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Meeting abstract

202 Contrast-Enhanced MRI for high yield detection of left ventricular thrombus – predictors of improved thrombus detection versus echocardiography

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Introduction

Identification of left ventricular thrombus (LVT) affects clinical management of at risk patients. Contrast-enhanced MRI (CE-MRI) identifies LVT based on tissue characteristics and has been validated as a highly sensitive technique that improves LVT detection vs non-contrast echocardiography. However, prior comparative studies were performed without echo contrast agents, which facilitate LVT detection by improving LV cavity delineation.

Purpose

We studied diagnostic performance of contrast (C-ECH) and non-contrast (NC-ECH) echocardiography vs a reference of CE-MRI LVT detection.

Methods

We prospectively enrolled patients referred for CE-MRI to evaluate for LVT. CE-MRI was performed on a 1.5 T scanner using a standard segmented inversion recovery pulse sequence. Both conventional (TI 250–350 msec) and long (600 msec) inversion times were used, with long TI imaging used to selectively null avascular thrombus. NC-ECH and C-ECH were performed within 7 (mean 0.9 ± 1.4) days of CE-MRI. Echo and MRI were interpreted blinded to results of the other modality. LVT were scored for location, volume, and type (intracavitary or mural). Ejection fraction was measured by planimetry of cine-MRI. Cine and CE-MRI were scored via a 17 segment model to quantify wall motion and scar.

Results

116 patients underwent both MRI and echocardiography (age 62 ± 13, 90% CAD, NYHA 2.0 ± 0.8). CE-MRI identified LVT in 25 patients (22%). 84% of LVT were apically located; 68% were intracavitary. All LVT were adjacent to myocardial scar. Pts with LVT by CE-MRI had larger transmural scar size (26 vs 16% LV segments, $p = 0.001$), lower EF (29% vs 40%, $p = 0.001$), and higher wall motion score index (2.3 vs 1.6, $p < 0.01$) than patients without LVT. In multivariable analysis, both percent transmural scar (OR 1.28, CI 1.05–1.56, $p = 0.02$) and EF (OR 0.95, CI 0.91–0.98, $p < 0.01$) were independent predictors of LVT. Using CE-MRI as a reference, sensitivity was nearly 2-fold higher ($p < 0.01$) and there was a trend towards improved specificity ($p = 0.07$) with C-ECH vs NC-ECH (Table 1). However, C-ECH did not detect 32% of LVT identified by CE-MRI. LVT missed by C-ECH were more likely to be mural ($p < 0.01$). Apically located LVT were more likely to be missed when small (0.9 vs 4.1 cm3, $p < 0.05$) while detection of non-apical LVT was independent of size.

Table 1: Among a broad at-risk patient cohort, contrast-enhanced MRI provided improved left ventricular thrombus detection versus contrast and non-contrast echocardiography. Left ventricular thrombus is typically detected by contrast-enhanced MRI but missed by echocardiography when mural in shape or small in volume.

Left Ventricular Thrombus Detected by CE-MRI (n = 25)					
Echo Performance	**Sensitivity**	**Specificity**	**Accuracy**	**Positive Predictive Value**	**Negative Predictive Value**
Contrast echo	68% (17/25)	98% (89/91)	91% (106/116)	89% (17/19)	92% (89/97)
Non-contrast echo	36% (9/25)	91% (83/91)	79% (92/116)	53% (9/17)	84% (83/99)

Conclusion

CE-MRI identifies LVT that are undetected by echocardiography. While echo contrast improves diagnostic performance for LVT, a substantial number of LVT identified by CE-MRI are undetected by C-ECH. LVT missed by C-ECH are typically mural in shape or, if apical, small in volume.