Intracardiac Echocardiography

Use of Intracardiac Echocardiography to Guide Catheter Ablation

Papillary muscle ventricular arrhythmias remain technically demanding targets for catheter ablation due to complex intracavitary anatomy and unstable catheter contact. This case report illustrates how intracardiac echocardiography enables real-time anatomical visualization, optimizes lesion delivery, and facilitates durable arrhythmia elimination when conventional mapping alone proves insufficient.

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Case Report

A 56-year-old gentleman was referred for catheter ablation (CA) of frequent, symptomatic premature ventricular complexes (PVCs). The clinical PVC showed a left-superior axis with right bundle branch morphology in lead V1 and rS-complexes in leads V5 and V6, indicating an origin from the posteromedial papillary muscle (PMPM) (1).

A retrograde aortic approach was chosen. After obtaining femoral arterial access, the ablation catheter was advanced retrogradely through the aortic valve into the left ventricle. Using a 3D electroanatomic mapping system, an activation map of the left ventricle was created, attempting to localize the earliest ventricular activation. In order to better understand the anatomy of intracavitary structures, such as the papillary muscle, intracardiac echocardiography (ICE) was used. Via femoral venous access, an 8F ICE catheter (AcuNav™, Biosense Webster®) was advanced into the right ventricle.

The earliest local ventricular activation was found at the PMPM. Via ICE, ablation catheter-tissue contact was confirmed with the inferior body of the PMPM. During ablation, effective lesion formation was observed on ICE via a gradual increase in echo density *(Figure 1)*. Despite effective ablation, only transient suppression of the PVC was achieved. Under ICE guidance, the ablation catheter was now moved to the superior head of the PMPM. Lesion formation was again observed on ICE, demonstrating now two separate locations of increase in echo density on the PMPM *(Figure 1)*. After the second ablation, the PVC was eliminated without return during a 20-minute waiting period. The patient was discharged the following day.

Discussion

CA of PVCs from the PMPM may be challenging due to the complex anatomy, often resulting in inadequate ablation catheter-tissue contact. ICE has become an essential tool for CA of PVCs from the PMPM (1,2). Its use permits real-time catheter visualization, better understanding of cardiac anatomy, and confirms adequate catheter-tissue contact during the procedure (3). Local lesion formation can be monitored on ICE, like in this example, through changes such as tissue swelling resulting in increased echo density. In addition, the use of ICE likely results in reduced fluoroscopy time and allows real-time monitoring of potential complications during CA. Limitations of the widespread use of ICE include the costs and a required learning curve for appropriate use during CA. □

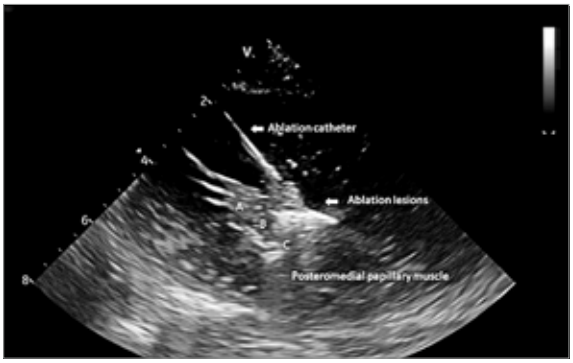

Figure 1: The ablation catheter on top of the body of the papillary muscle is shown. Intracardiac echocardiography (ICE) confirms adequate catheter-tissue contact during the procedure. Local lesion formation was monitored on ICE through changes such as tissue swelling resulting in increased echo density. A: Tip, B: Body, C: Base.

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