



Late gadolinium enhancement detected by cardiovascular magnetic resonance imaging is associated with increased inducibility of ventricular tachyarrhythmias in patients with hypertrophic cardiomyopathy

S. Fluechter (1), J. Kuschyk (1), C. Wolpert (1), D. Haghi (1), C. Doesch (1), D. Dinter (2), S. Schönberg (2), T. Süselbeck (1), M. Borggreffe(1), T.Papavassiliu (1)
(1)1st medical Department, Mannheim, Germany (2) Department of Radiology, Mannheim, Germany

Purpose

Ventricular tachycardia (VT) and ventricular fibrillation (VF) are established as the principal mechanisms of sudden death in patients with hypertrophic cardiomyopathy (HCM). However risk stratification of patients with HCM still remains a challenge. Myocardial replacement scarring is probably an important anatomic component of the arrhythmogenic substrate in patients with HCM and can be assessed by late gadolinium-enhancement (LGE) CMR. Thus, we hypothesized that myocardial scarring detected by LGE CMR might be associated with an increased likelihood of inducibility of ventricular tachyarrhythmias in patients with HCM. The aim of this retrospective study was to investigate whether presence or extent of myocardial scarring assessed by LGE CMR correlates with the inducibility of ventricular tachyarrhythmias during programmed ventricular stimulation (PVS) in patients with HCM.

Methods

67 patients with HCM underwent LGE CMR. 32 of these patients (22 males and 10 females; mean age 56 ± 15 years) were also examined by electrophysiologic study including PVS. LV function, volumes, myocardial thickness, and the extent of LGE, were assessed with respect to the inducibility of ventricular tachyarrhythmias during PVS.

Extent of LGE in the different groups:			
	Inducible VT/VF (n=11)	No inducible VT/VF (n=21)	p-values
Presence of LGE	9 / 11 (81%)	11 / 21 (55%)	0,161* (ns)
LGE (%) total extent	23 ± 17	10 ± 16	0,037+

Table1:

Presence of LGE = Number of patients in whom LGE was detectable (irrespective of extent)
LGE(%) = Extent of LGE, expressed as a percentage of total myocardium (Mean value ± standard deviation).
p-values for chi-square-test (*) and unpaired t-test (+);
ns =not significant (<0.05)

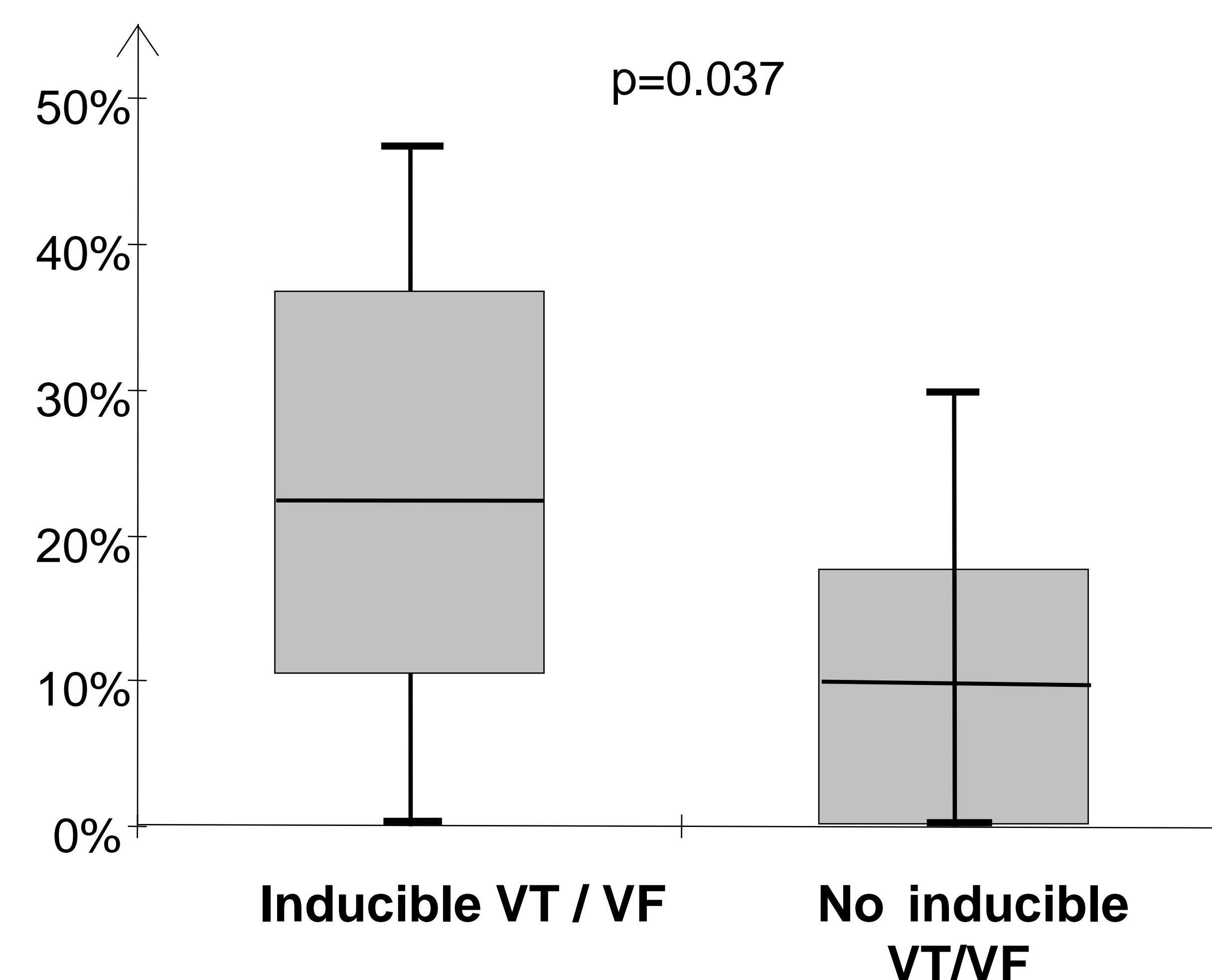


Figure 2 : Box-Plot showing the different extent of LGE in patients with and without inducible ventricular tachyarrhythmias. Patients with inducible ventricular tachyarrhythmias had significantly more LGE than patients without ($p=0.037$)

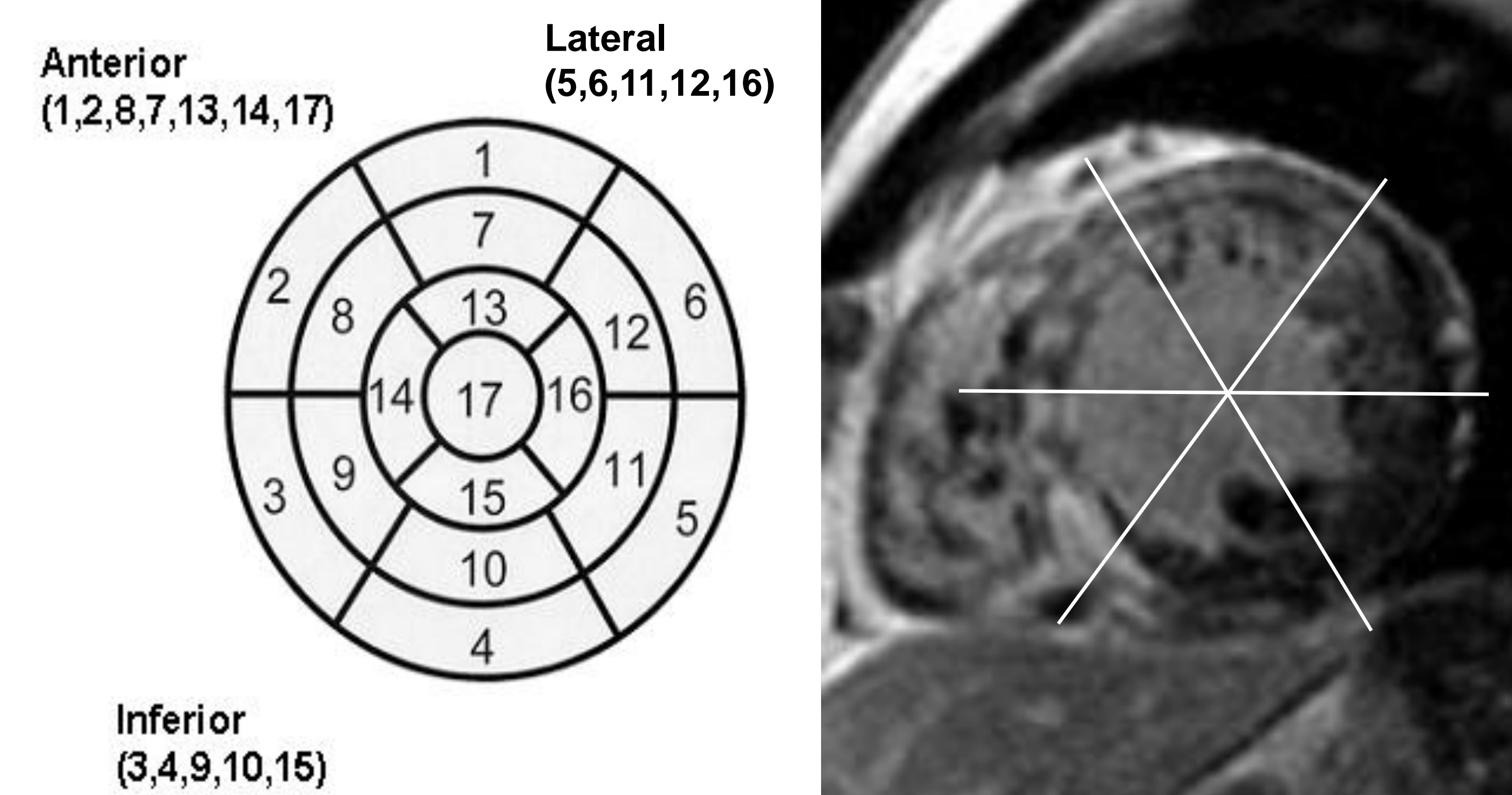


Figure1 : Plot of the 17 myocardial segments and their classification into territories. Every segment was assessed separately concerning the extent of LGE.

Each myocardial segment (Figure 1) was visually scored for the segmental percentage of hyperenhancement by using the following scoring scheme: 0=0%, 1=1-25%, 2=26-50%, 3=51-75% and 4=76-100%. All 17 segmental scores were summed up. The extent of LGE was reported as the percentage of the maximum possible score. (The validity of this semiquantitative method to determine the extent of LGE has been previously reported by Comte et al. (Eur Radiol. 2004;14: 2182-7).)

Results

21 of the 32 patients (66%) showed LGE, 11 patients did not (34%). Overall, in 11 patients (34%) ventricular tachyarrhythmias were inducible during PVS (Table 1). LV function, volumes and mass were comparable in patients with and without inducible ventricular tachyarrhythmias (Table 2). However, the extent of LGE was larger in patients with inducible ventricular tachyarrhythmias than in patients without (23% vs. 10%, $p=0.037$) (Figure 2).

Conclusion

The extent of LGE is associated with the inducibility of ventricular tachyarrhythmias in patients with HCM. Future studies are needed to assess the potential role of LGE CMR for risk stratification in patients with HCM.

CMR parameters in patients with and without inducible VT/VF			
	Inducible VT/VF	no inducible VT/VF	p-values
EF (%)	57 ± 11	57 ± 10	ns+
EDV (ml)	157 ± 59	149 ± 52	ns+
ESV (ml)	69 ± 45	64 ± 27	ns+
SV (ml)	87 ± 25	82 ± 31	ns+
LVEDD (mm)	51 ± 8	51 ± 7	ns+
SWT (mm)	20 ± 5	20 ± 5	ns+
PWT (mm)	11 ± 3	11 ± 4	ns+
RVEDD (mm)	42 ± 7	41 ± 8	ns+
RVSD (mm)	28 ± 21	28 ± 6	ns+

Table 2 : CMR parameters in patients with and without inducible ventricular tachyarrhythmias. There were no statistically significant differences between patients with and without inducible VT/VF.