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Meeting abstract

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1036 Semi-quantitative segmental scores is an accurate method in determing the size and extent of acute myocardial infarction

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Introduction

As increasing numbers of subjects undergo cardiac magnetic resonance (CMR) imaging to determine myocardial salvage and viability following acute myocardial infarction (AMI), a simple and robust method to portray the extent and severity of necrotic myocardium is clinically necessary to aid rapid communication, monitor therapies and predict cardiovascular outcomes. The American Heart Association published guidelines on the use of a 17-segment model to aid this communication amongst various imaging modalities.

Purpose

We examined the predictive accuracy of semi-quantitatively scoring wall function and hyperenhancement in patients following an AMI.

Methods

122 subjects had a cine and contrast-enhanced viability CMR study within 1 week following an acute ST-segment elevation AMI. All subjects underwent emergent percutaneous revascularization, and no subjects had a known prior history of myocardial infarction. Patient identifiers were removed from the CMR images. Cine and viability studies were randomly scored on a17-segment model by a consensus of 2 expert CMR readers. Cine images were scored on a 5-point scale with the following: 0 = normal, 1 = mild hypokinesis, 2 = moderate to severe hypokinesis, 3 = akinesis, and 4 = dyskinesis. Viability images were also scored on a 5-point scale for hyperenhanced (HE) infarct size: 0 = none, 1 = 1–25% HE, 2 = 26–50% HE, 3 = 51–75% HE, and 4 = 76–100% HE. Areas of microvascular obstruction was included in the HE point score. Wall motion scores and hyperenhancement scores were summed to obtain the Summed Wall Motion Score (SMS) and the Summed Infarct Score (SIS). Manually planimetered quantitative analysis was also performed to obtain LV end-diastolic volume (LVEDV), LV end-systolic volume (LVESV), LV ejection fraction (LVEF), and infarct size. Clinical events (MACE) were monitored for 2 years to evaluate for death, recurrent myocardial infarction, admission for heart failure or cardiac transplantation.

Results

A total of 2074 segments were available for analysis with 36% of these segments (n = 756 segments) showing evidence of HE on viability images. The mean SMS was 14.1 ± 10.4, and the mean SIS of 15.3 ± 10.3. The LVEF significantly correlated with the SMS ($R = -0.91$, $p < 0.001$) and the planimetered infarct size significantly correlated with the SIS ($R = 0.94$, $p < 0.001$). (See Figures 1 and 2). Additionally, the SIS correlated significantly with the SMS ($R = 0.84$, $P < 0.001$), the LVEDV index ($R = 0.44$, $P < 0.001$), the LVESV index ($R = 0.71$, $P < 0.001$). Cox regression analysis found both SMS (HR = 1.1 [1.05–1.14], $P < 0.001$) and SIS (HR = 1.11 [1.06–1.15], $P < 0.001$) to be significant univariate predictors for MACE. Increasing categories of SIS by scores of 7 (10% of total possible SIS of 68) resulted in an increasing proportion of subjects with MACE, and a greater percentage of patients had MACE events when the SIS exceeded a summed score of 21 or 30% of the maximum SIS ($P < 0.001$, See Bar Graph).

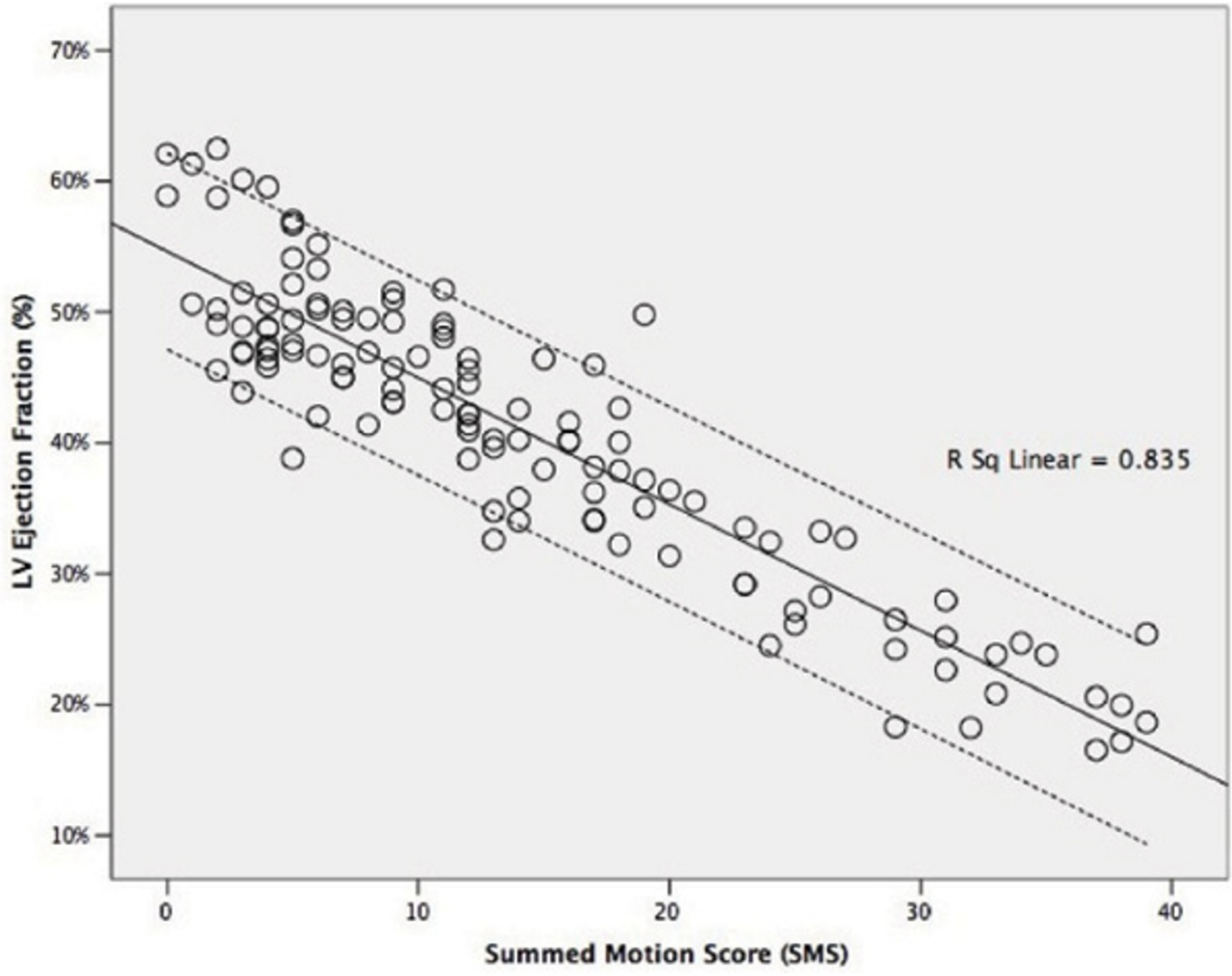

Figure 1

Conclusion

Semi-quantitative scores correlated well with quantitative scores and represent a quick, yet powerful alternative in grading the size and extent of any wall motion abnormalities and myocardial infarction. Both the Summed Motion Score and the The Summed Infarct Score portray the size and severity of the acute myocardial infarction and are powerful predictors for future adverse cardiovascular events.

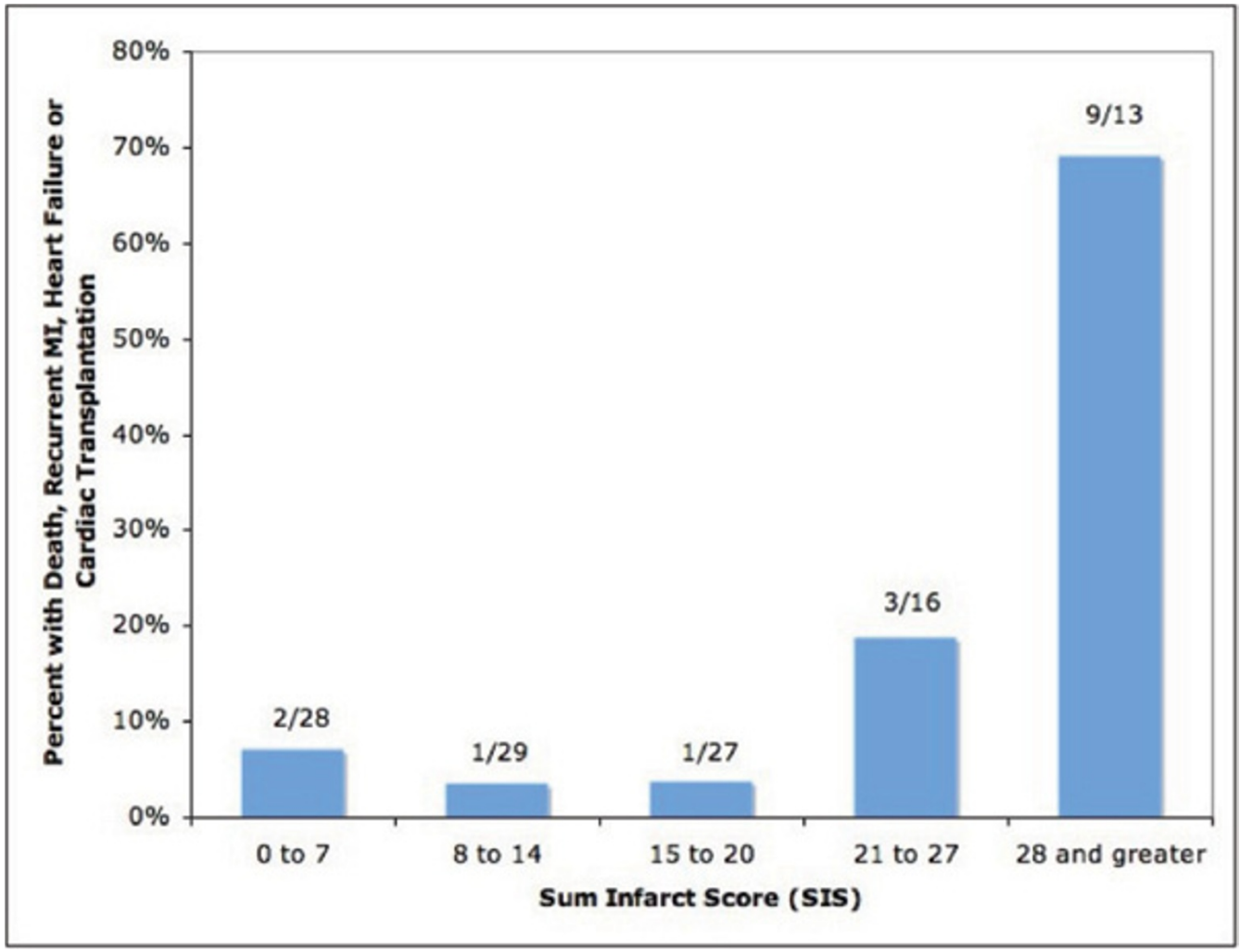

Figure 2