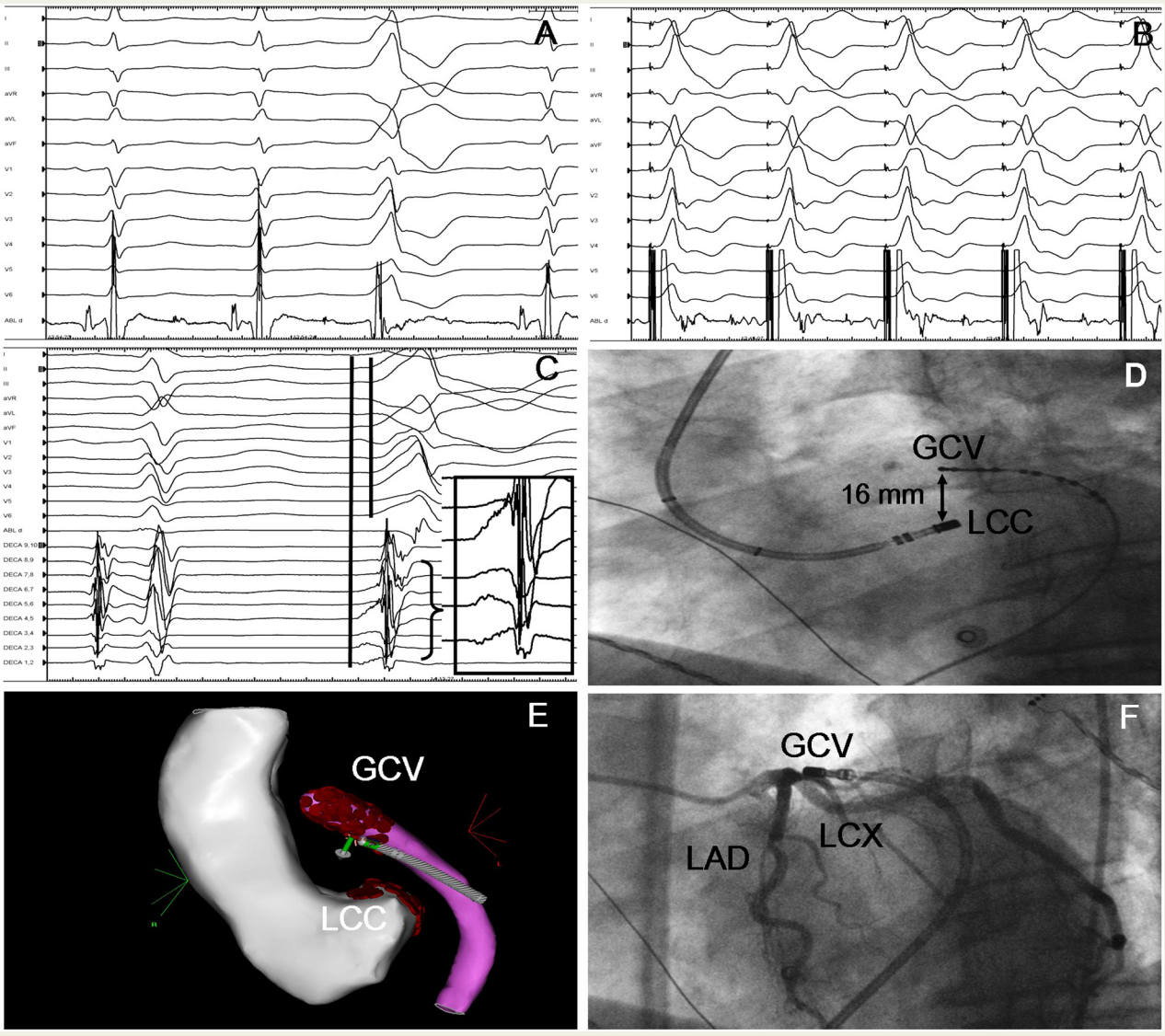

Figure 1 (A) Twelve lead ECG showing a premature ventricular contraction with RBBB-like morphology, inferior axis and rS pattern in lead I. The earliest ventricular activation within the left coronary cusp (LCC) preceded the surface QRS onset by 10 ms (ABL d). Discrete mid-diastolic potentials are recorded in LCC (ABL d); (B) Pace-mapping from the LCC showing good match; (C) Activation mapping showing the earliest activation at the distal great cardiac vein (GCV) (DECA 1,2) (magnification) preceding the QRS complex by 30 ms; (D) Fluoroscopic image in LAO projection showing the positions of the ablation catheter at the LCC and the multipolar mapping catheter within the coronary sinus; (E) 3-D electroanatomic map in left anterior oblique (LAO) projection showing the close anatomic proximity between the distal GCV and the LCC; (F) Coronary angiography (LAO projection) illustrating the close proximity of the ablation catheter to both left anterior descending coronary (LAD) and left circumflex coronary (LCX) arteries.

Case 2

A 60-year-old female with frequent idiopathic premature ventricular contractions was referred for catheter ablation. The extrasystoles displayed LBBB-like morphology (rS in lead V1) with precordial transition in lead V3, inferior axis and QS pattern in lead I (Figure 1A). The MDI was greater than 0.55. A detailed activation mapping of the right and left ventricular outflow tracts including the coronary cusps as well as of the coronary venous system was performed. The earliest ventricular activation preceded the surface QRS onset by 15 ms was initially recorded at the LCC (Figure 2B and 2D). Pace mapping from this site failed to show good match. Activation mapping within the coronary venous system with the multipolar catheter revealed the earliest activation at the distal GCV preceding the QRS complex by 40 ms (Figure 2B (magnification) and 2D). Pace mapping from this site showed perfect match (Figure 2C). The

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