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Two-Dimensional LGE or Three-Dimensional High-Resolution LGE: Role of Cardiovascular Magnetic Resonance Imaging in the Treatment of Ventricular Arrhythmias

LETTER TO THE EDITOR

To the Editor,

We have recently read with great interest the article by Kara et al[1] entitled "Cardiac Magnetic Resonance-Guided Conducting Channel Delineation of an Aneurysmal Ventricular Tachycardia with the Same Circuit in the Reverse Direction." The authors carried out a successful catheter ablation of ventricular arrhythmia case by using cardiovascular magnetic resonance (CMR) imaging.[1] We would like to learn the sequence which they used and contribute to the role of CMR in the management of ventricular arrhythmias (VA).

Catheter ablation is being used to treat patients with ischemic scars who are suffering from recurrent VA. Its main purpose is to locate and ablate isthmuses critical for sustaining the VA.[2] In vast majority of cases, electro-anatomical mapping (EAM) is used to delineate unipolar and bipolar low-voltage areas and to determine fragmented electrograms and late potentials. However, EAM can be a time-consuming procedure and may be hampered by inaccurate description of intramyocardial scars due to epicardial adipose tissue.

Myocardial scar can be heterogeneous with viable myocytes and fibrotic tissue, and this specific tissue is a substrate for VA. This border zone (BZ) can be determined by late gadolinium enhancement (LGE), based on its intermediate signal intensity as compared to the dense high signal of the dense scar core. The BZ includes both the peri-infarct zone, that is, the transition between dense fibrotic tissues and the surrounding healthy tissue, and the conducting channels (CCs), that is, corridors of viable tissue penetrating within the scar. Noninvasive CMR helps to delineate this substrate accurately and guides substrate-based ablation of VAs. Analysis of CMR images with a software, which is known as ADAS (ADAS 3D, Barcelona, Spain), is very helpful for identifying these CCs.[3]

We are wondering which sequence the authors used. When we checked the LGE images for this case, we thought that authors utilized 2D-T1_PSIR LGE sequence. As we know there are different types of LGE sequences that can be used. These are as follows: (a) typical segmented 2-dimensional (2D) breath-held pulse sequences with or without phase-sensitive inversion recovery (PSIR), (b) single-shot, 2D sequences with or without PSIR that are acquired within one heartbeat and do not require a breath-hold, (c) segmented 3-dimensional (3D) sequences that are acquired with a breath-hold, and (d) segmented 3D sequences that are acquired free-breathing using a respiratory navigator high in-plane spatial resolution. For ADAS software processing, the ideal sequence is 3D-HR-LGE navigator sequence. High-resolution late gadolinium enhancement (HR-LGE) navigator sequence provides finer details and allows for a better characterization of the scar morphology than 2D-LGE sequence. After applying ADAS software, we can determine the CCs more detailed than conventional 2D-LGE images. So, the success of ablation will be high and recurrence will be low. Using CMR for ventricular

İbrahim Altun
İlknur Altun

[1]*Oxford Centre for Clinical Magnetic Resonance Research (OCMR), Oxford, UK*

Corresponding author:
Ibrahim Altun
✉ ibrahim_altun@yahoo.com

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arrhythmia ablation more frequently is very helpful. As the authors pointed out, the result of the VOYAGE trial will provide us with more information.

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