Cardiac Imaging

Anatomical Non-Contact Ablation of Incessant Ventricular Tachycardia with a Double Transseptal Procedure

Anna Kostopoulou, Efthimios G. Livanis, George N. Theodorakis

2nd Department of Cardiology, Onassis Cardiac Surgery Centre, Athens, Greece

Key words:
Ventricular tachycardia; transseptal, ablation.

Manuscript received:
January 15, 2008;
Accepted:
April 15, 2008.

Address:
Anna Kostopoulou

Onassis Cardiac Surgery Center
356 Syngrou Ave.
17674 Athens, Greece
e-mail:
annapana@ath.forthnet.gr

A 75-year-old male patient with ischaemic cardiomyopathy and severe peripheral arteriopathy was admitted to our hospital with incessant ventricular tachycardia.

He had a history of an old inferior myocardial infraction and defibrillator implantation three years previously because of episodes of sustained ventricular tachycardia. Disease progression necessitated revascularisation two years later. His left ventricular ejection fraction post-surgery was 25-30%.

The electrocardiogram during ventricular tachycardia at admission had a right bundle branch block configuration and left axis deviation (Figure 1), indicating an origin in the left ventricle. Reversible aetiologies were excluded, and after failure of treatment it was decided to perform an ablation procedure with the non-contact anatomical system EnSite 3000 (Endocardial Solutions, Inc.).[1,2] A double transseptal procedure was performed to facilitate the safe insertion of the multielectrode array balloon and mapping catheter through 9 and 8 French sheaths, respectively, into the left ventricle, since severe arteriopathy made their advance via the aortic valve unfeasible (Figure 2). Because of the incessant episodes, recordings and mapping were performed during the ventricular tachycardia. The non-contact system revealed a ventricular tachycardia circuit with the slow conduction area located in the posterior-inferior wall at the borders of the scar and the exit site in the posterior wall towards the intraventricular septum. Electrograms from the mapping catheter in the slow conduction area revealed a characteristic diastolic electrogram (Figure 3), whereas virtual electrograms showed early ventricular activation which corresponded to the exit area of the isthmus into the healthy myocardium (Figure 4). Twenty-seven radiofrequency applications (60 s, 60^{o} C, 40 Watts) formed two lines at the exit site and along the slow conduction area of the ventricular tachycardia circuit (Figures 3, 4) with successful termination and no re-induction of the arrhythmia.

Non-contact systems facilitate the mapping of complex ventricular and supraventricular tachycardias with high success rates[2-6] but their use may be limited by technical difficulties. A double transeptal procedure can therefore facilitate their application in high-risk patients with severe contraindications.

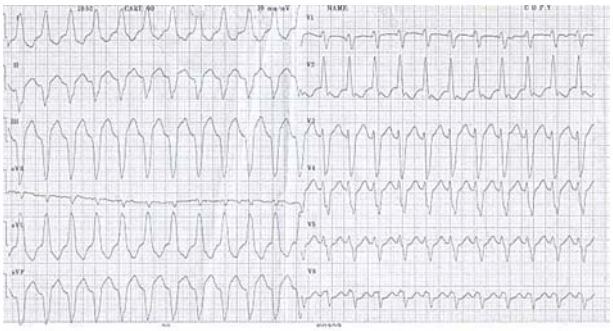

Figure 1. A 12-lead ECG of the ventricular tachycardia.

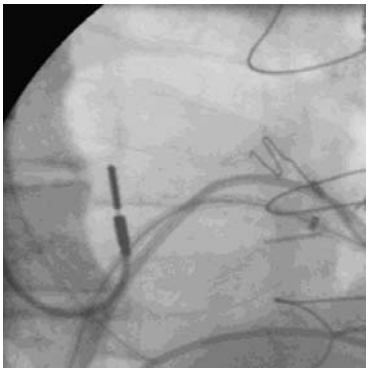

Figure 2. Fluoroscopic image of both the balloon and mapping catheter inserted through the intra-atrial septum in a right anterior oblique projection.

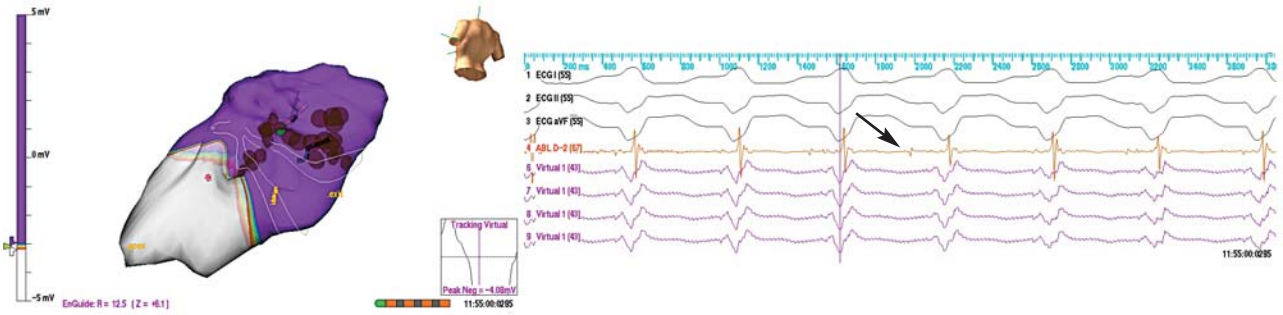

Figure 3. Characteristic diastolic activity (arrow) recorded from the mapping catheter in the isthmus area. Details of applications along the slow pathway at the posterior-inferior wall towards the mitral valve are shown.

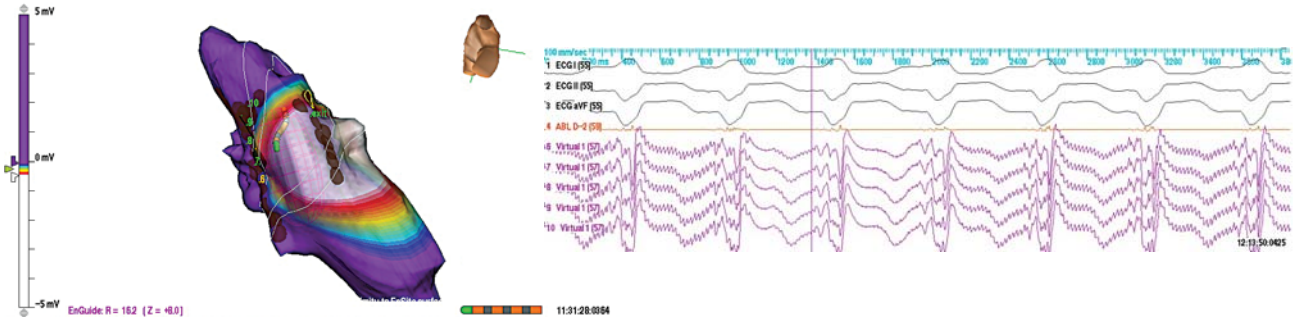

Figure 4. Early ventricular activity that corresponds to the exit area of the circuit is shown in virtual electrograms. Linear applications along the slow pathway and the exit site of the ventricular tachycardia circuit are shown in this figure.

References

1. De Bakker JM, van Capelle FJ, Janse MJ, et al. Slow conduction in the infarcted human heart: 'zigzag' course of activation. Circulation. 1993; 88: 915-926.
2. Bansch D, Oyang F, Antz M, et al. Successful catheter ablation of electrical storm after myocardial infarction. Circulation. 2003; 108: 3011-3016.
3. Della Bella P, Pappalardo A, Rival S, et al. Non-contact mapping to guide catheter ablation of untolerated ventricular tachycardia. Eur Heart J. 2002; 23: 742-752.
4. Strickberger S, Knight B, Michaud G, et al. Mapping and ablation of ventricular tachycardia guided by virtual electrograms using a noncontact, computerized mapping system. J Am Coll Cardiol. 2000; 35: 414-421.
5. Katsouras GE, Margos PN, Livanis EG, Theodorakis GN, Kremastinos DT. Contribution of electroanatomical mapping to the diagnosis of arrhythmogenic right ventricular cardiomyopathy in a patient with sustained ventricular tachycardia. Hellenic J Cardiol. 2006; 47: 184-189.
6. Papagiannis J, Maounis T, Laskari C, Theodorakis GN, Rammos S. Ablation of atrial tachycardias with radiofrequency current after surgical repair of complex congenital heart defects. Hellenic J Cardiol. 2007; 48: 268-277.