Acute Viral Myocarditis: Patterns of Late Gadolinium Enhancement on Cardiac Magnetic Resonance and Relationship with Biomarkers of Myocardial Damage and Inflammation

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INTRODUCTION

- Very few published studies have documented the relationship between Late Gadolinium Enhancement (LGE) on Cardiac Magnetic Resonance (CMR) and biomarkers of myocardial damage and inflammation in acute viral myocarditis.

- Data from the aforementioned studies are conflicting and limited by small numbers of patients (<50) and Troponin levels recorded long after the acute episode.

AIMS

- To describe the distribution pattern of LGE in suspected acute viral myocarditis.

- To explore the relationship between LGE on CMR and biomarkers of myocardial injury and inflammation in clinically suspected acute viral myocarditis.

METHODS

- We retrospectively reviewed the notes of all patients (N=125) with a clinical diagnosis of myocarditis who underwent CMR as part of their clinical evaluation during index admission in our institution between 2005 and 2014.

- The peak values of hsTroponinI, Creatine Kinase (CK) and C- reactive protein (CRP) value during admission were recorded.

- CMR was performed using a 3T magnet (Philips Achieva, Best, the Netherlands). LGE short-axis images were obtained post 0.1mmol/kg gadolinium-DTPA injection.

- Manual quantification of the LGE in percent of left ventricular myocardium was performed by an experienced operator blinded to the biomarkers results.

RESULTS

Table 1: Demographics, presenting symptoms, electrocardiographic abnormalities, LGE patterns, survival status on discharge and follow-up data. SD- standard deviation, W-white, B- black, A- Asian, ECG- electrocardiographic, LOS- length of Hospital stay, CK- creatine kinase, CRP- C-reactive protein, LGE- late gadolinium enhancement, LVEF- left ventricular ejection fraction.

RESULTS

Acute Viral Myocarditis	N=125		
Age [years, SD]	41±16	**LOS [days, SD]**	5±10
Male	110 (88%)	**Biomarkers:**	
Ethnicity	W 88 (70%), B 13 (10%), A 18 (14%), Other 6 (5%)	CK	688±1545
Symptom onset [days, SD]	6±14	hsTroponinI	15558±16265
Recent viral episode	59 (48%)	CRP	85±88
Clinical presentation:			
Infarct-like symptoms	77 (63%)	**CMR findings:**	
Cardiogenic shock/ life-threatening arrhythmia	5 (4%)	%LGE	8±9
Dyspnoea	12 (10%)	LVEF on CMR	62±10
Fever and atypical chest pain	35 (28%)		
Palpitations	4 (3%)	**In-hospital death**	2 (2%)
ECG abnormalities:			
No ECG changes	12 (12%)	**Follow-up data:**	
ST elevation	64 (62%)	Recurrent symptoms	17 (14%)
ST depression	5 (5%)	Re-admission	7 (6%)
T wave inversion	12 (12%)	Death after discharge	0 (0%)
Minor ECG abnormalities	12 (12%)		

RESULTS

- Typically LGE originated from the subepicardial regions of the left ventricle (55%) and was more frequently localized in inferior and lateral wall (predominantly basal segments). These findings are consistent with results of already published smaller studies.

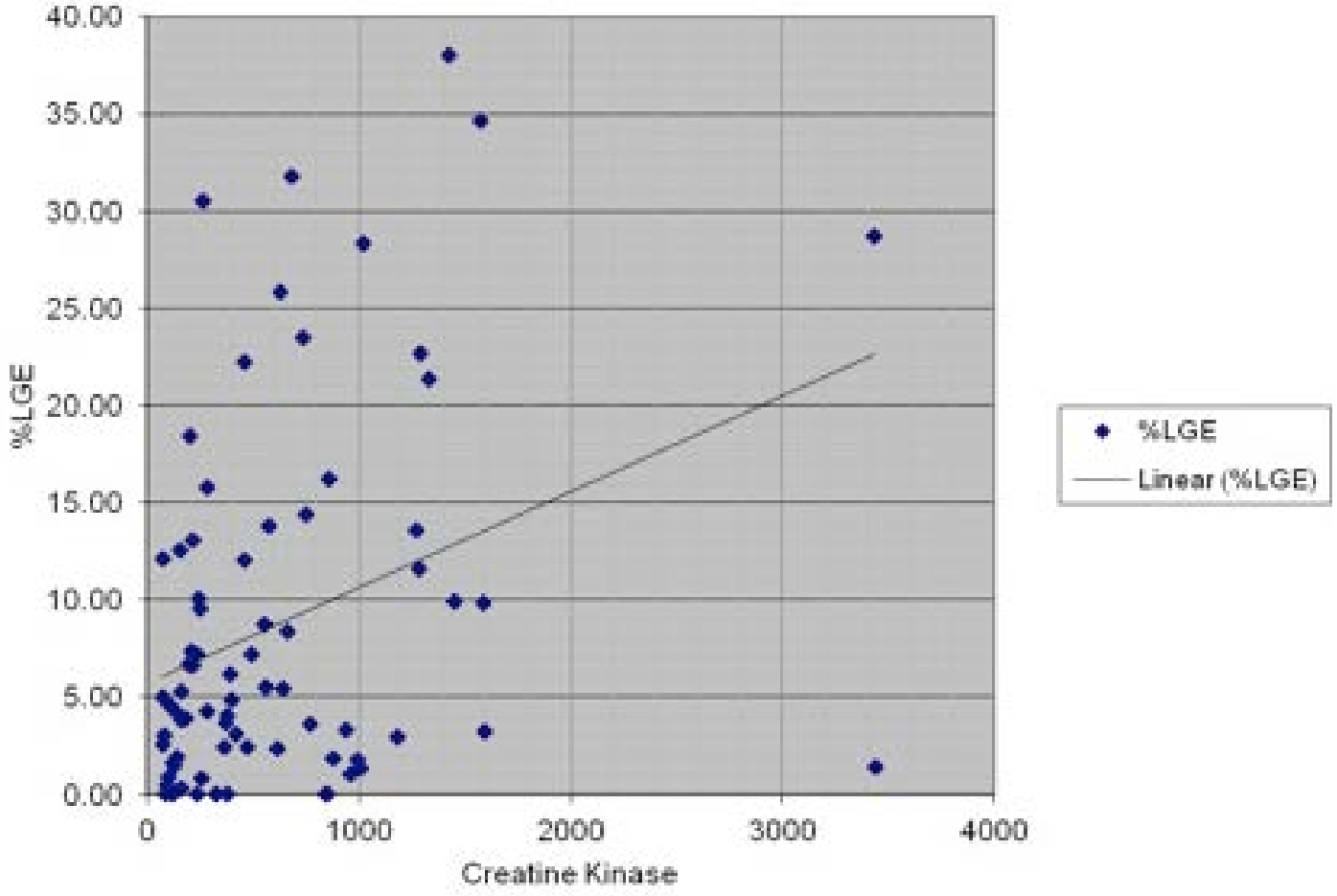
- There was significant correlation between peak hsTroponinI and LGE extent (expressed as % of myocardial volume) (r 0.62, $p<0.01$), and weaker correlation between CK and LGE extent (r 0.34, $p<0.01$).

- There was no correlation between CRP and LGE extent (r 0.05, $p<0.01$).

- There was no correlation between LGE extent and left ventricular ejection fraction (r -0.36, $p<0.01$) or length of hospital stay.

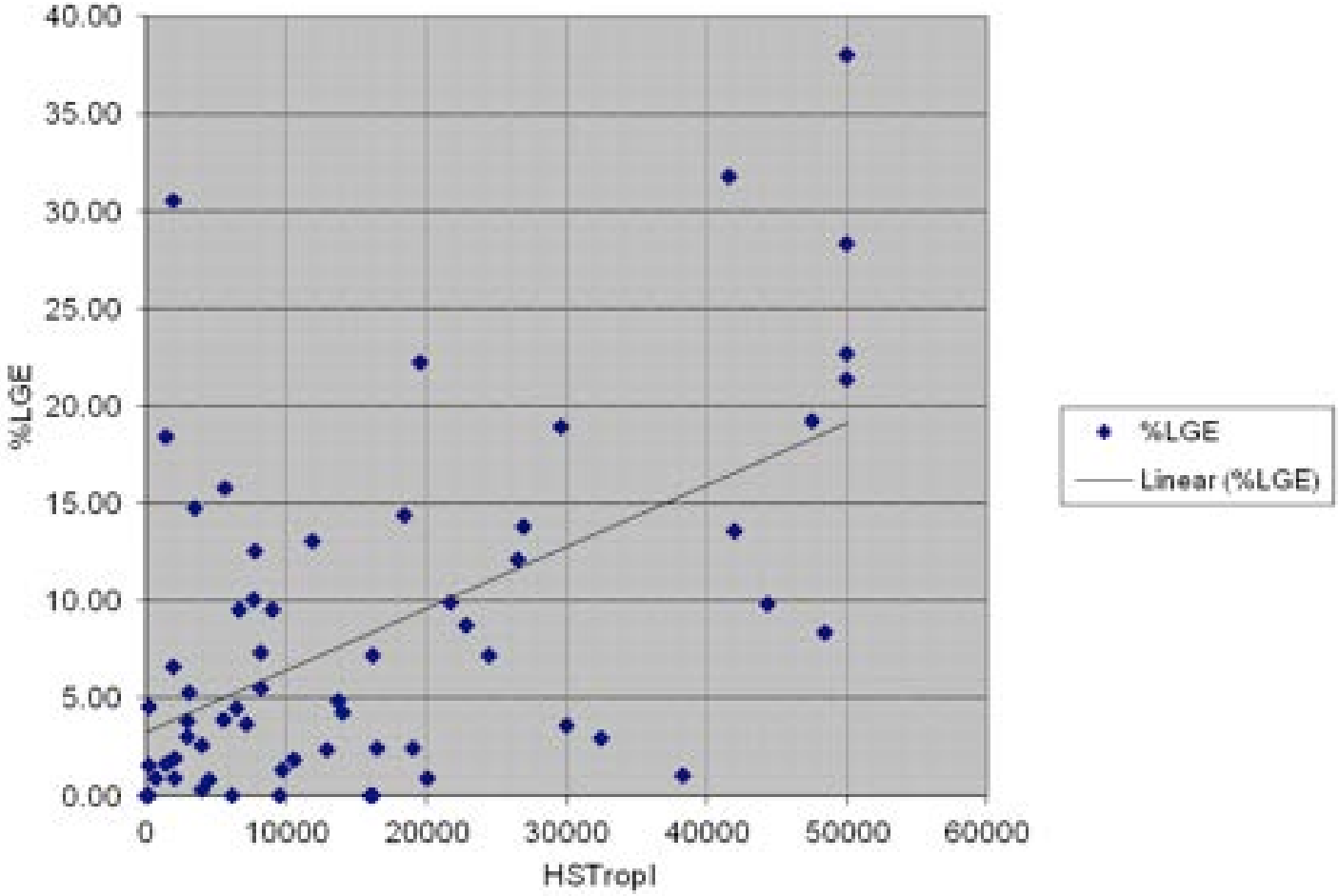
- There was poor, non-significant correlation between recurrence of symptoms (17%) and extent of LGE (r 0.12, p 0.18).

RESULTS



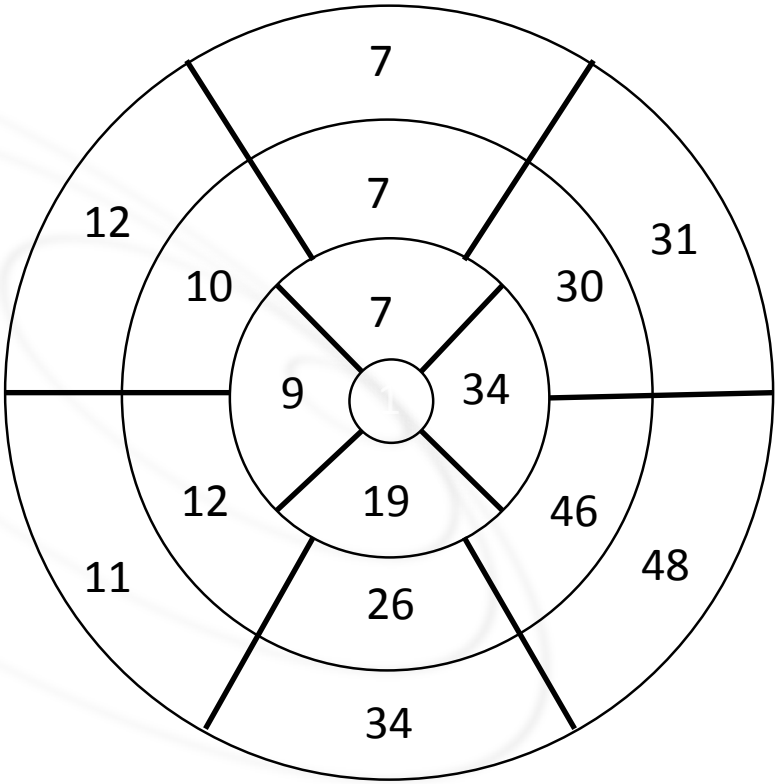
Correlation between CK and % LGE (r 0.34, p<0.01)

RESULTS



Correlation between HSTropI and % LGE (r 0.62, p<0.01)

RESULTS



Bullseye of AHA 17-segment model demonstrating the LV segments with %LGE.

Patterns of LGE:

- Subepicardial 55%
- Mid-wall 45%
- Subendocardial 1%
- Transmural 3%

CONCLUSIONS

- In clinically suspected acute viral myocarditis LGE extent is significantly correlated to peak values of biomarkers of myocardial injury.
- In clinically suspected acute viral myocarditis there is no correlation between LGE extent and inflammatory biomarkers.
- The role of myocardial injury quantified by LGE as a predictor for long-term outcome warrants further investigation.