Roles of Cardiovascular Magnetic Resonance Imaging in Evaluation of Left Ventricular Thrombus

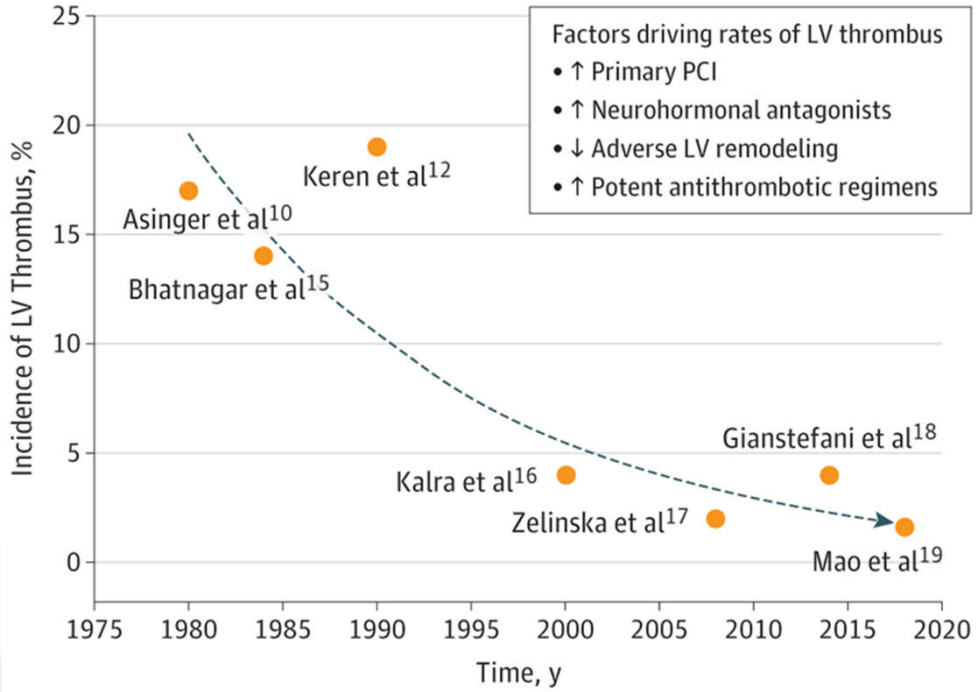
Qui Minh **NGUYEN**, M.D

Son Phi **DUONG**, M.D

A.Prof. Vu Tuan **NGUYEN**

Director – Hai Thanh **PHAN**, M.D

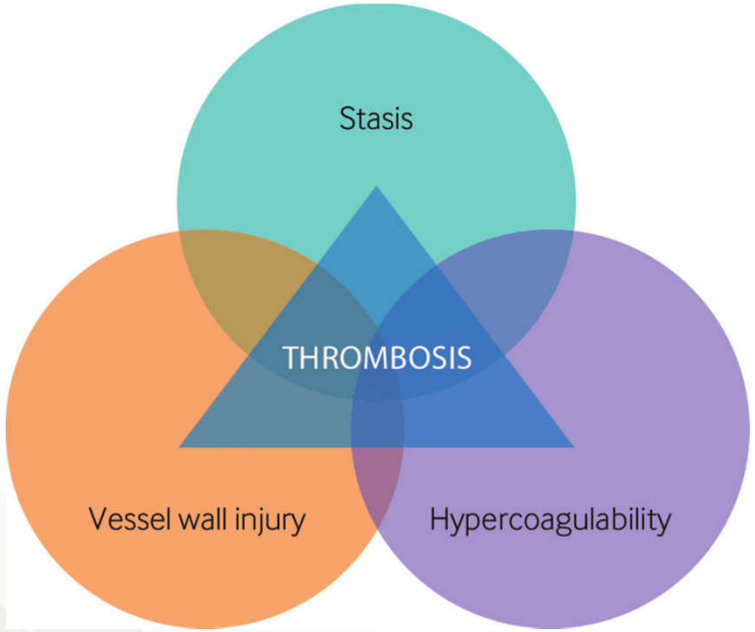
OVERVIEW



- In thrombolytic era: 17% after MI (34-57% after anterior MI)
- In PCI era: 2,7 – 3,5% (7,1-9,1% after anterior MI)
- Embolic complications: 2,0-6,1%

Asinger RW, et al. *New England Journal of Medicine*. 1981;305(6):297-302.
Robinson AA, et al. *International journal of cardiology*. 2016;221:554-559.
Pöss J, et al. *Circulation: Cardiovascular Imaging*. 2015;8(10):e003417.
Byrne RA, et al. *European Heart Journal: Acute Cardiovascular Care*. 2024;13(1):55-161.

RISK FACTORS



- Large or anterior MI
- LVEF < 40%
- LV aneurysm

Kearon C, et al. *Chest*. 2012;141(2):e419S-e496S.
Chiarella F, et al. *The American journal of cardiology*. 1998;81(7):822-827.
Lee GY, et al.. Elsevier; 2015:441-449.
Esmon CT. *Blood reviews*. 2009;23(5):225-229.

Comparing the Diagnostic Value of Imaging Modalities in the Evaluation of LV Thrombus

Imaging Modality	% Range			
			Predictive Value	
	Sensitivity	Specificity	Positive	Negative
Noncontrast transthoracic echocardiogram[a]	21-35	95-98	67	94
Contrast transthoracic echocardiogram,[a] No. (%)	9 (64)	174 (99)	9 (82)	174 (97)
Transesophageal echocardiogram,[b] No. (%)	39 (39)	232 (97)	39 (87)	232 (79)
Delayed-enhancement cardiac magnetic resonance imaging[b]	82-88	99-100	100	98

McCarthy, C. P., et al. Left ventricular thrombus after acute myocardial infarction: screening, prevention, and treatment. *JAMA cardiology*, *3*(7), 642-649.

Recommendations for Evaluating LV Thrombus After Acute Myocardial Infarction

LV thrombus		
CMR imaging should be considered in patients with equivocal echocardiographic images or in cases of high clinical suspicion of LV thrombus.[577,578]	IIa	C
Imaging		
Routine echocardiography is recommended during hospitalization to assess regional and global LV function, detect mechanical complications, and exclude LV thrombus.	I	C
When echocardiography is suboptimal/inconclusive, CMR imaging may be considered.	IIb	C

© ESC 2023

Echocardiography remains the first-line imaging test for the detection of LV thrombus. In patients where the apex is not well visualized on regular echocardiography, contrast echocardiography may be considered for improved image quality. CMR is the gold standard imaging modality for the diagnosis and assessment of LV thrombi.

Characteristics

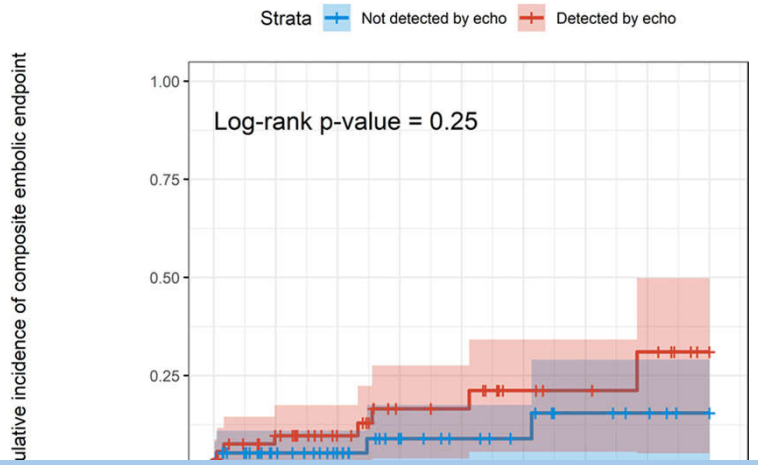
A hypointense intracardiac mass on cine sequences, adjacent to regional wall thinning and/or akinesis, along with a homogeneous low-signal mass adherent to hyperenhanced scar tissue on EGE and LGE imaging.

ıropean Heart Journal: Acute Cardiovascular Care (2024) 13, 55–161

Srichai MB,et al. *American heart journal*. 2006;152(1):75-84.

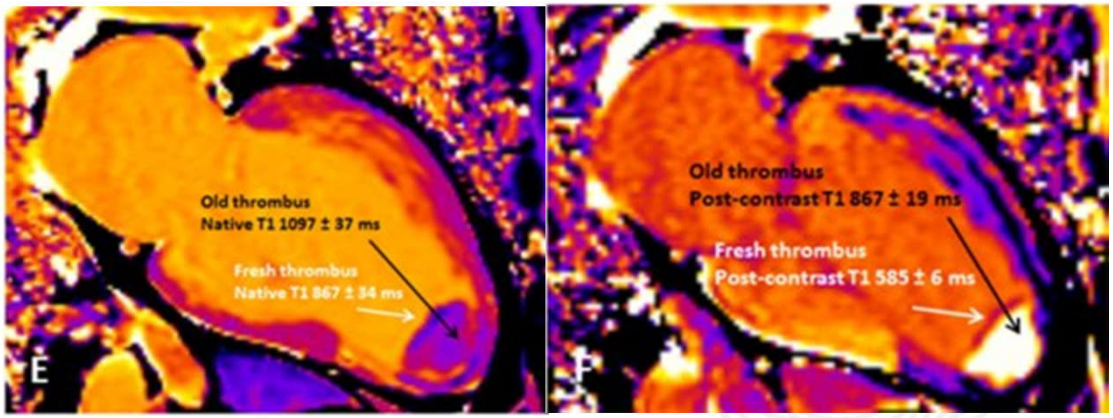
Pazos-López P, et al. JACC: Cardiovascular Imaging. 2014;7(9):896-905.

Prediction and Recent Evidence



- Cohort study
- No significant difference in the incidence of the composite embolic endpoint (*P*=0.25)

Velangi PS, *et al.*. *Circ Cardiovasc Imaging* 2019;**12**:e009723.

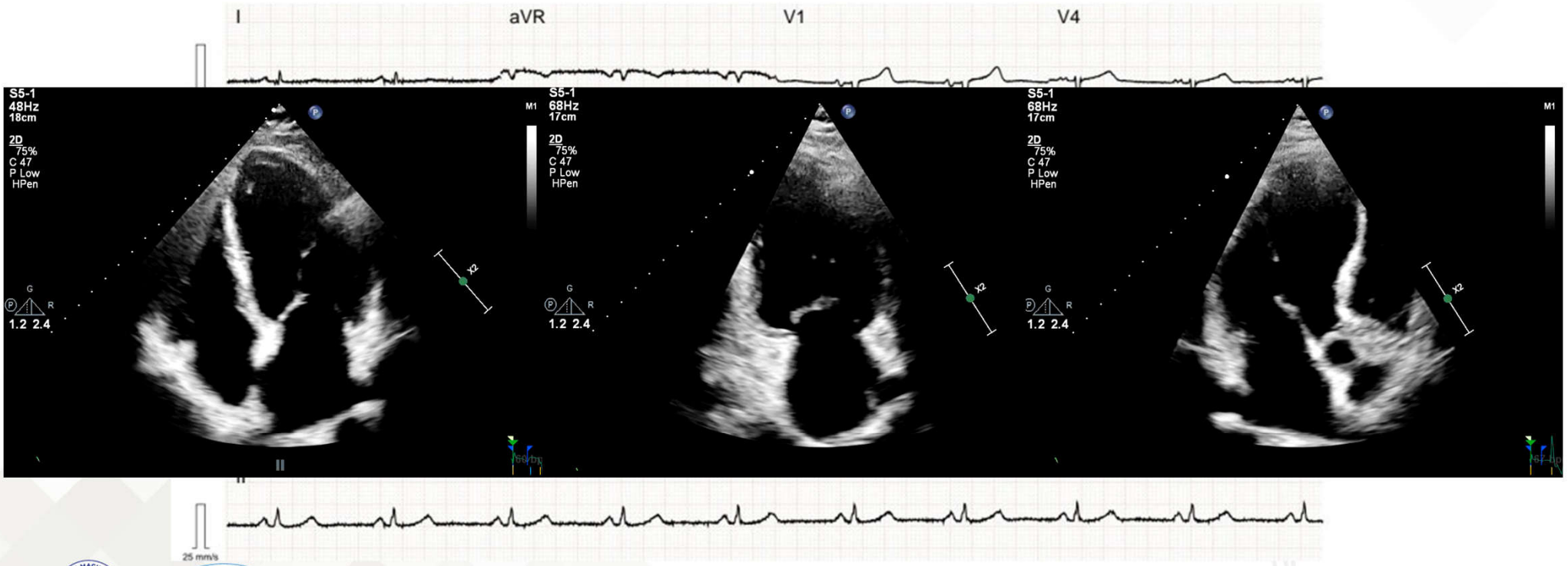


Haaf, P., et al. (2020), *36*(8), 1515-1516.

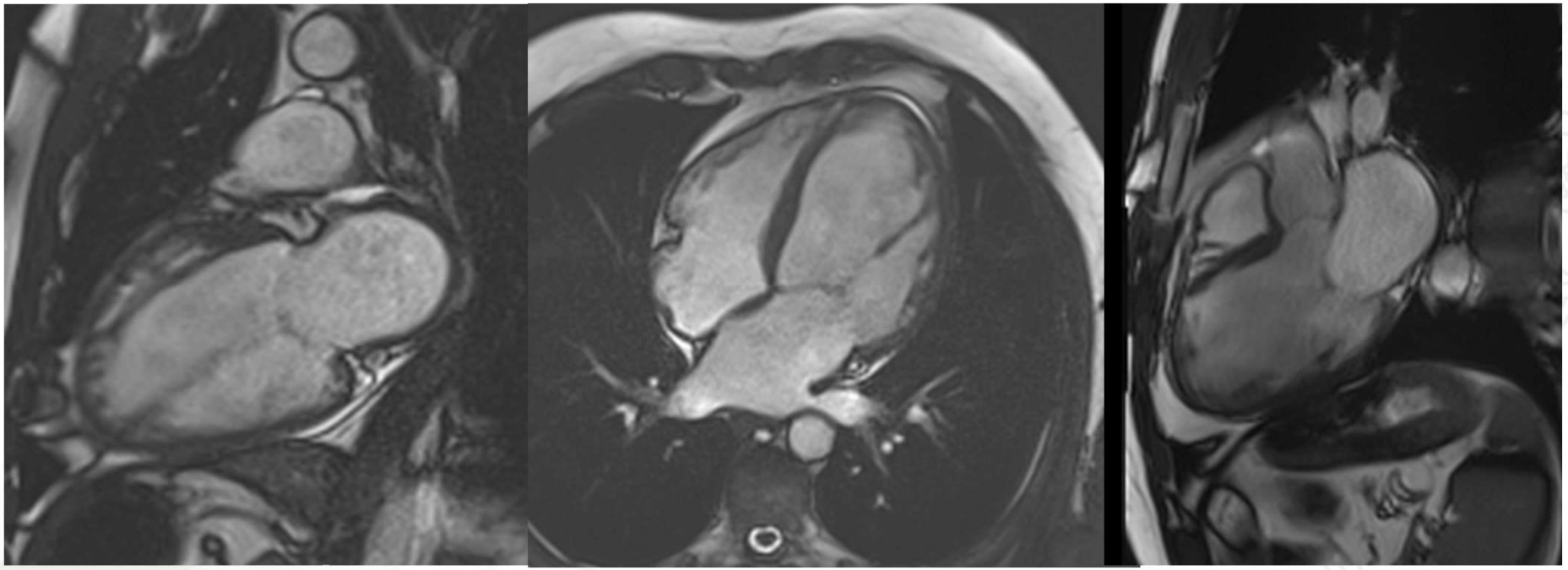
n	Recent thrombus	Old thrombus	*P* value
T1 thrombus	1098.04 ± 61.27	1316.25 ± 75.05	$< 10^{-4}$
T1 myocardium	1223.91 ± 73.11	1253.75 ± 47.68	0.139
T1 blood pool	1933.70 ± 137.17	2008.33 ± 123.77	0.135

Abi Khalil et al. Egypt J Radiol Nucl Med (2023) 54:208

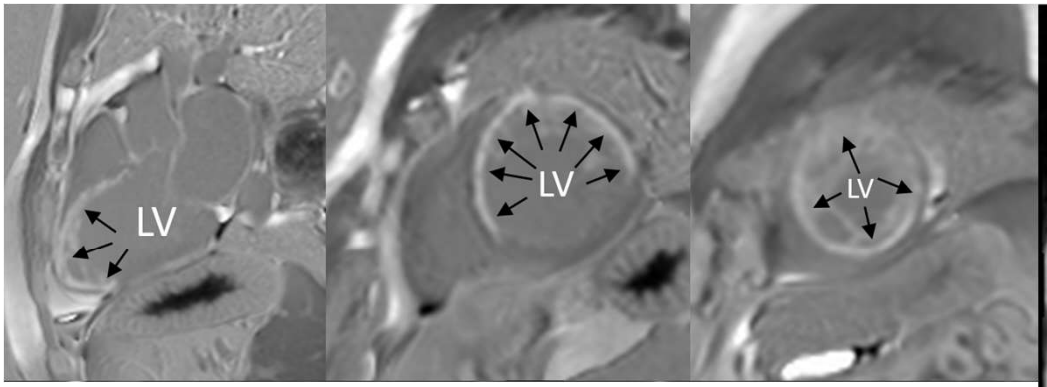
A 47-year-old male patient with a history of CML and prior extensive anterior STEMI (one year ago) under treatment with 1 stent in the proximal LAD.

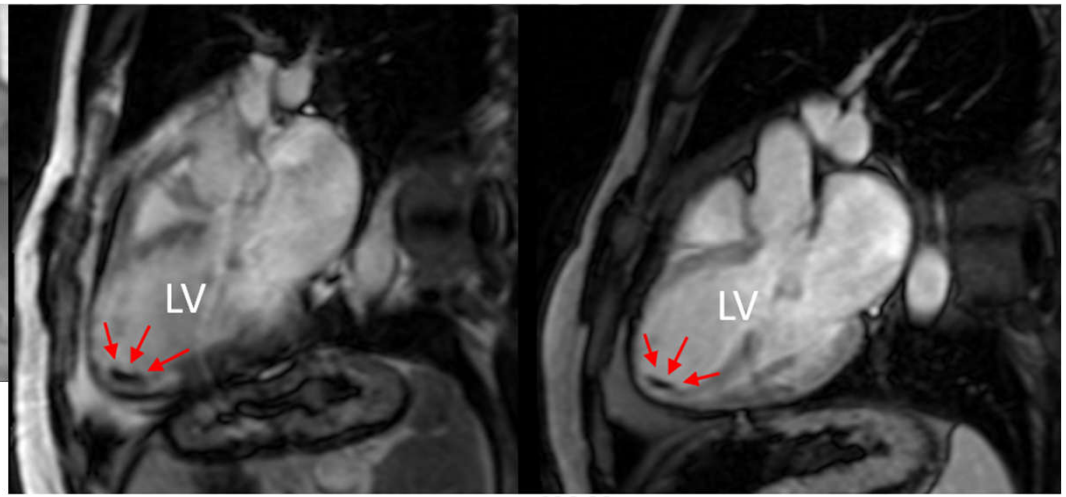


A 47-year-old male patient with a history of CML and prior extensive anterior STEMI (one year ago) under treatment with 1 stent in the proximal LAD.



A 47-year-old male patient with a history of CML and prior extensive anterior STEMI (one year ago) under treatment with 1 stent in the proximal LAD.





Mural/laminar thrombus

Oral anticoagulant therapy (VKA or NOAC) should be considered for 3–6 months in patients with confirmed LV thrombus.[603]	IIa	C
Following an acute anterior MI, a contrast echocardiogram may be considered for the detection of LV thrombus if the apex is not well visualized on echocardiography.[604]	IIb	C

Before and three months after anticoagulant treatment

Take Home Messages

- Gadolinium-enhanced CMR imaging is particularly useful for **diagnosing and monitoring LV thrombus**, especially when echocardiography is suboptimal or inconclusive.
- Early CMR should be considered in **high-risk patients** to detect LV thrombus, including mural/laminar subtypes, even without echocardiographic evidence.

THANK YOU VERY MUCH FOR YOUR ATTENTION!