Journal of Cardiovascular Magnetic Resonance

Oral presentation

Open Access

Fragmented QRS complex and late gadolinium enhancement characterization of unrecognized myocardial scar provided complementary prognosis of cardiac death in patients with suspected coronary artery disease

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from 13th Annual SCMR Scientific Sessions
Phoenix, AZ, USA. 21-24 January 2010

Published: 21 January 2010

Journal of Cardiovascular Magnetic Resonance 2010, **12**(Suppl 1):O5 doi:10.1186/1532-429X-12-S1-O5

This abstract is available from: http://jcmr-online.com/content/12/S1/O5

Introduction

Fragmentation of the QRS complex (FQRS) on the resting electrocardiogram has been shown to be associated with post-infarct arrhythmogenesis and increased incidence of hard cardiac events. Late gadolinium enhancement (LGE) by cardiovascular magnetic resonance (CMR) imaging can detect subendocardial unrecognized myocardial infarction which has been shown to indicate high risk for cardiac death.

Purpose

This study sought to determine if FQRS and evidence of unrecognized myocardial scar by LGE, provide similar or incremental prognostic information in patients with suspected but no prior history of coronary artery disease (CAD).

Methods

The study was conducted on 331 patients (176 men and 155 women) referred for CMR assessment for evidence of CAD. Electrocardiograms were performed, on average, 1.6 ± 5 days before the CMR exam. FQRS was assessed according to established criteria. The patients were followed for a median duration of 3.27 years to monitor cardiac events.

Results

The patients have a mean age of 54.7 years. 83% of patients were diabetic, 59% had hypercholesterolemia and 54% had hypertension. The mean left ventricular ejection fraction (LVEF) was 60%. During the follow-up period, there were 16 cardiovascular deaths (4.9%). Baseline FQRS was present in 74 patients: 46 patients had FQRS in the inferior leads (II, III, aVF), 21 had FQRS in the anterior leads (V1-V6) and 7 patients had FQRS in the anterior and inferior leads. No patient had FQRS in the

Table 1: Hazard ratio for cardiac death by univariable analysis

Variable	HR	95% CI	*P*-value
Age	1.05	[1.01, 1.09]	0.015
Female gender	0.77	[0.28, 2.12]	0.611
Hypertension	1.84	[0.65, 5.16]	0.249
Diabetes	2.01	[0.68, 5.89]	0.205
Dyslipidemia	2.78	[0.95, 8.14]	0.062
LVEF	0.95	[0.93, 0.98]	0.002
LGE	9.59	[3.47, 26.53]	<0.001
FQRS-anterior leads	4.49	[1.56, 12.94]	0.0005
FQRS-lateral leads	NA	NA	NA
FQRS-inferior leads	0.67	[0.15, 2.94]	0.595
FQRS-any leads	1.84	[0.67, 5.08]	0.238

Note. HR = hazard ration, CI = confidence interval

lateral leads (I, aVL, V5-6). LGE was present in 36 patients (12%). By univariable analysis (Table 1), LGE and FQRS in the anterior leads portended to a 10-fold (Hazard Ratio, HR = 9.59, $p < 0.0001$) and to a 5-fold (HR = 4.49, $p = 0.005$) increase in hazards to cardiac death, respectively. By multivariable analysis adjusting for age and LVEF, both FQRS in the anterior leads (HR = 13.1, $p < 0.001$) and LGE (HR = 14.6, $p < 0.001$) maintained strong and significant adjusted association with cardiac death.

Conclusion

In patients with clinical suspicion and risk factors for CAD, FQRS and unrecognized myocardial scar detected by LGE provide robust and complementary prognosis to cardiac death. Incorporation of these non-invasive techniques in risk stratification algorithms warrants further prospective study.