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Role of MRI in the diagnosis and prognosis of ventricular arrhythmias

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Background

Many patients with malignant cardiac arrhythmias' require thorough investigations to determine the etiology. Conventional tests (ECG and echocardiography) often cannot detect a structural basis for the arrhythmia and physicians therefore lack guidance as to the most appropriate treatment.

Previous studies have shown MRI is a more sensitive and specific modality to better elucidate cardiac abnormalities and provide insight to the underlying etiology and better predict clinical outcomes.

Hypothesis

Compared to conventional testing, Cardiac MRI has incremental benefit in the diagnosis and treatment of patients with ventricular tachycardia and in the assessment/treatment of patients with suspected ARVD.

Methods

We performed a retrospective review of patients who have undergone CMR as part of their treatment/workup for ventricular arrhythmias and/or ARVD at the University of Alberta Hospital over the last 4 years. CMR results were correlated to patient outcomes: death, cardiac death, hospital admissions, ICD implantation, and electrophysiologic ablation

Results

A total of 211 patients were enrolled; however complete clinical data on only 142 patients was obtained. The baseline age/sex was 46 years & 59% male. The average BSA was 1.86m^2. Known CAD was documented in 9.8%.

The presenting symptom(s) to medical attention are as follows: Syncope 36.6%, Palpitation 36.6%, Arrest 9.2%, None 17.6%. The arrhythmia's documented upon patient review were Atrial Tachycardia 2.8%, 10.5%, NSVT 28.8%, VT 31.7%, and VF 5.6%, None 20.6%)

Table 1 Average Ejection fraction based on Imaging Modality

	Echo	CMR	Atypical Gadolinium uptake
LVEF%	52.82	60.36%	58.2%
RVEF%	Normal	55.2%	53%

Based on the clinical presentation 55% of patients were admitted to hospital, 37% went on to have an EPS procedure. There were 12 cardiac arrests at presentation that received an ICD. A further 6% who did not arrest also received an ICD

The corresponding Ejection fractions can be seen in Table 1.

In terms of ARVD, a diagnosis was made in 2.1% of the patients via CMR while 8.4% of the patients possessed one minor criterion. No diagnosis of ARVD was made on echocardiography or EKG

Conclusion

CMR's increased sensitivity is able to detect many more abnormalities but these rarely translate into changes in clinical practice unless in the context of a diagnosis of ARVD. Although a normal CMR is reassuring and likely precludes a favorable outcome 1/3 of patients still underwent further EPS testing with ½ of those resulting in no further intervention. This details that CMR may be a more sensitive tool to exclude malignant causes of ventricular arrhythmia but this has not changed current practice patterns.

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