

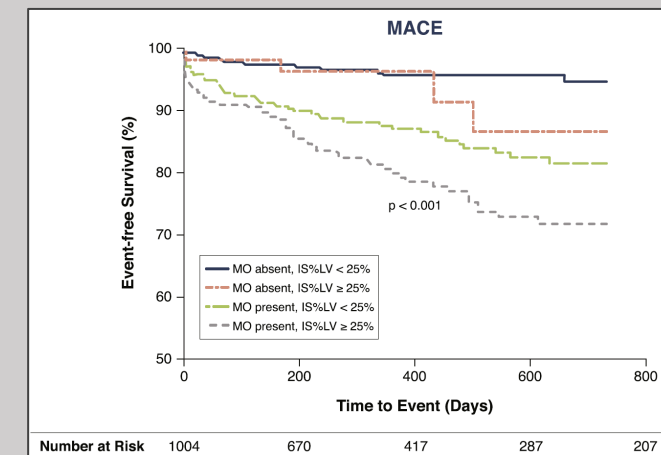
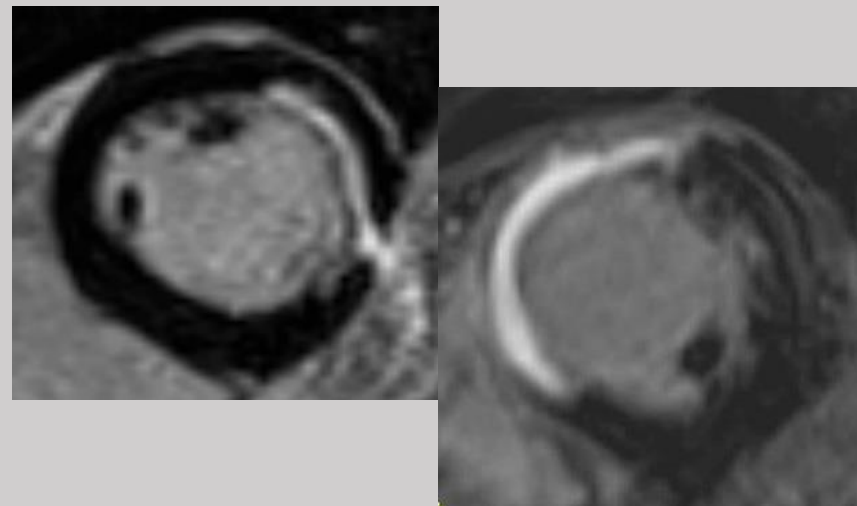


Role of CMR and CT in the management of acute myocardial infarction

Dr Loïc BIERE
CHU ANGERS, France

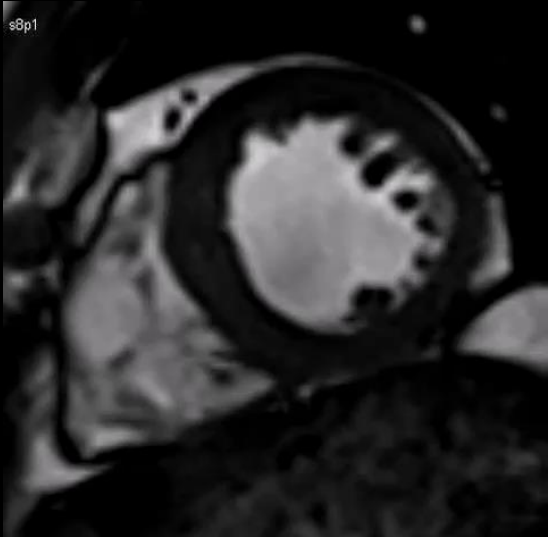
Today we won't speak about:

- TTE vs CMR vs CT to assess LV volumes and EF
- Ischemia, viability
- CMR parameters to assess 1-month or long-term survival
- Post-infarction remodeling
- Chronic phase

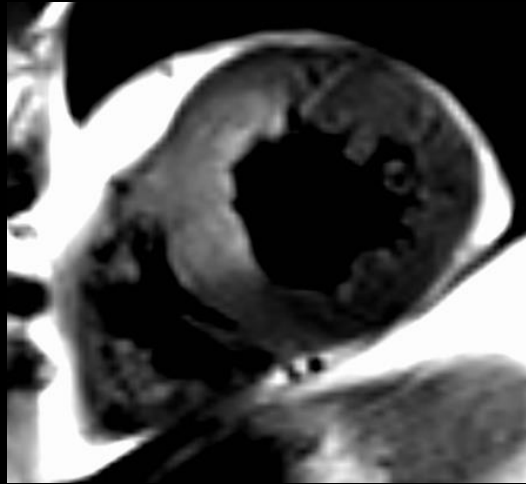


MINOCA

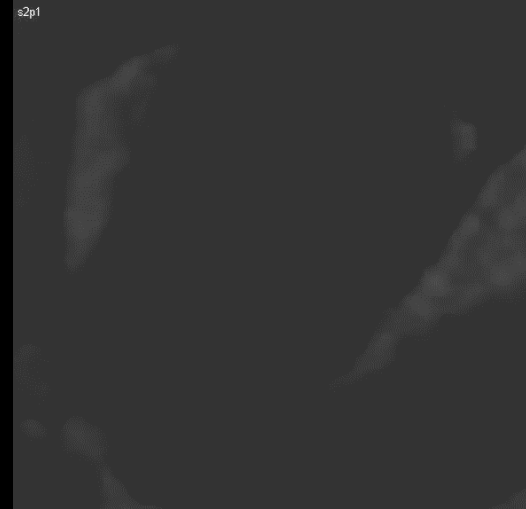
CINE



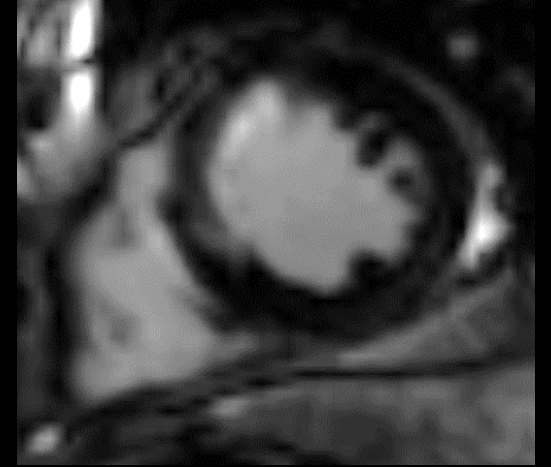
T1, T2



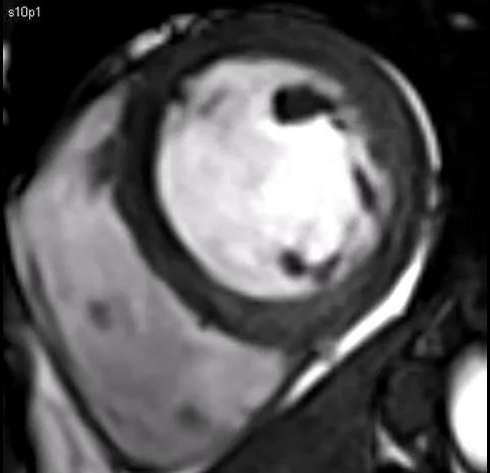
PERFUSION



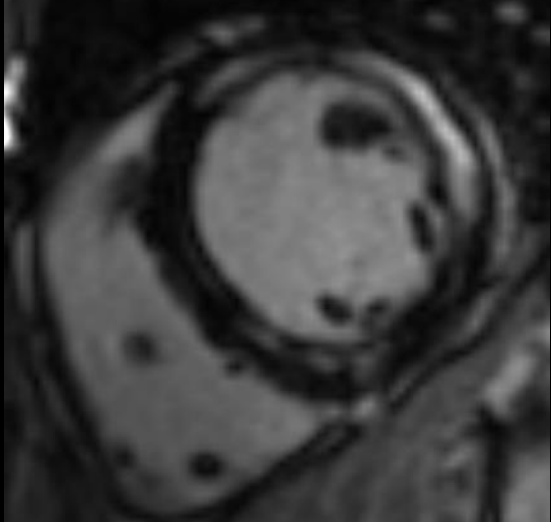
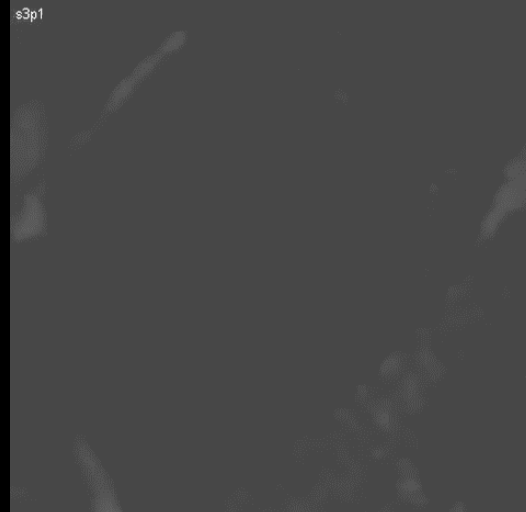
**REHAUSSEMENT
TARDIF**



s10p1

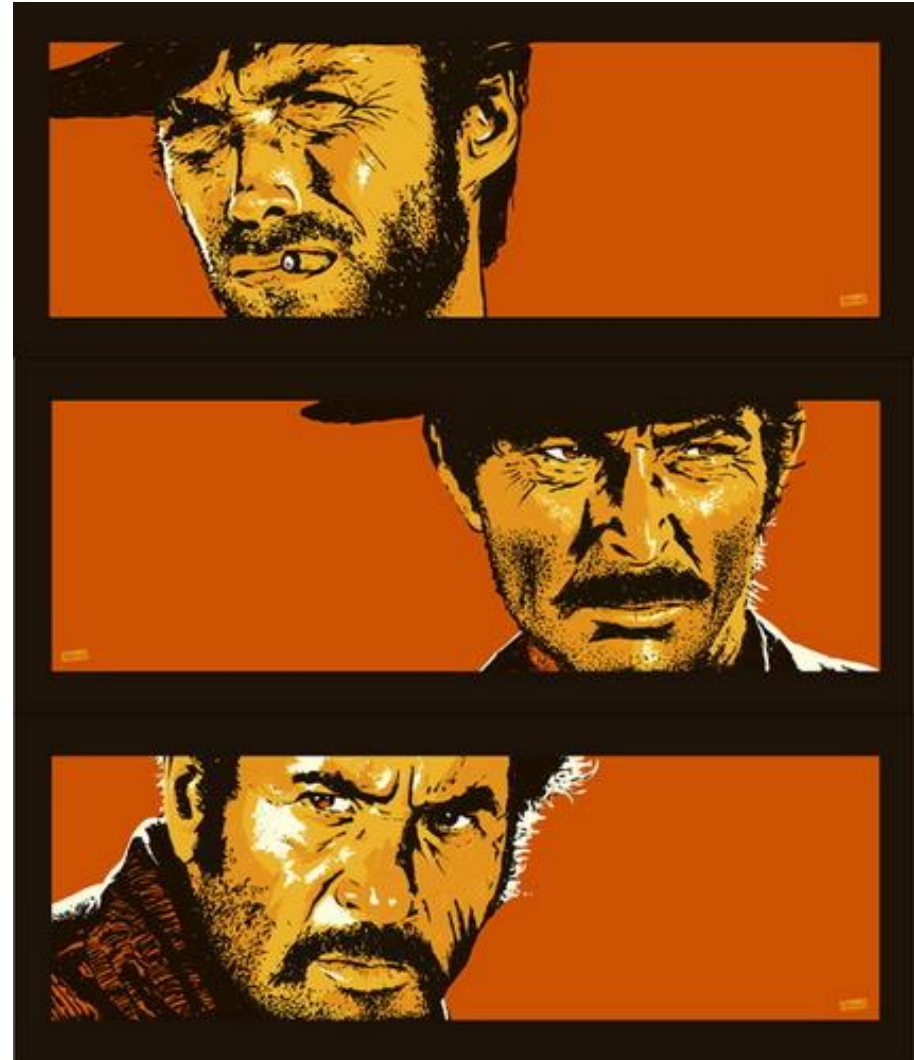


s3p1



We will speak about the gaps in AMI management

- Pericardial effusion very common
- LV thrombus 2-9%
- Cardiac rupture,
ventricular septal defect,
mitral papillary infarction rare



REPERFUSED STEMI

STEMI

CORONARY ARTERY DISEASE

CARDIOLOGY

Pericardial effusion

How to qualify a pericardial effusion?

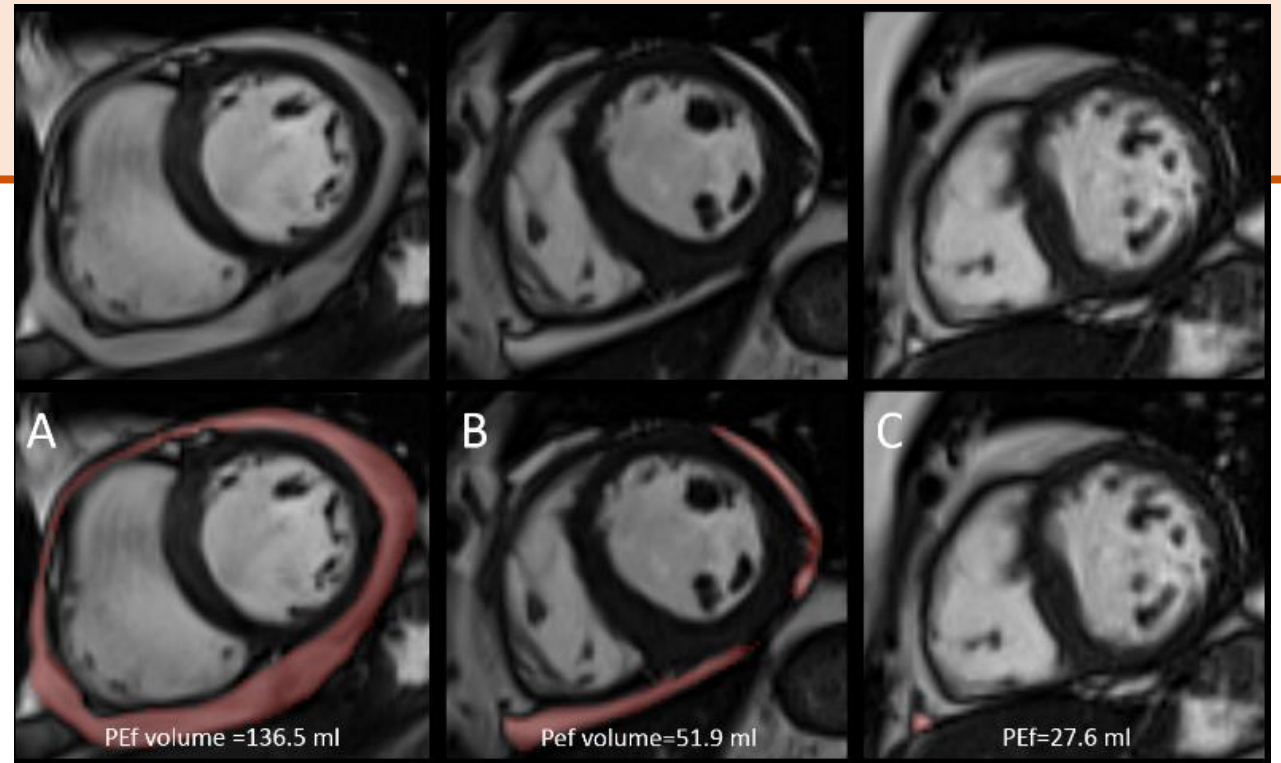
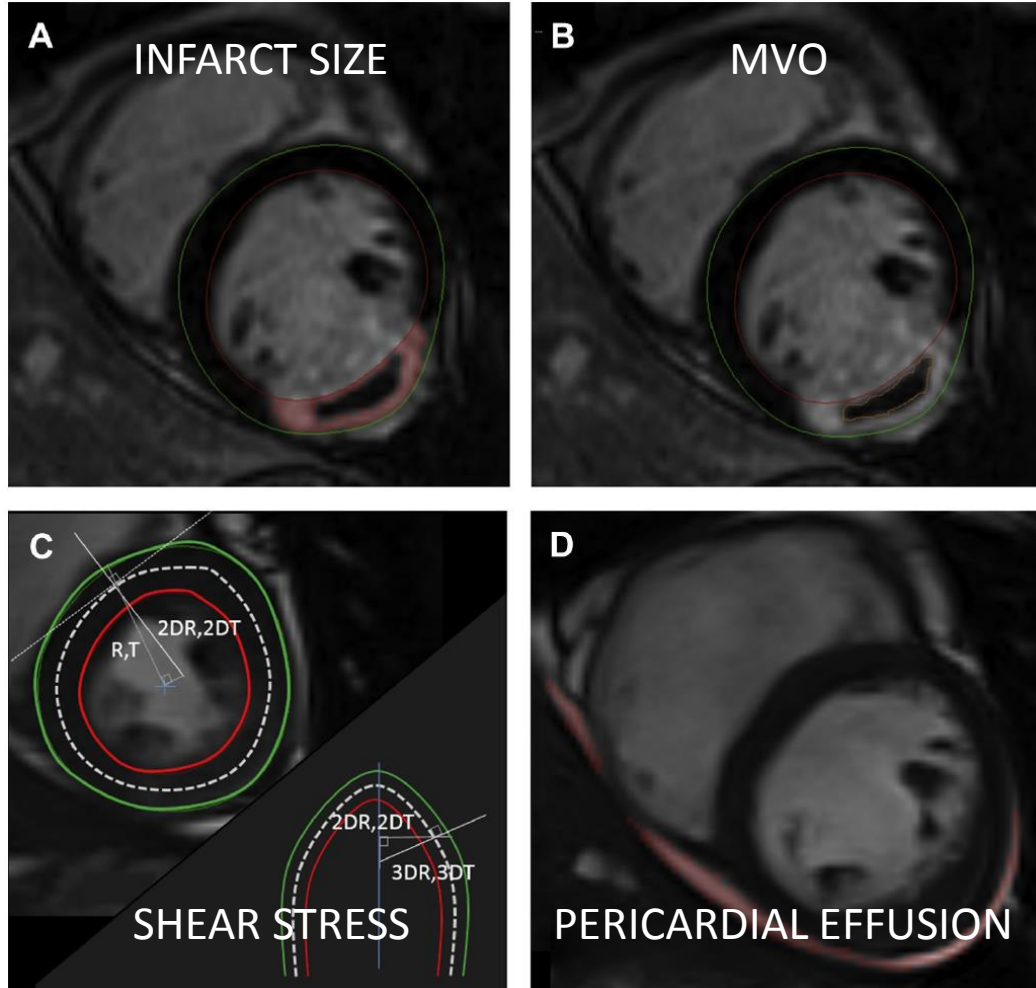
- 2D or 3D assessment?
- Localized or circumferential?
- Echo-free or echo-dense?
- Qualitative scale?

trivial/mild

moderate

severe

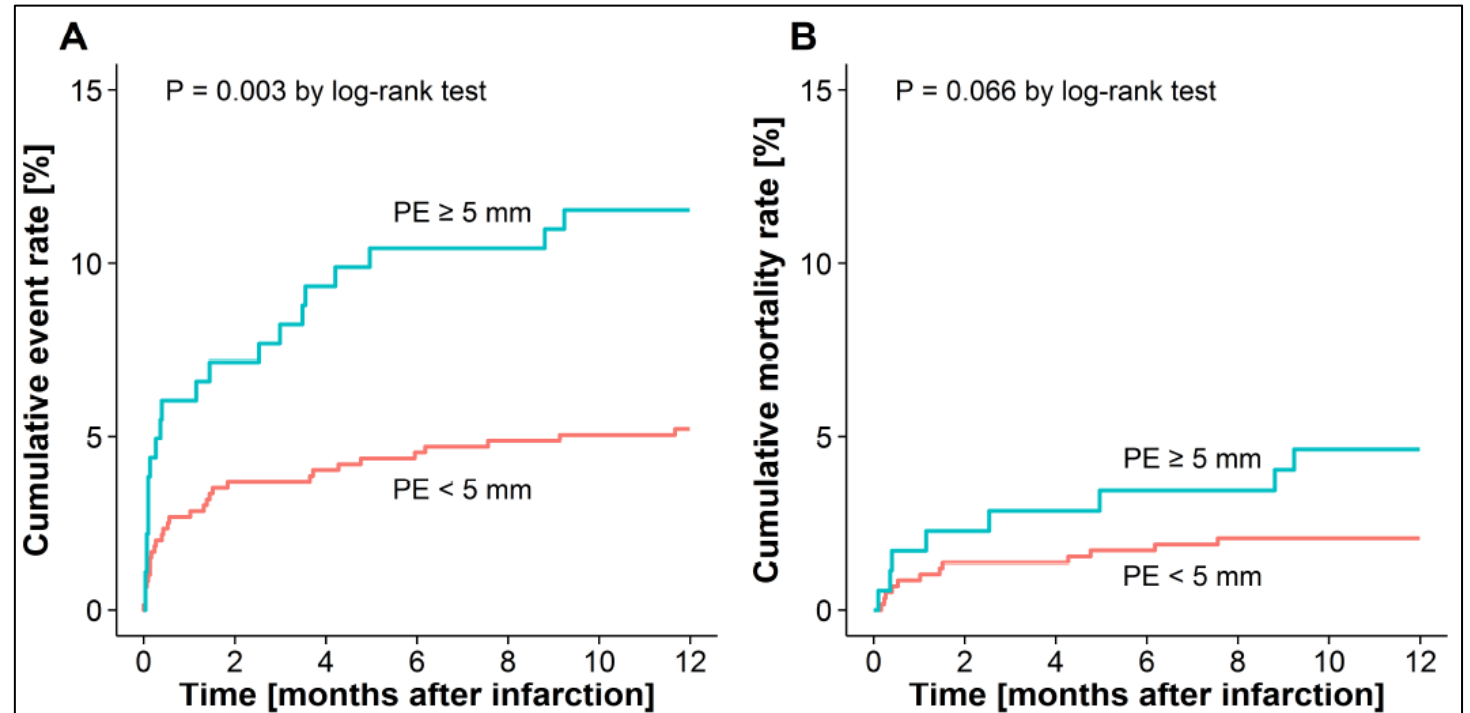
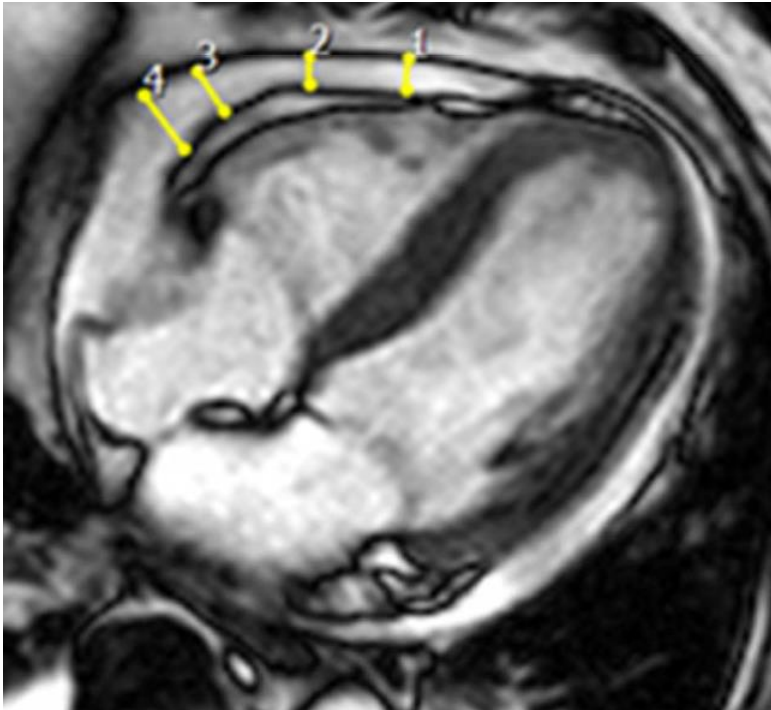
Correlates of PEf



“One patient was deferred for ventricular surgical repair because of a suspected free wall rupture according to a CMR scan, which, however, was not confirmed by the surgeon. No late post- MI pericarditis was recorded.”

Biere et al. AJC. 2015 Aug 15;116(4):497-503

Pericardial effusion and prognosis



N=780 STEMI

183 with moderate to severe PEf

AIDA substudy

2D measurement

Jobs et al. 2015 Oct 1;116(7):1010-6

“No PE required pericardiocentesis due to hemodynamic compromise and we did not identify any patient during follow-up with constrictive pericarditis following myocardial infarction.”

Pericardial effusion \neq cardiac rupture

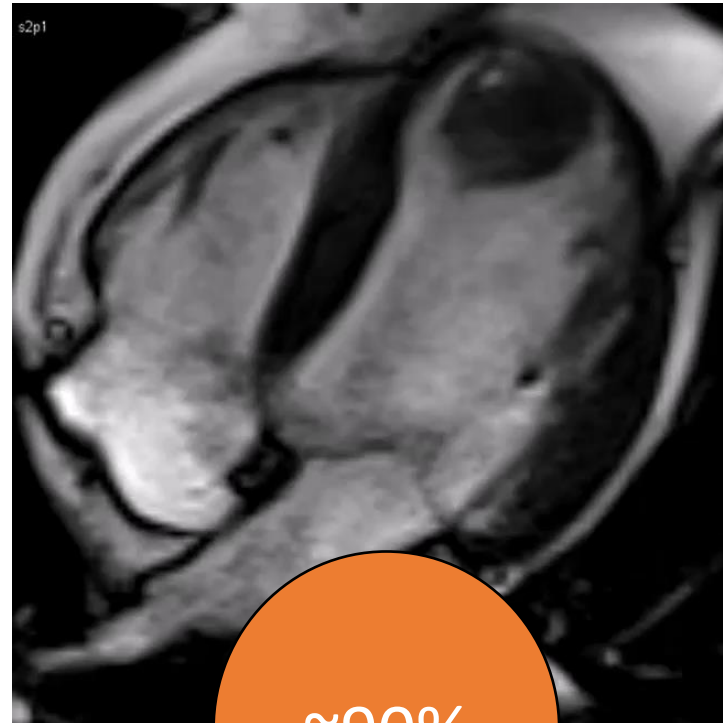
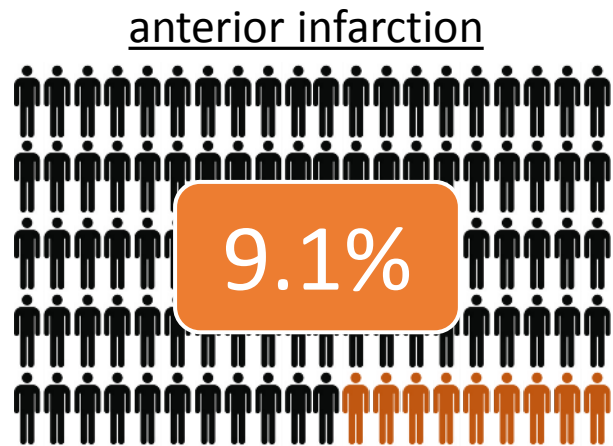
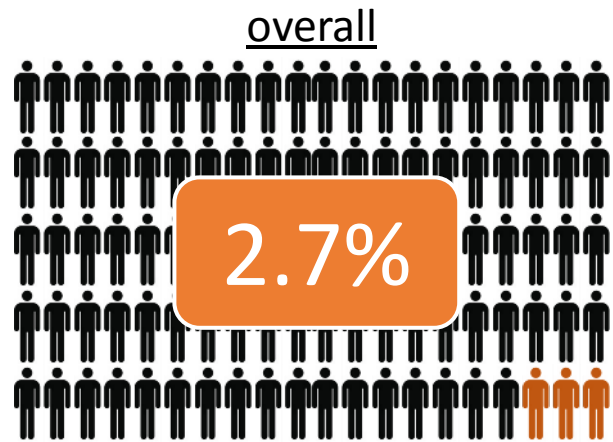
- Today, no sign of prerule BUT almost 100% of patients with rupture had a mild effusion at admission
- Understudied because TTE is the most available tool



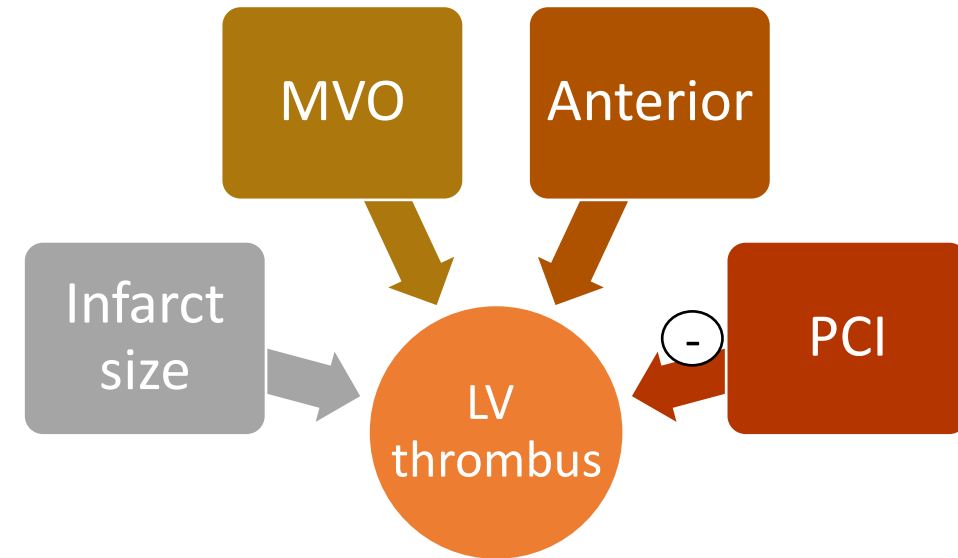
LV thrombus



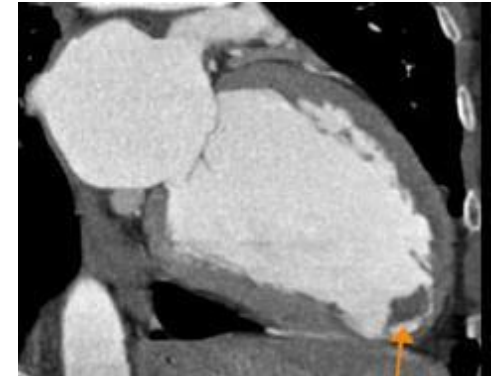
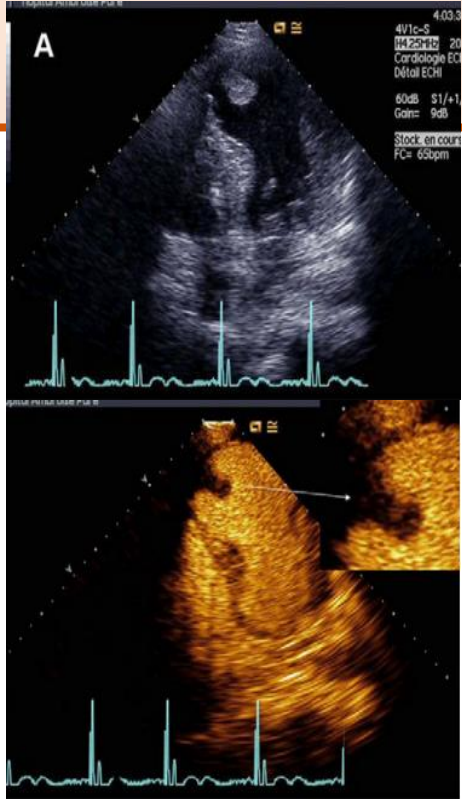
LV thrombus ID



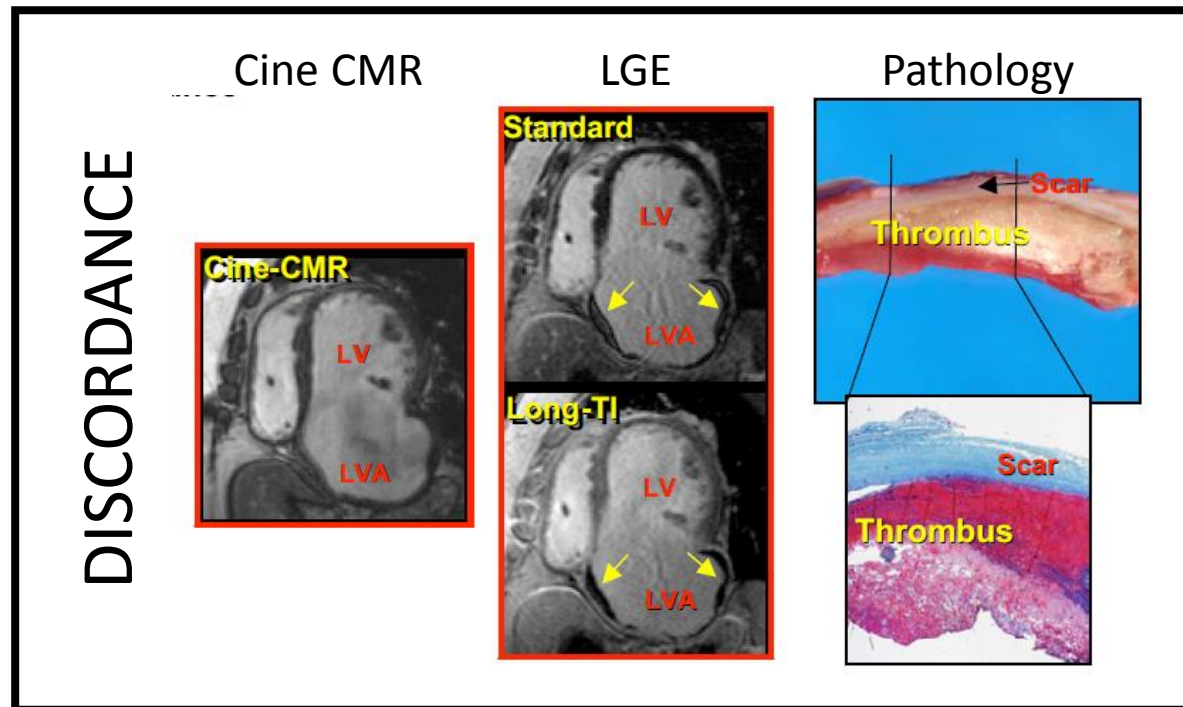
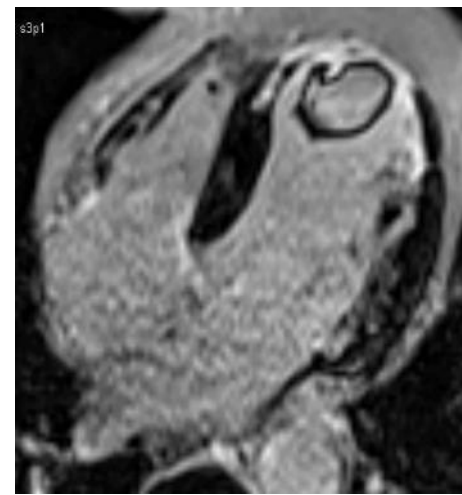
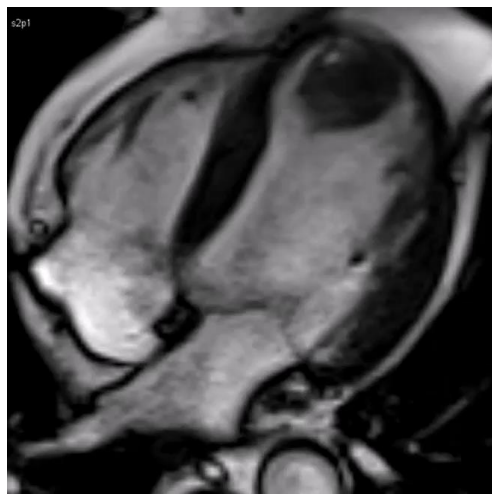
~90%



How to diagnose LV thrombus?

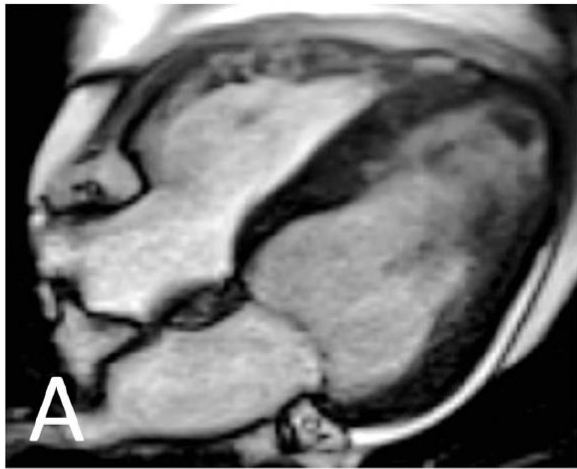


	SEN	SPE
TTE	23	96
TOE	40	96
Contrast Echo	61	99



24/55 LVT not seen by cine CMR alone (n=784)

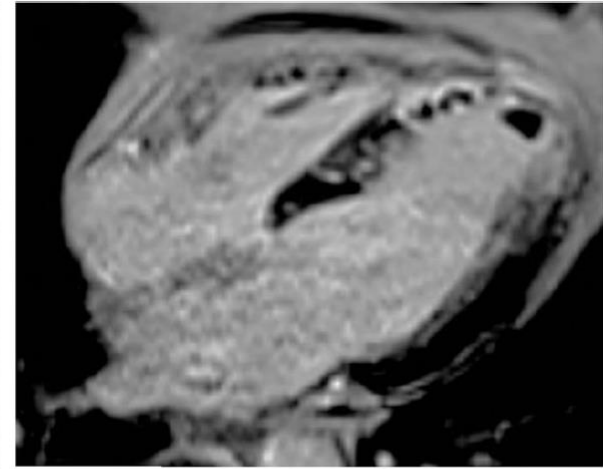
Weinsaft et al. JACC 2008;52:148–57 & Weinsaft et al. JACC Img 2009;2:969–79



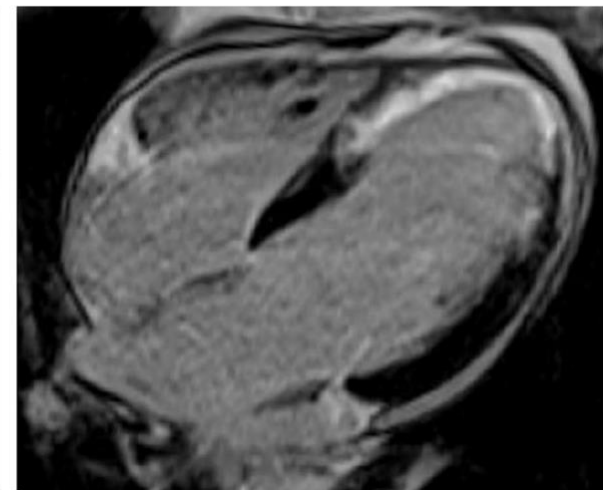
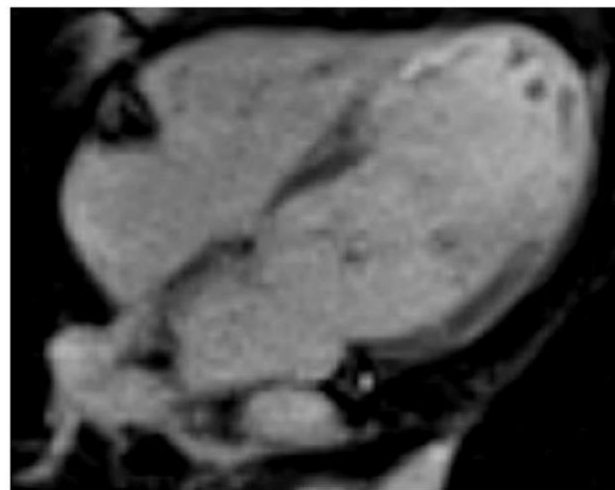
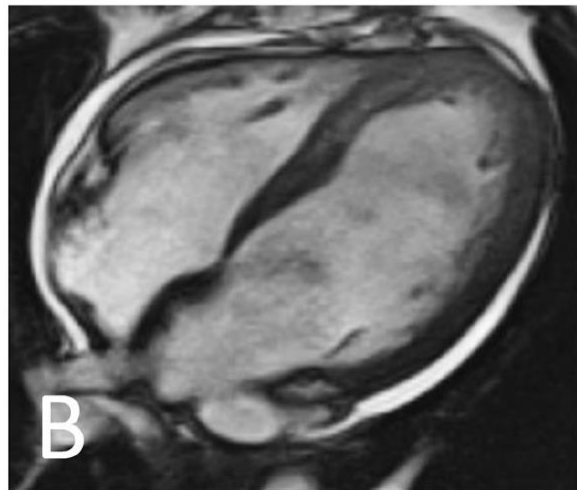
Cine



First pass



LGE



N= 329 STEMI

baseline and 3-month, 31 LVT

2 LVT not seen by Cine + LGE

By using FPP, the novice did as good as the expert

Biere et al. Eur J Radiol. 2016 Sep;85(9):1532-7

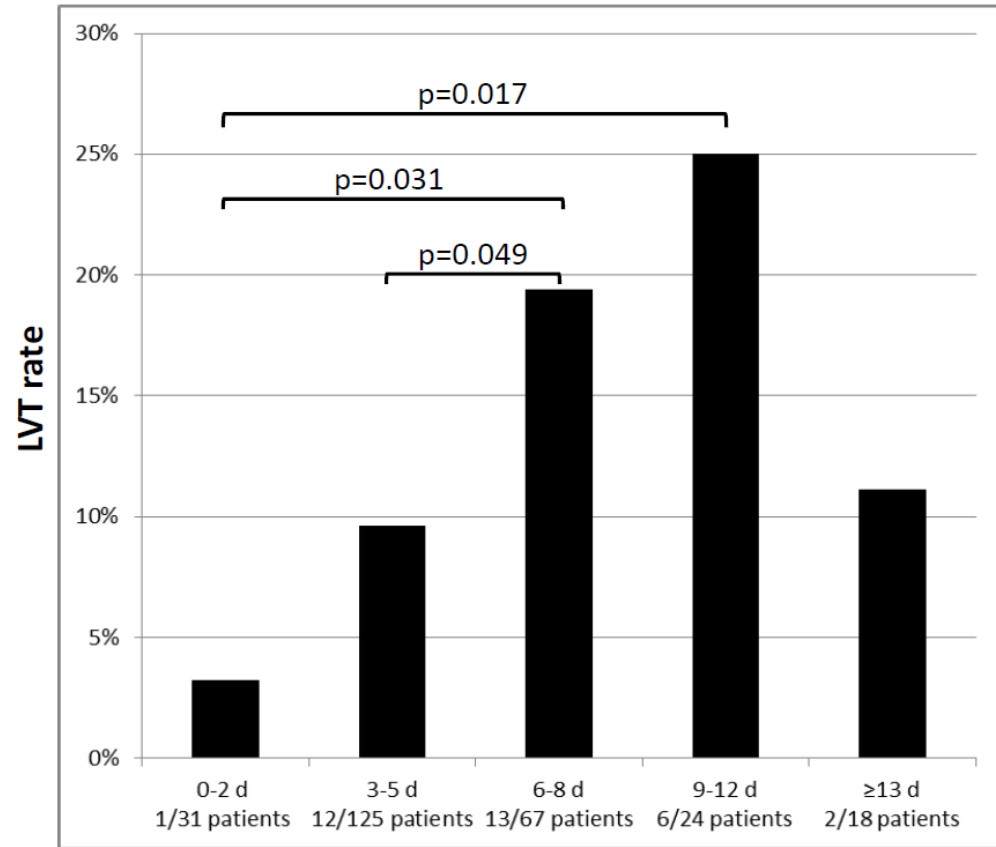


Cine IRM



LGE

Timing of assessment



MI-to-CMR time (days)

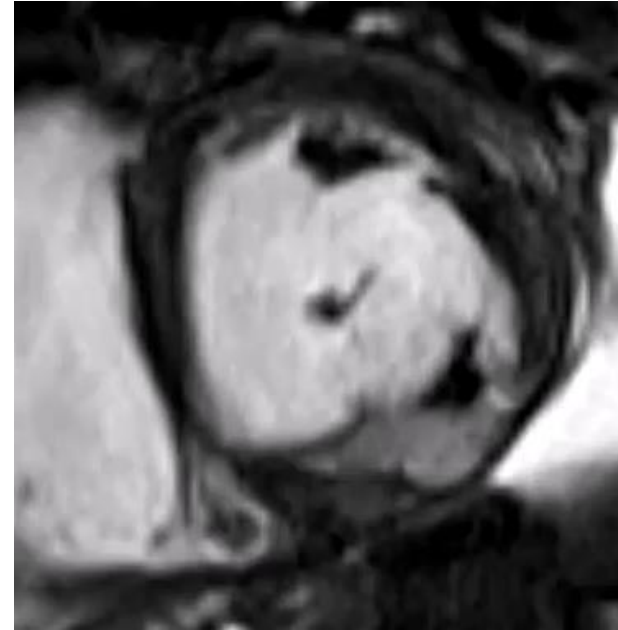
n=265 anterior STEMI

IS>10%

34 /265 (12.8%)

- Identify risk markers
- Improve timing of assessment
- Validate new therapies

Cardiac rupture



Cardiac rupture: an overlooked event

- What does history tell us?
 - 1880 Winsor
 - 1910 Bicetre: 1 out of 100 autopsies (any incoming patients)
 - 1992 Lopez-Sendon (n=1214): 2.6%;
 - 2008 Gueret (n=908): 0.8%
- What does Braunwald tell us? “ *Alternatively, a patient may present subacutely...* ”
- What do the guidelines tell us?
 - ACCF/ACR/SCCT/ SCMR/ASNC/NASCI/SCAI/SIR **2006** appropriateness criteria for cardiac CT and CMR imaging. JACC. 2006;48(7):1475–1497.
“*Evaluation of post infarct complications including aneurysm, ventricular septal defect, ruptured/infarcted papillary muscle, myocardial rupture, pericardial effusion in cases where diagnosis remains uncertain after echocardiography or additional information is needed to plan surgical repair = NOT EVALUATED”*”
 - ESC STEMI **2012** “ *The diagnosis is confirmed by echocardiography.* ”

Tamponade due to cardiac rupture is highly lethal

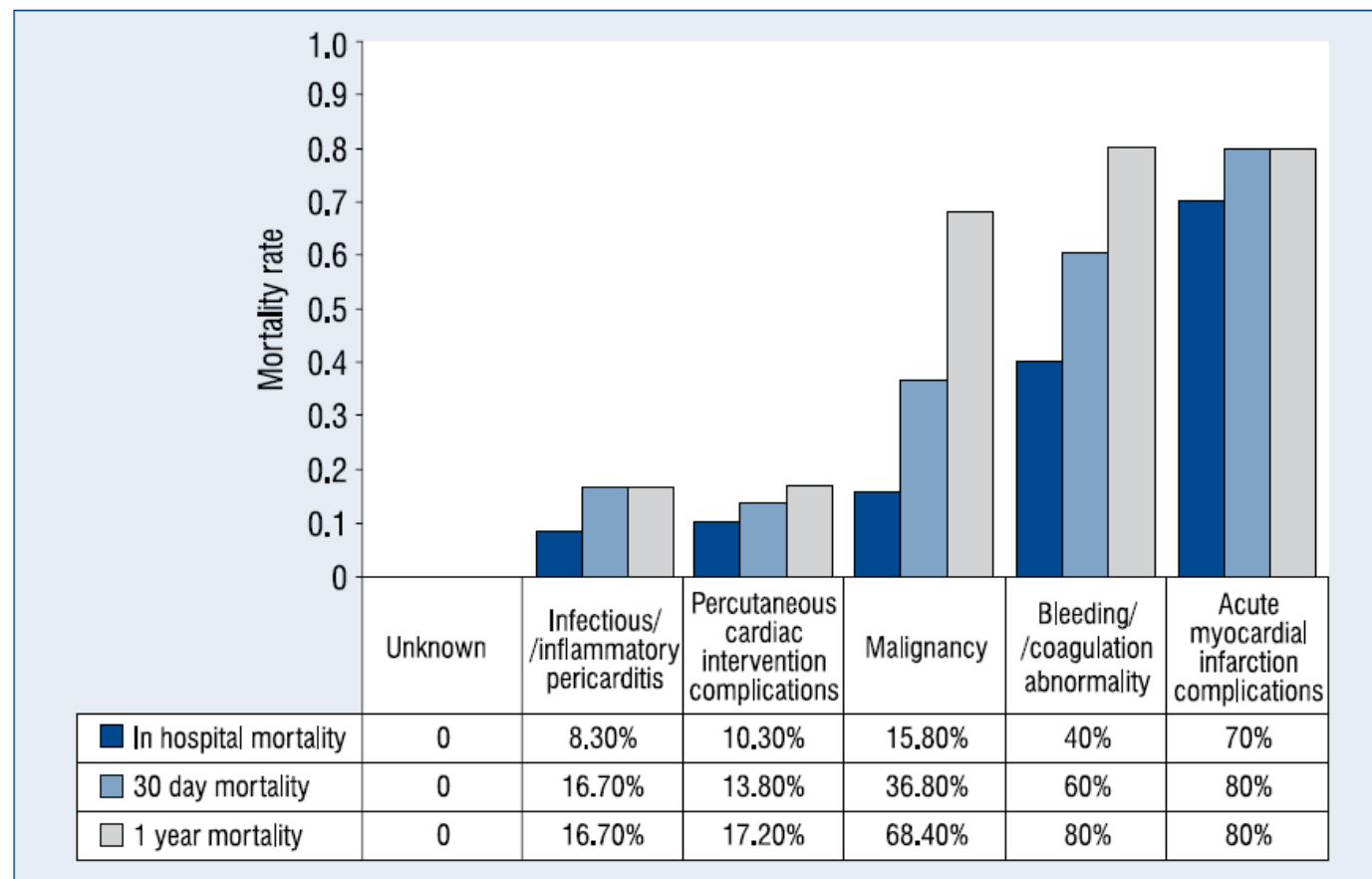
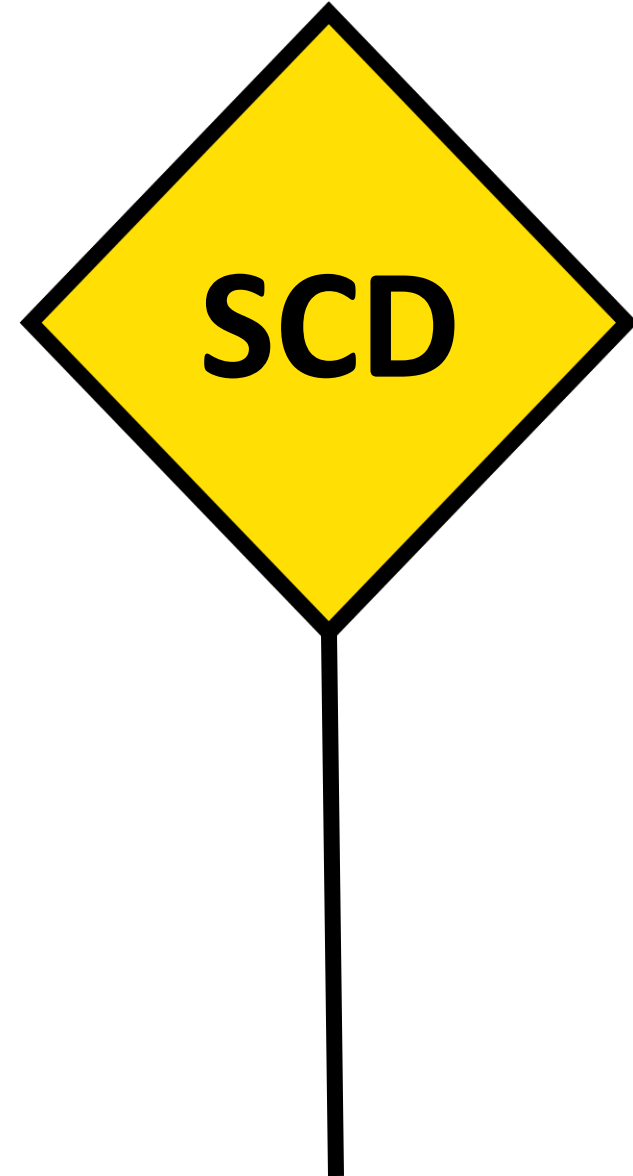


Figure 1. Mortality rates according to different causes of cardiac tamponade.

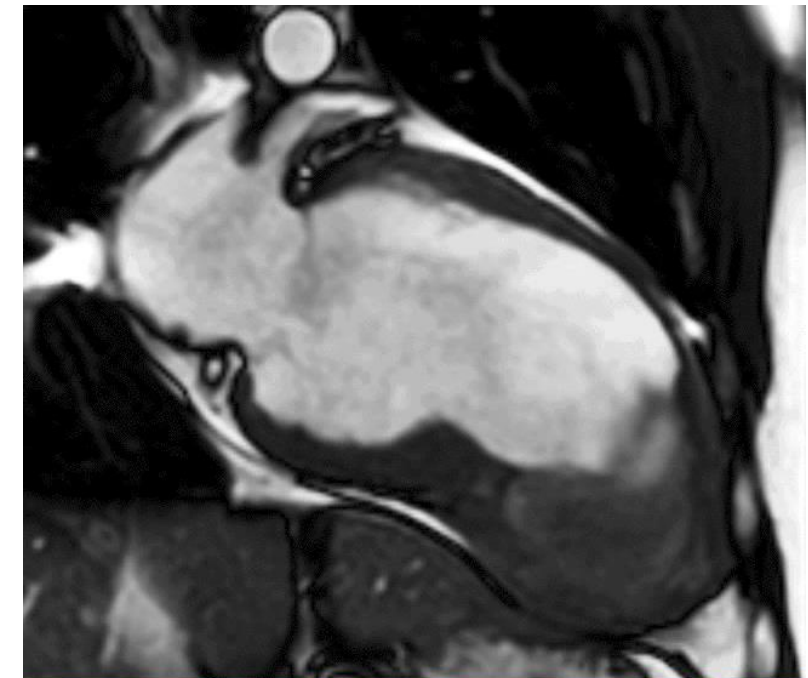
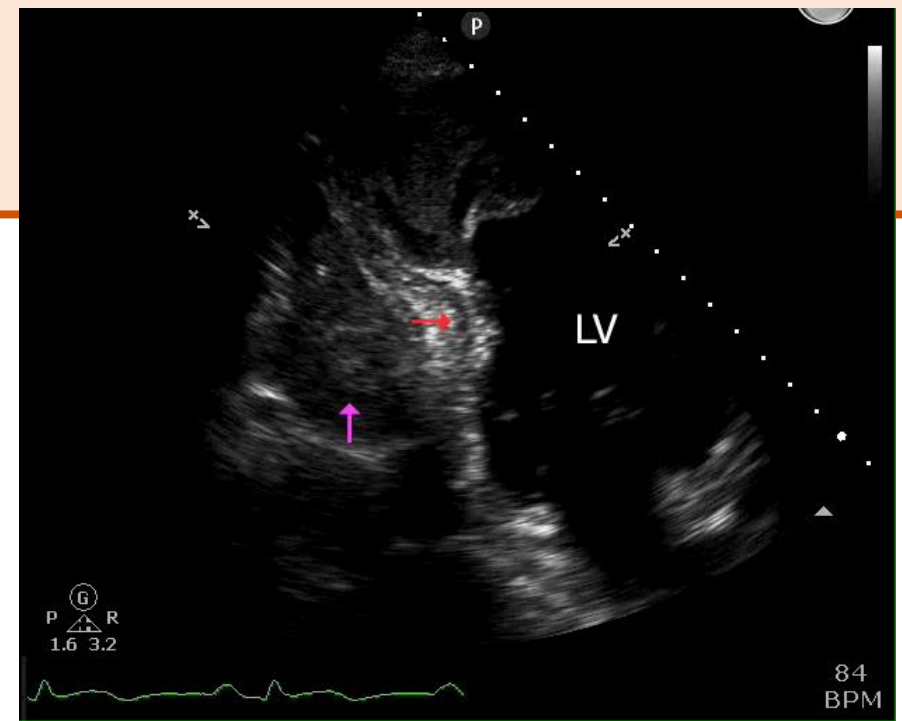
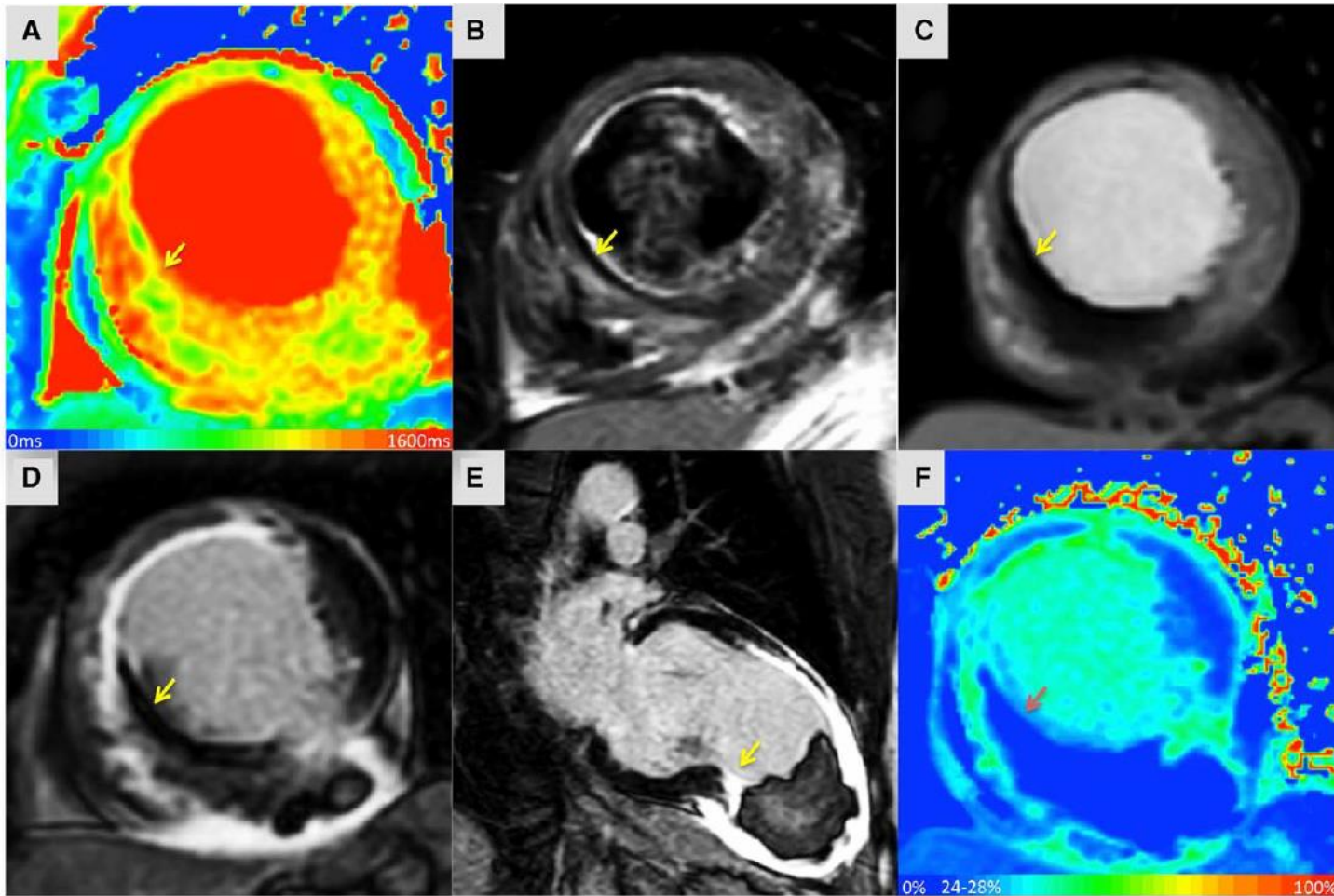
Imaging data about cardiac rupture are scarce

- Cardiac rupture is rare
- Cardiac rupture doesn't alert
- Subacute case? Is it really time for a CMR scan?
- Echo can do the job



From the litterature

A 37 year old male...



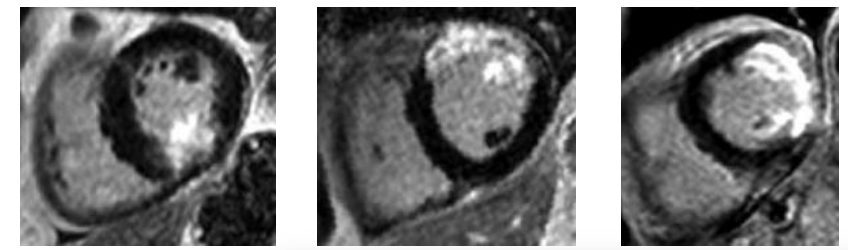
Garg. Circulation. 2015;132:e245-e247

Take home message

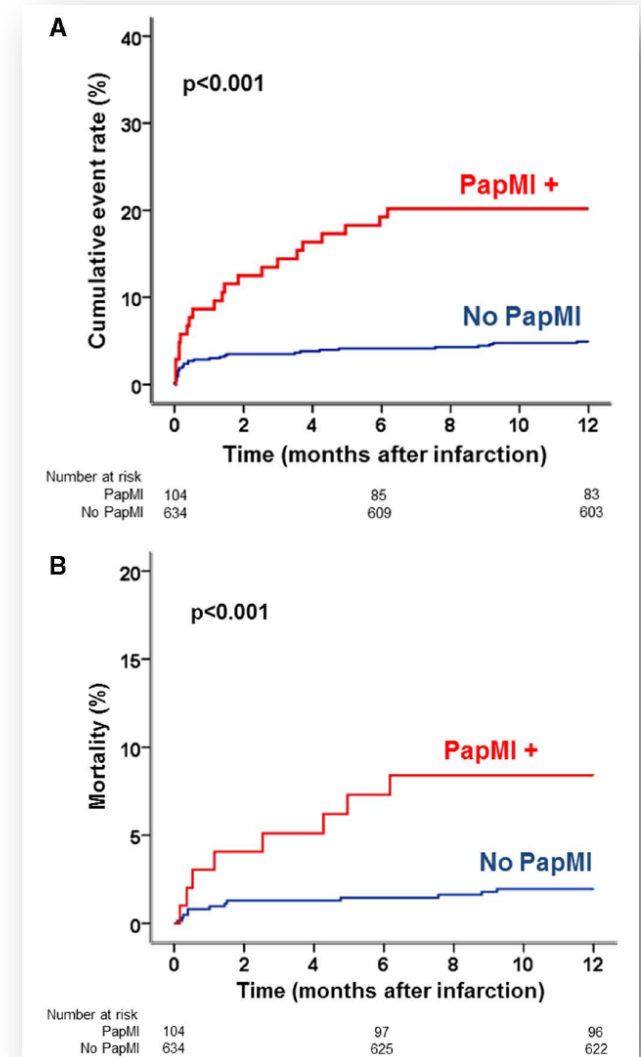
- **Pericardial effusion** is very common and seems to decrease spontaneously
- **LV Thrombus** decreased with PPCI, is better investigated by CMR, and there is a need to identify at-risk patients
- **Cardiac rupture** is a silent assassin
- CMR remains a real contender for LV volumes and viability assessment



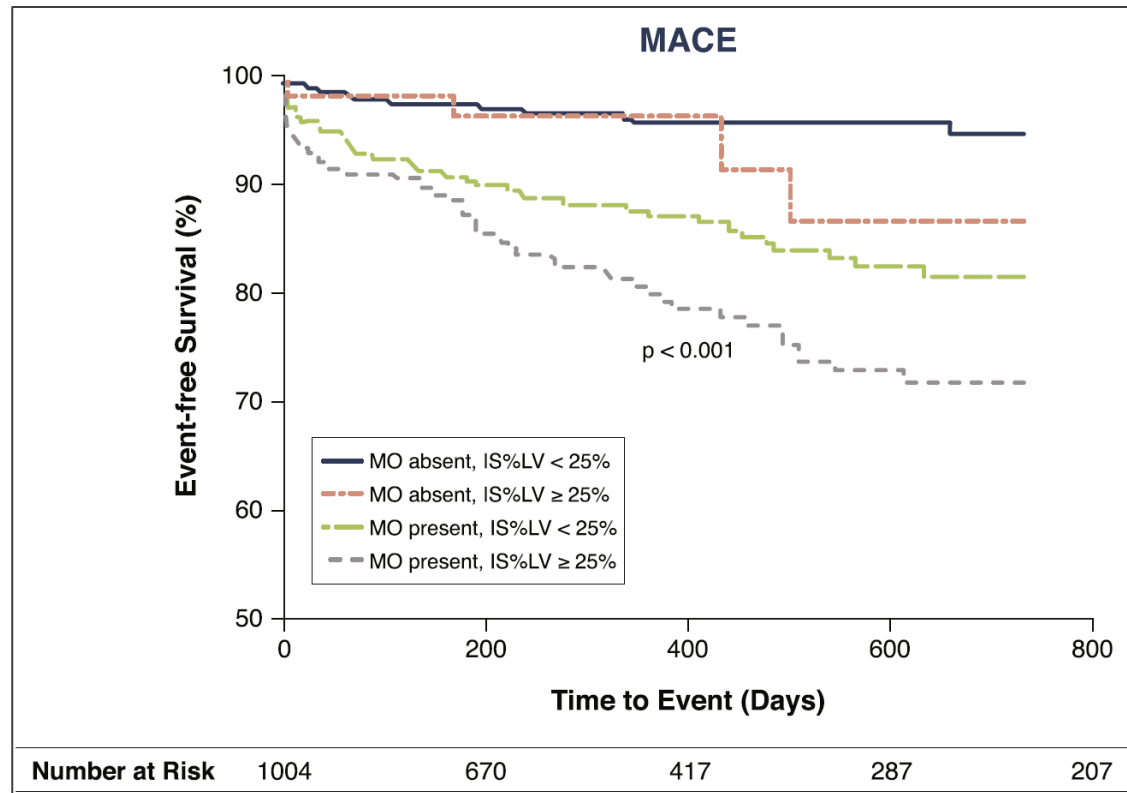
Papillary muscle infarction (PapMI)



	<i>Tanimoto. Circulation</i> 2010, 122:2281-2287 n=118 STEMI	<i>Eitel. Circ Cardiovasc</i> <i>Imaging. 2013;6:890-898</i> n=738 STEMI
PapMI prevalence	40% (77% inf PapMI)	14% (64% inf PapMI)
Relation of PapMI with Mitral regurgitation <u>at baseline</u>	no	no
Relation of PapMI with Mitral regurgitation <u>at follow-up</u>	no	no
Relation of PapMI with remodeling	yes	-
Relation of PapMI with prognosis	-	yes



Prognosis after MI



van Kranenburg. JACC Img 2014;7:930–9

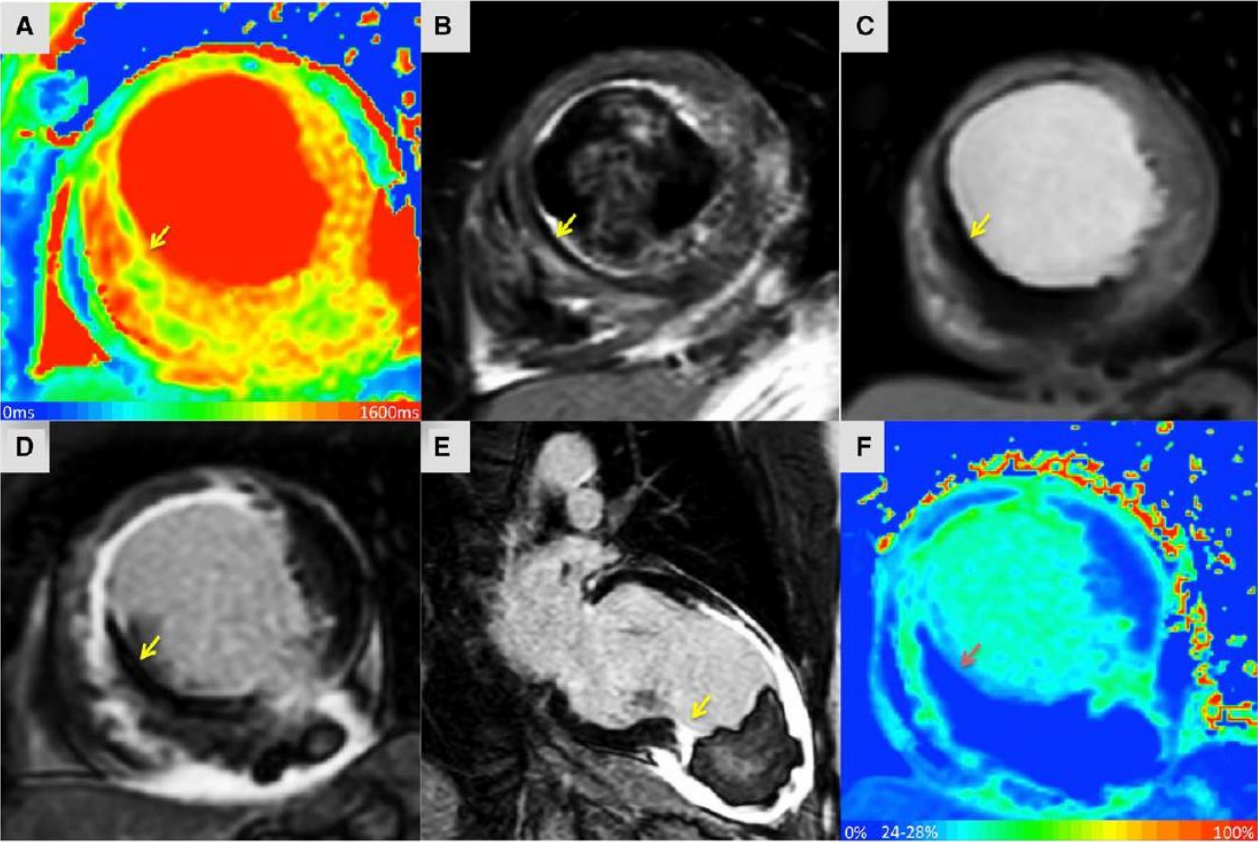
CMR imaging findings		Hard events				Major adverse cardiac events			
			Patients evaluated (multi-variable analysis)	Weighted % of studies with significant result	Weighted % of studies with significant results on multivariable analysis		Patients evaluated (multi-variable analysis)	Weighted % of studies with significant result	Weighted % of studies with significant results on multivariable analysis
Finding	Criterion	Studies evaluated			0%50%100%	Studies evaluated			0%50%100%
LVEF	%	2	624	68%	<div><div></div></div>	11	2268	70%	<div><div></div></div>
WMA (rest)	Segments	-			<div><div></div></div>	1	214	100%	<div><div></div></div>
WMA (induced)	Segments	-			<div><div></div></div>	1	214	0%	<div><div></div></div>
Perfusion (rest)	Segments	-			<div><div></div></div>	1	192	0%	<div><div></div></div>
MVO	Early	1	422	0%	<div><div></div></div>	3	713	40%	<div><div></div></div>
	Late	2	624	68%	<div><div></div></div>	3	668	100%	<div><div></div></div>
	NOS	-			<div><div></div></div>	6	1047	11%	<div><div></div></div>
Infarct size	Presence / extent	1	422	0%	<div><div></div></div>	13	2205	9%	<div><div></div></div>
	Transmurality	-			<div><div></div></div>	1*	214	100%	<div><div></div></div>
Edema	%	1	202	100%	<div><div></div></div>	3*	600	35%	<div><div></div></div>
IMH	Presence	-			<div><div></div></div>	2*	416	100%	<div><div></div></div>

El Aidi. JACC 2014;63:1031–45

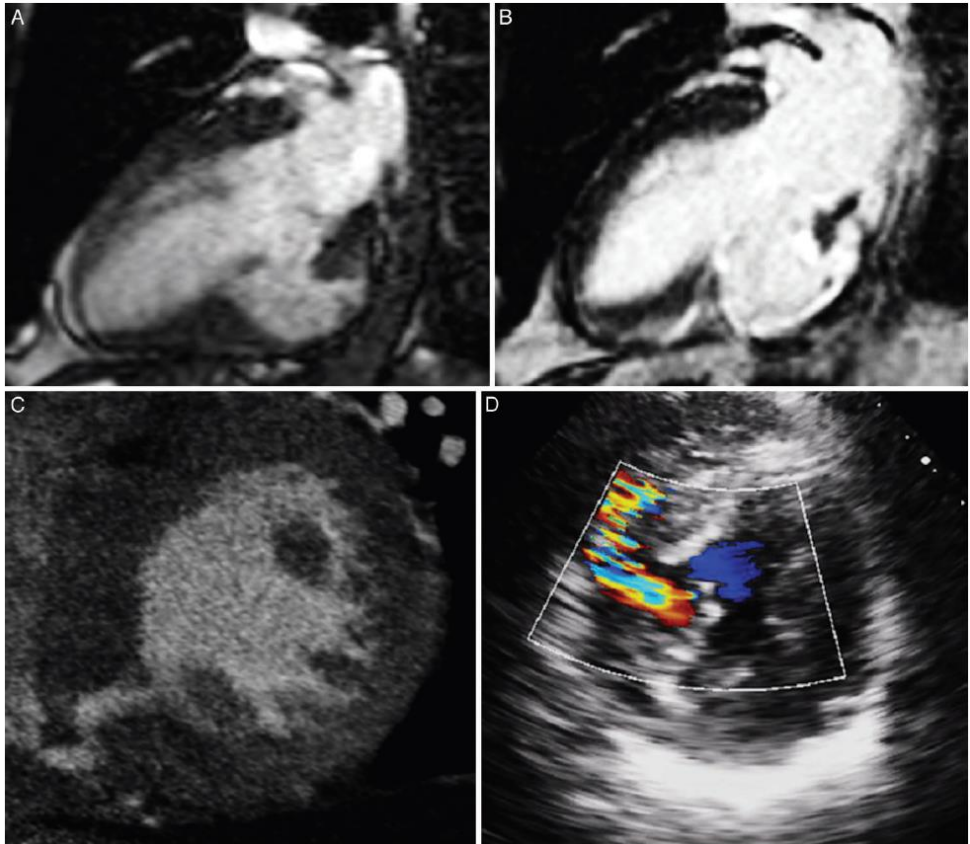
...Hamirani. JACC Img 2014;7:940–52,

From the litterature

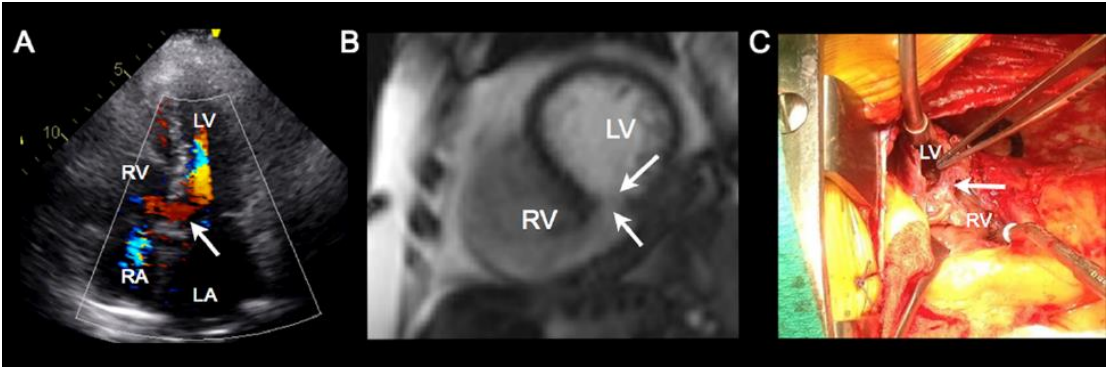
A 37 year old male...



Garg. *Circulation*. 2015;132:e245-e247



Gramze. *Met Deb CV J*. 2016 Apr-Jun;12(2):122



Dhaliwal et al. *BMC Research Notes* 2012, 5:583