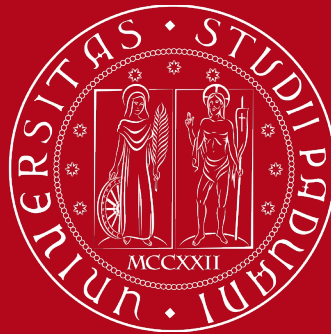




UNIVERSITÀ
DEGLI STUDI
DI PADOVA

Ruolo della RM nel paziente con cardiopatia ischemica

2019 ESC Guidelines for the diagnosis and management of chronic coronary syndromes

Resting echocardiography and CMR in the initial diagnostic management of patients with suspected CAD

A resting transthoracic echocardiogram is recommended in all patients for:

- Exclusion of alternative causes of angina;
- Identification of regional wall motion abnormalities suggestive of CAD;
- Measurement of LVEF for risk-stratification purposes;
- Evaluation of diastolic function.

I

B

Ruolo della RM cardiaca nella cardiopatia ischemica

2017 ESC Guidelines for the management of acute myocardial infarction in patients presenting with ST-segment elevation

During hospital stay (after primary PCI)

Routine echocardiography to assess resting LV and RV function, detect early post-MI mechanical complications, and exclude LV thrombus is recommended in all patients.^{296,297}

I

B

Emergency echocardiography is indicated in haemodynamically unstable patients.²⁹⁵

I

C

When echocardiography is suboptimal/inconclusive, an alternative imaging method (CMR preferably) should be considered.

IIa

C

Either stress echo, CMR, SPECT, or PET may be used to assess myocardial ischaemia and viability, including in multivessel CAD.^{1,298–300}

IIb

C

After discharge

In patients with pre-discharge LVEF $\leq 40\%$, repeat echocardiography 6–12 weeks after MI, and after complete revascularization and optimal medical therapy, is recommended to assess the potential need for primary prevention ICD implantation.^{3,296}

I

C

When echo is suboptimal or inconclusive, alternative imaging methods (CMR preferably) should be considered to assess LV function.

IIa

C



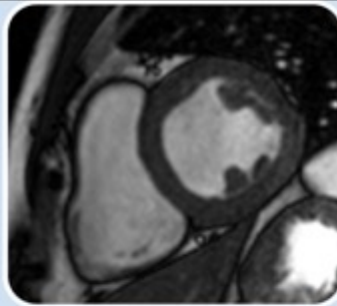
ESC

European Society
of Cardiology

European Heart Journal (2017) **00**, 1–66
doi:10.1093/eurheartj/ehx393

Infarto miocardico acuto

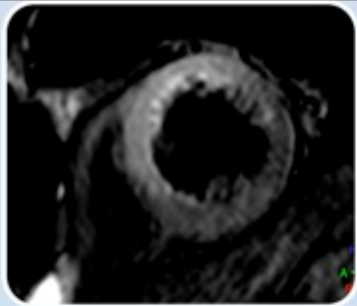
QUALI SEQUENZE UTILIZZARE NEL PAZIENTE CON IMA?



**Cine Imaging
(rest/stress)**

Contractile function

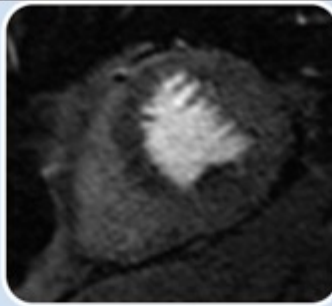
LV function/
ischemia/viability



T2-Weighted Imaging

Tissue oedema

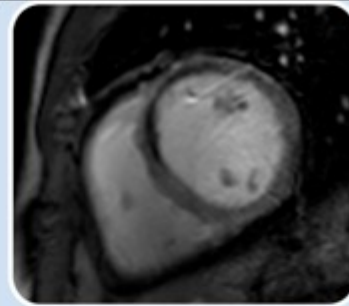
Infarct age/ area at risk



**First Pass Perfusion
(rest/stress)**

Regional myocardial blood
flow

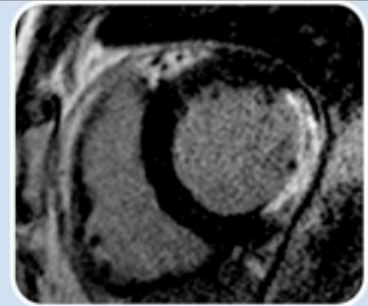
MVO/ischemia



**Early Gadolinium
Enhancement**

Microvascular integrity

No reflow/ MVO

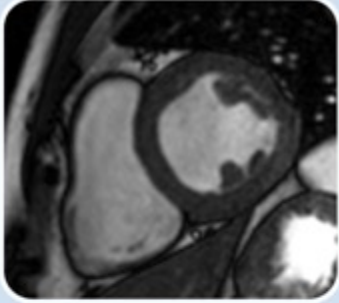
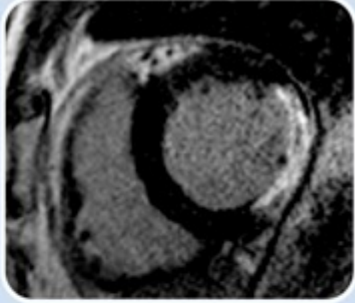


**Late Gadolinium
Enhancement**

Myocardial necrosis/fibrosis

Infarct size/viability

QUALI SEQUENZE UTILIZZARE NEL PAZIENTE CON CARDIOPATIA ISCHEMICA CRONICA?

	
Cine Imaging (rest/stress)	Late Gadolinium Enhancement
Contractile function	Myocardial necrosis/fibrosis
LV function/ ischemia/viability	Infarct size/viability

Infarto miocardico acuto

Technique & Sequences	Pathophysiological point of View	MRI analysis
Rest Cine Imaging: multislice SSFP cine short axisview (Slice thickness 6-10 mm, gap 0-4 mm; spatial resolution: 1-2 mm x 1-2mm in plane, temporal resolution: < 45 ms)	Contractile function; morfological assessment	Global evaluation: LV & RV volumes, mass, stroke volumes, ejection fraction; Regional evaluation: wall thickness, wall motion score index
T2-weighted spin.echo images: short axis view (Slice thickness 8-10 mm)	Hyperenhancement: myocardium at risk; Hypoenhancement core: Myocardial hemorrhage	Age of infarction; Area of myocardium At Risk (AAR, %); Presence, area of myocardial hemorrhage (%)
Rest First Pass Perfusion (3 short axis)	Myocardial blood flow	Positive first pass in chronic infarction (see thickness) Microvascular obstruction (presence, segment location; size)
Early gadolinium enhancement (2 min post-contrast T1-weighted IR GRE)	Microvascular function	Thrombus detection Microvascular damage (presence and area)
Late gadolinium enhancement (LGE) 10-15 min post-contrast T1-weighted IR GRE slice thickness 5-8 mm, gap 0-4 mm; spatial resolution: 1.4-1.8x1.4-1.8 mm ²	Myocardial necrosis; persistent microvascular damage	Infarct size: presence, transmuralità; size (gr, %) Myocardium salvaged: area at risk minus LGE Persistent microvascular damage: presence, n° segments; area (%).

Ruolo della RM cardiaca nel paziente con SCA

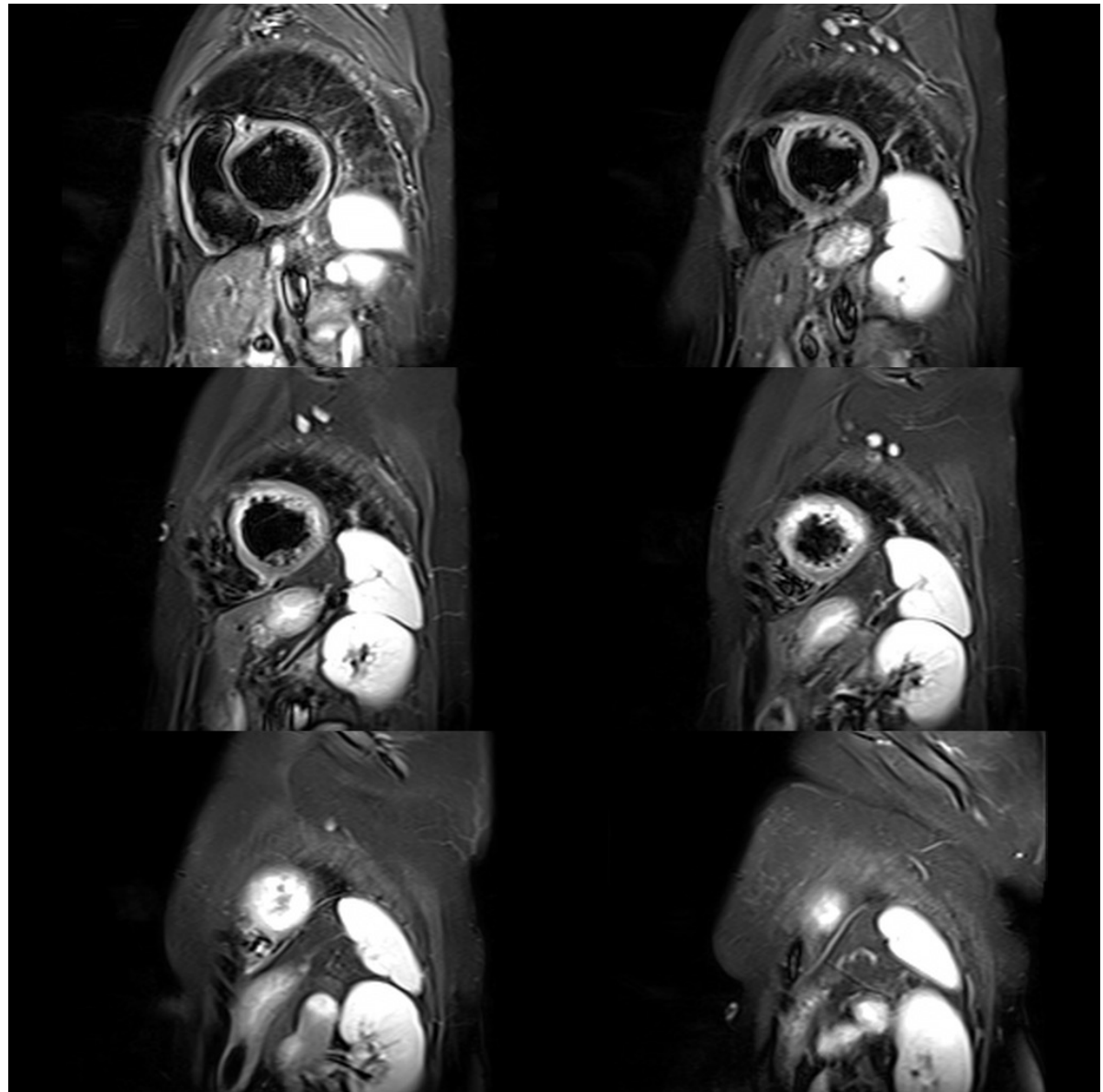
- area a rischio
- necrosi
- miocardio salvato
- no-reflow
- vitalità
- rimodellamento post-infartuale
- complicanze post-infartuali
- stratificazione prognostica
- diagnosi differenziale

- **area a rischio**
- necrosi
- miocardio salvato
- no-reflow
- vitalità
- rimodellamento post-infartuale
- complicanze post-infartuali
- stratificazione prognostica
- diagnosi differenziale

Valutazione della quota di edema



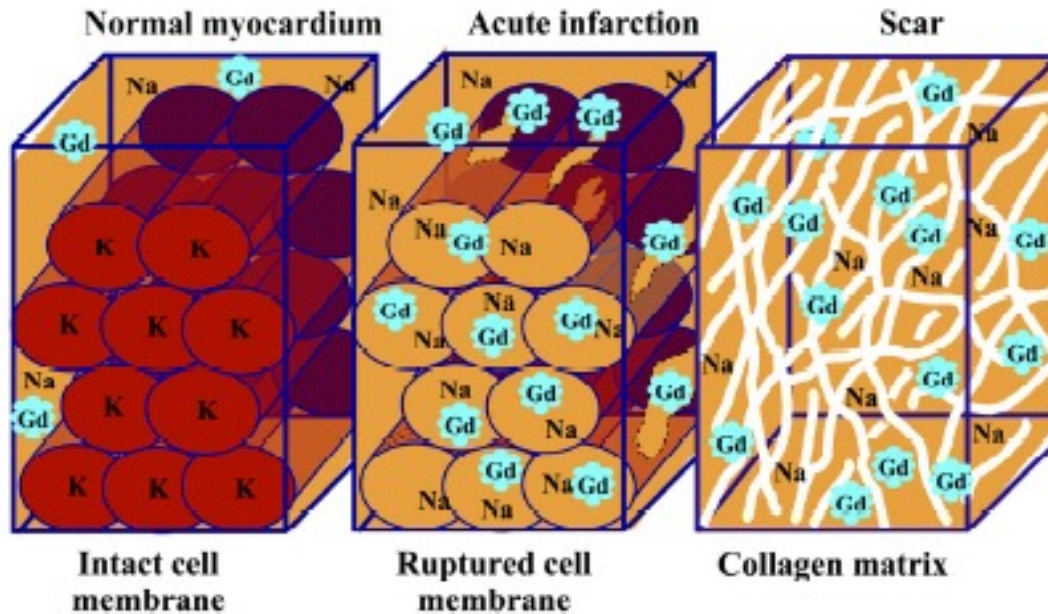
rappresenta la
quantità di miocardio
«*a rischio*» di
diventare fibrosi



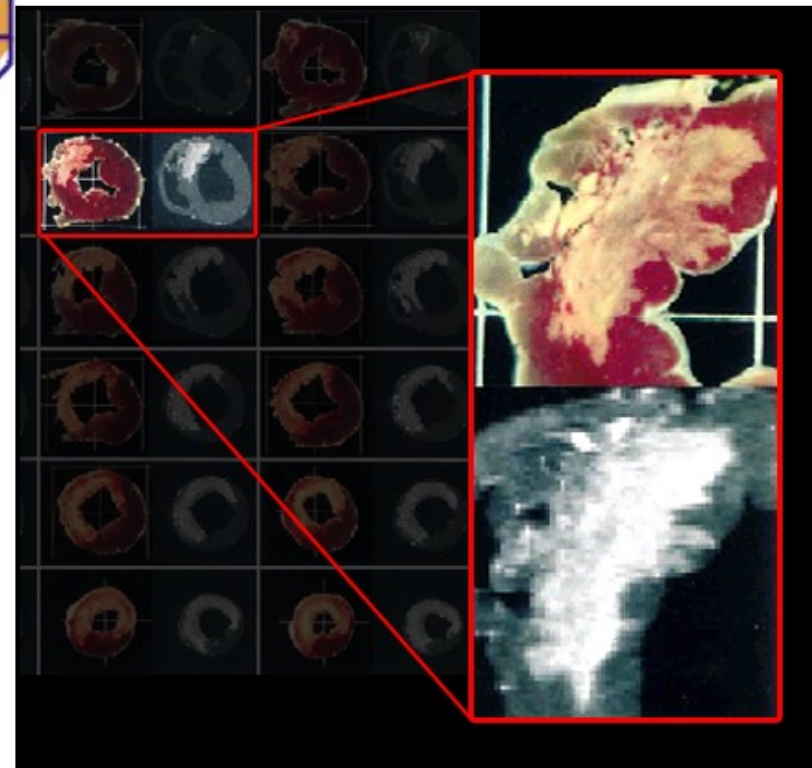
Ruolo della RM cardiaca nel paziente con SCA

- area a rischio
- **necrosi**
- miocardio salvato
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- complicanze post-infartuali
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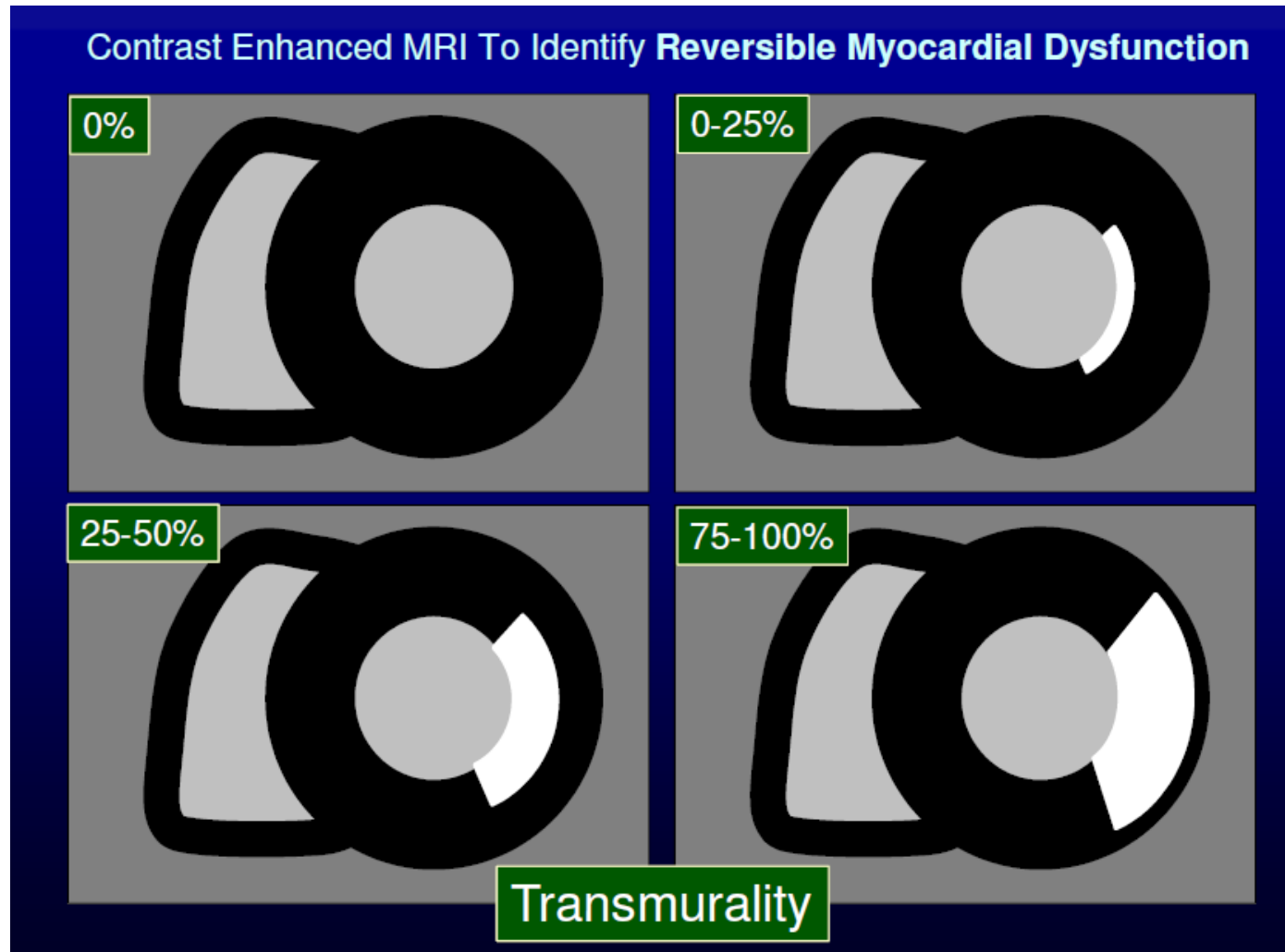
Necrosi



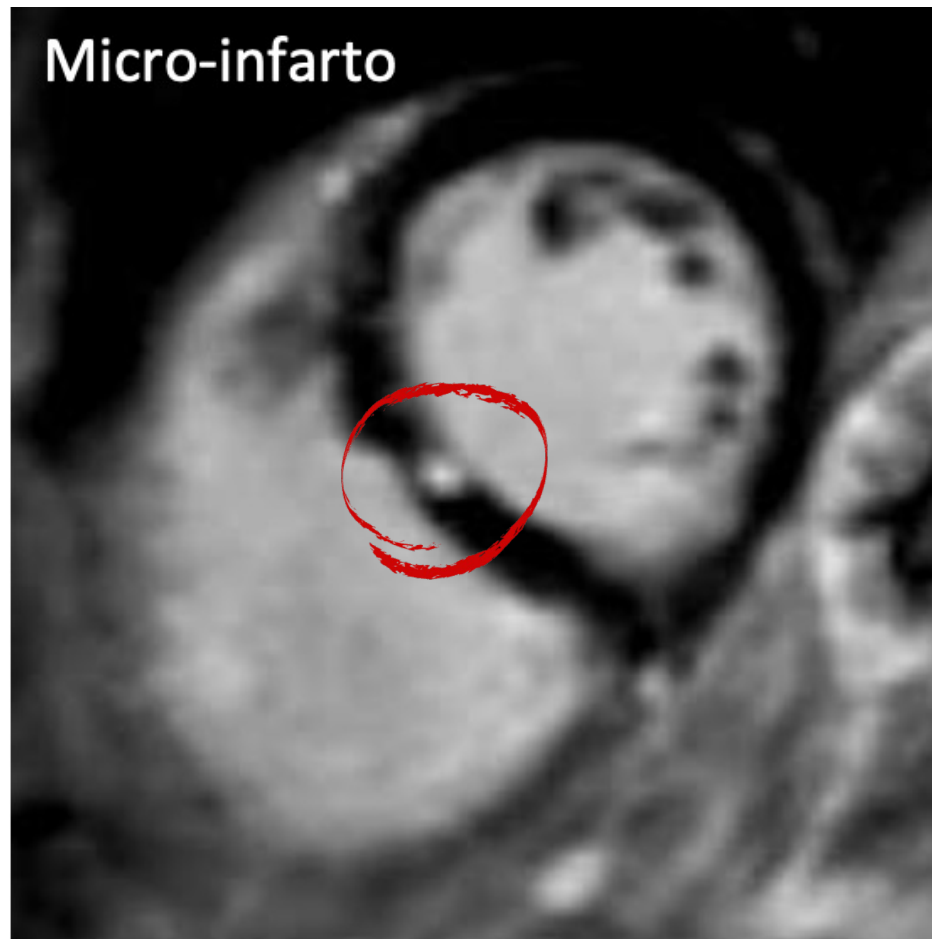
Si valuta la presenza di LGE nel contesto del miocardio.



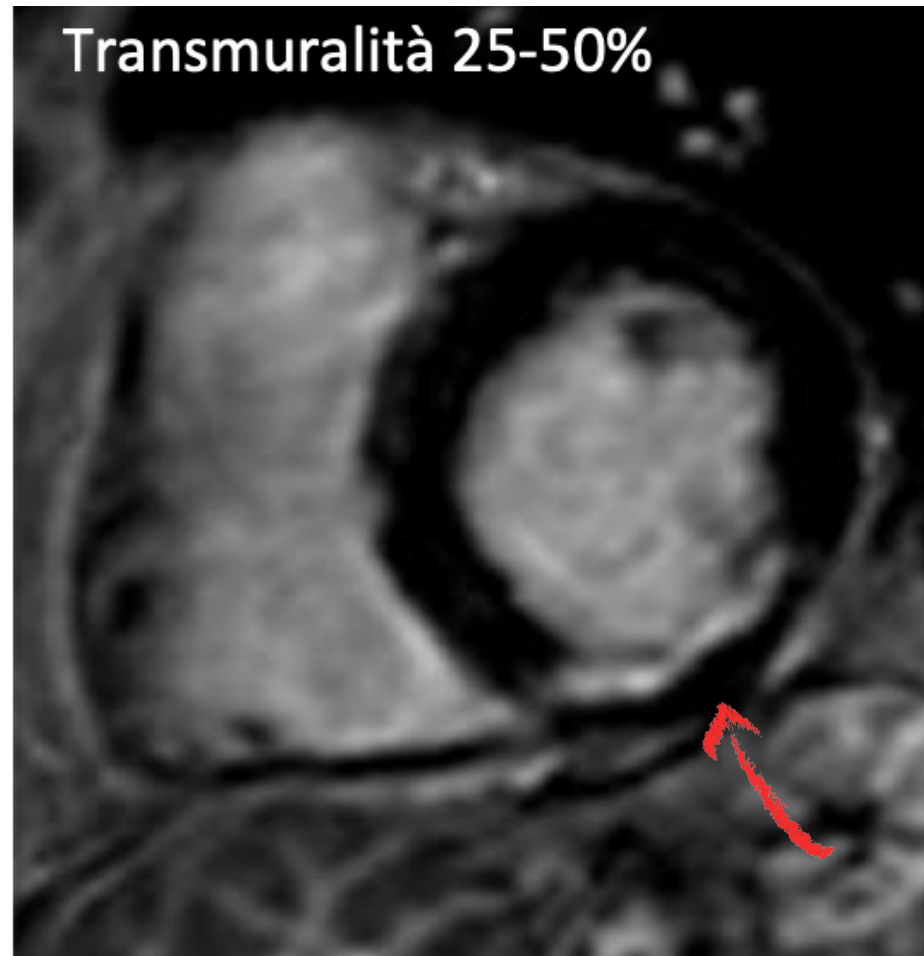
C'è correlazione tra la fibrosi identificata con RM cardiaca e la cicatrice autoptica.



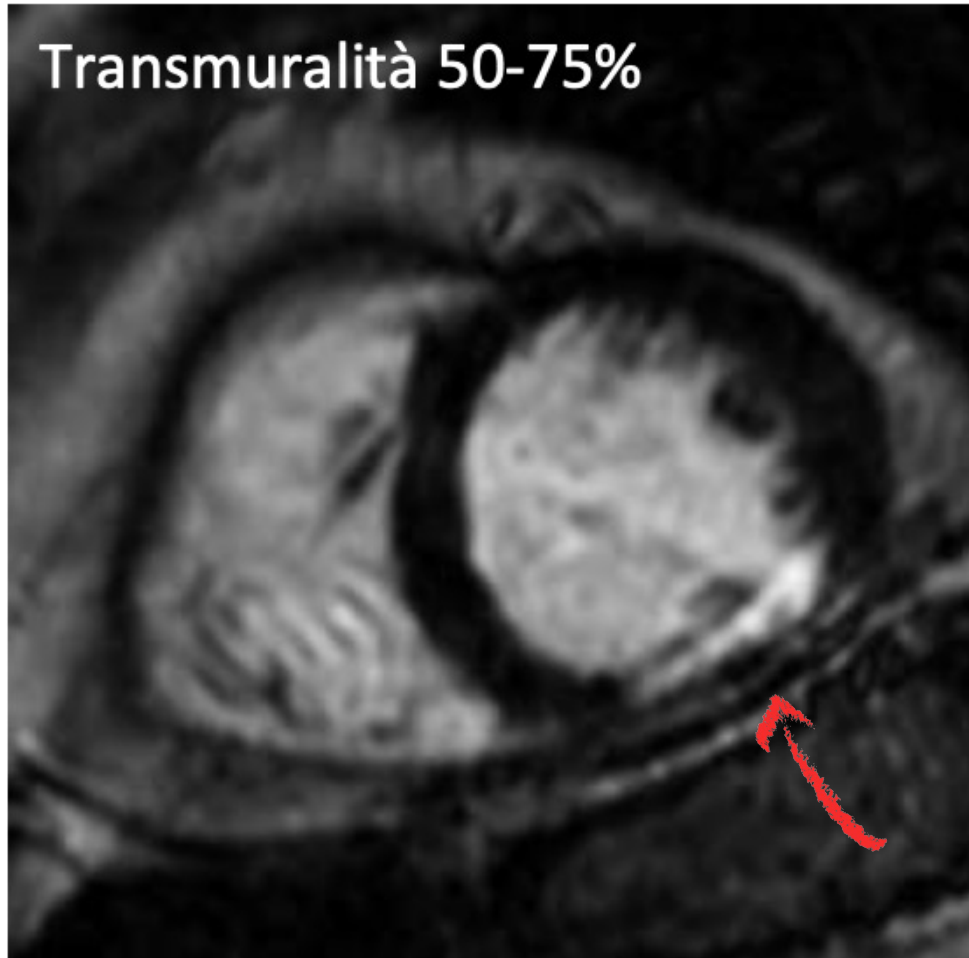
In base all'estensione di LGE si può stimare la reversibilità della disfunzione miocardica.

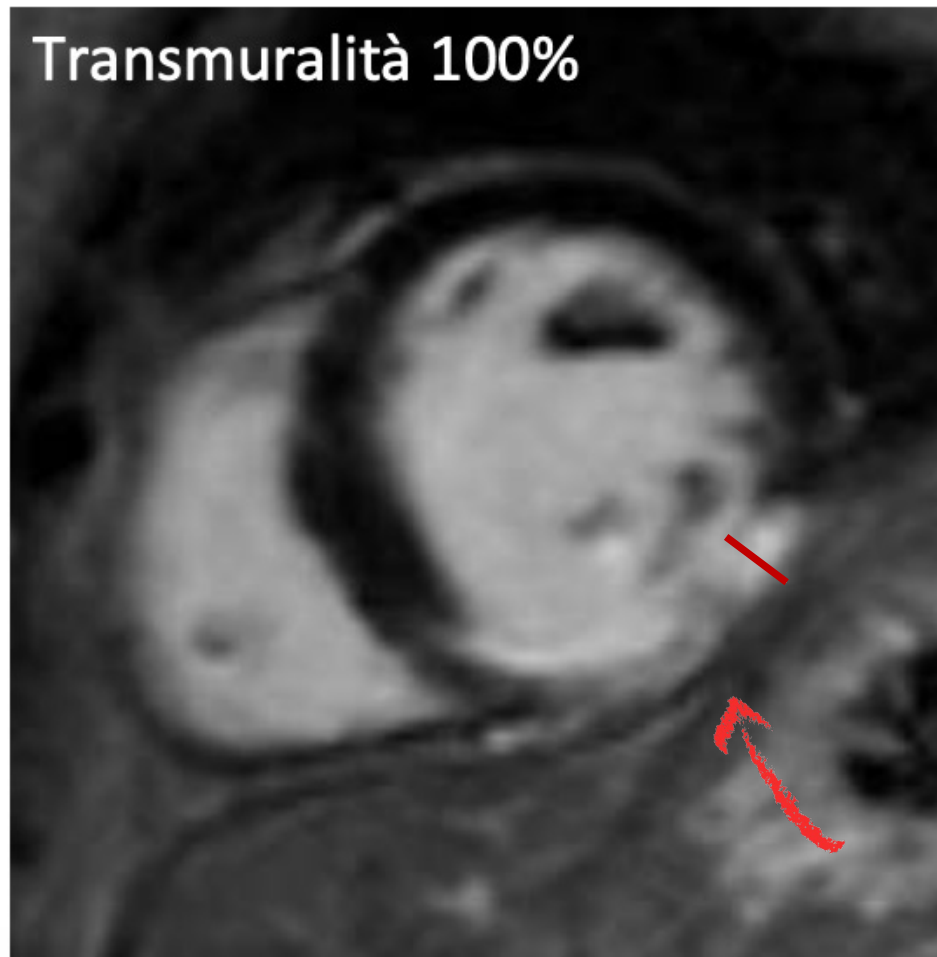


In base all'estensione di LGE si può stimare la reversibilità della disfunzione miocardica.

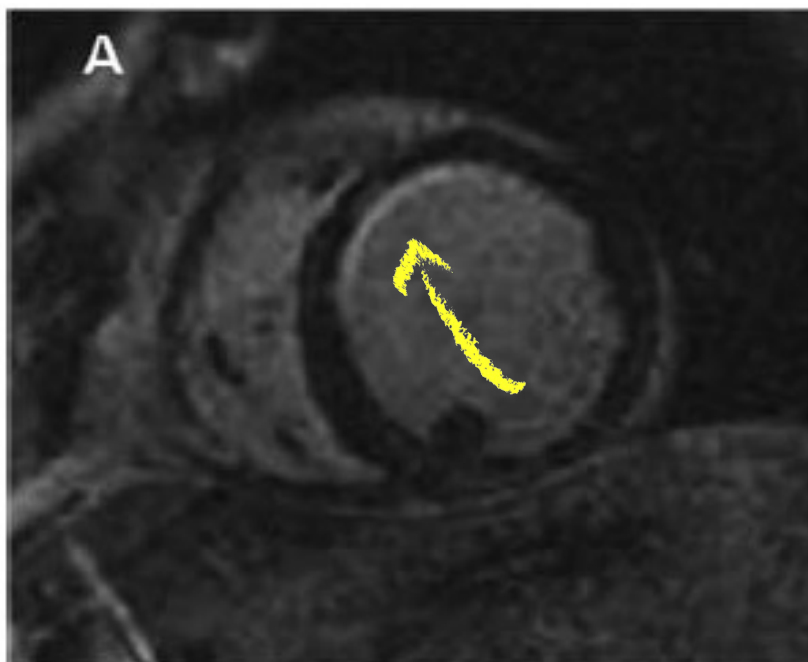


Transmuralità 50-75%

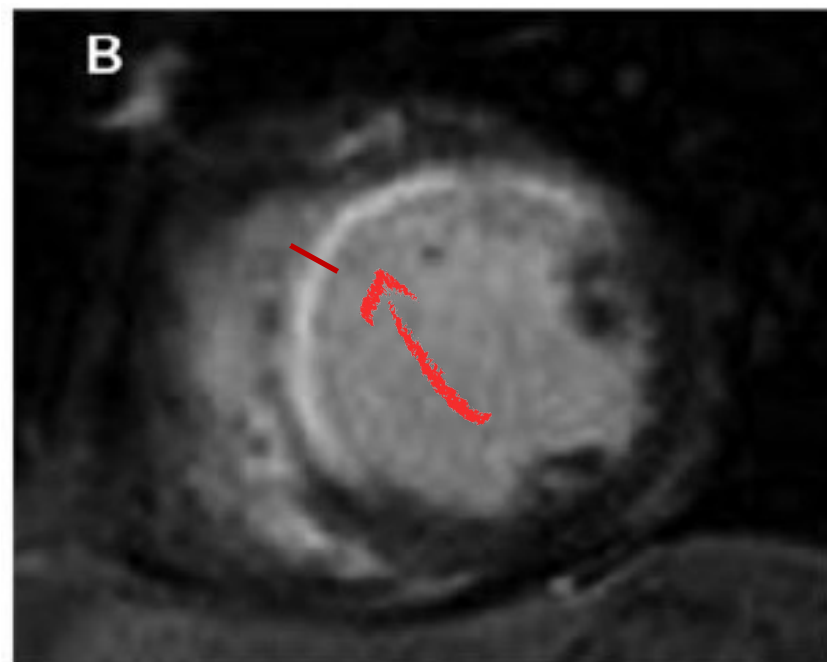




MRI in acute myocardial infarction



IMA non transmurale evidenziato dalla presenza di LGE per il 25 % dell'intero spessore del setto e parete anteriore basale.

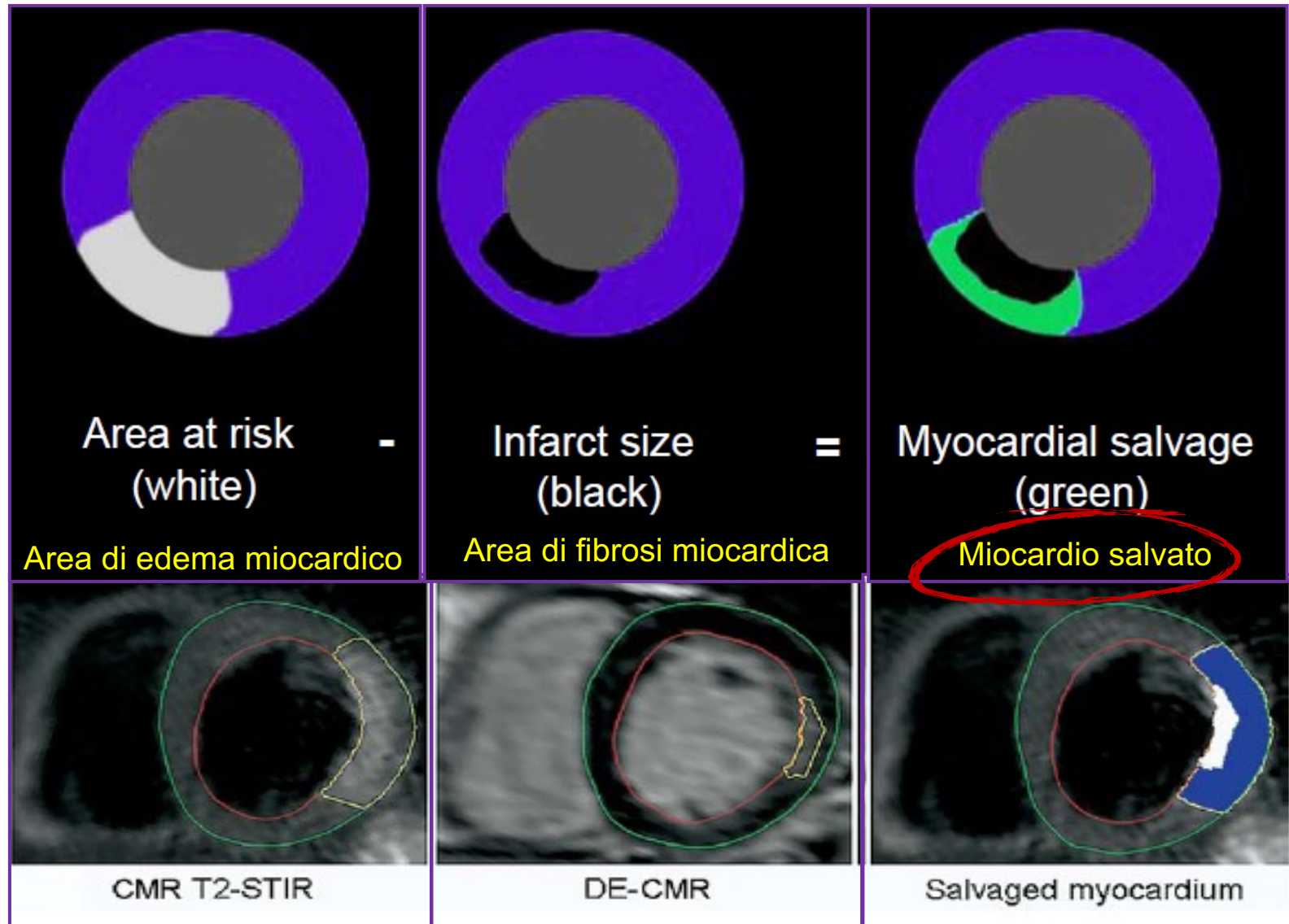


IMA transmurale (100%) del setto e della parete anteriore basale.

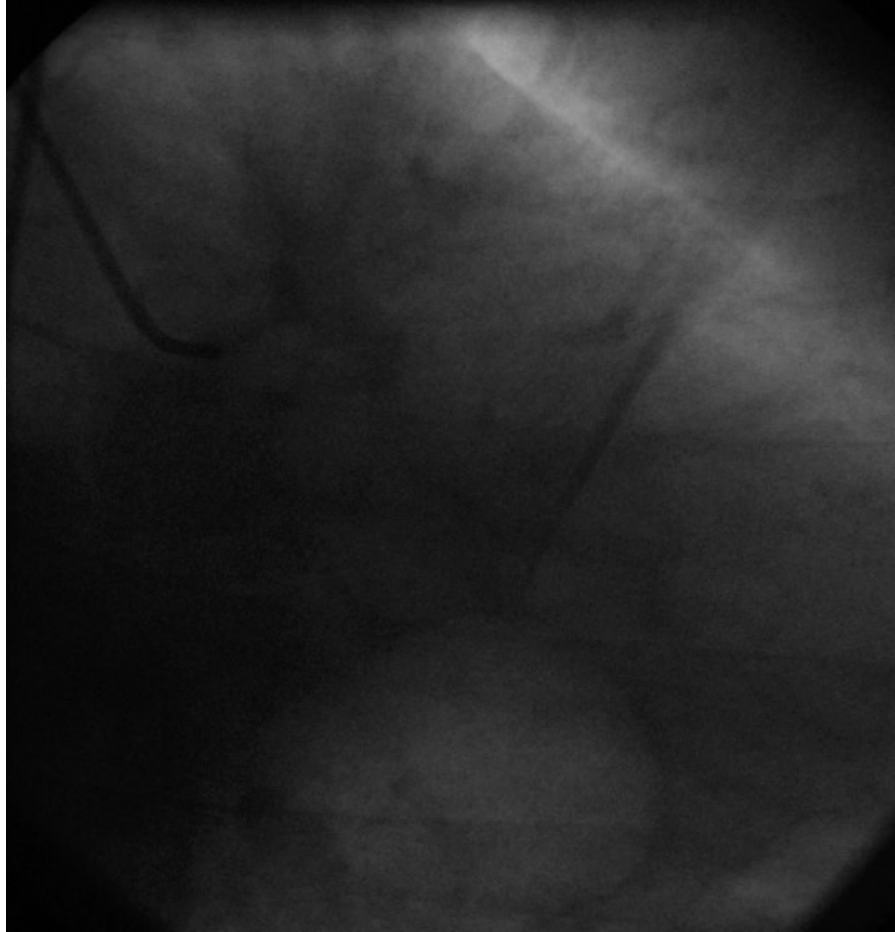
Ruolo della RM cardiaca nel paziente con SCA

- area a rischio
- necrosi
- **miocardio salvato**
- no-reflow
- vitalità
- rimodellamento post-infartuale
- complicanze post-infartuali
- stratificazione prognostica
- diagnosi differenziale

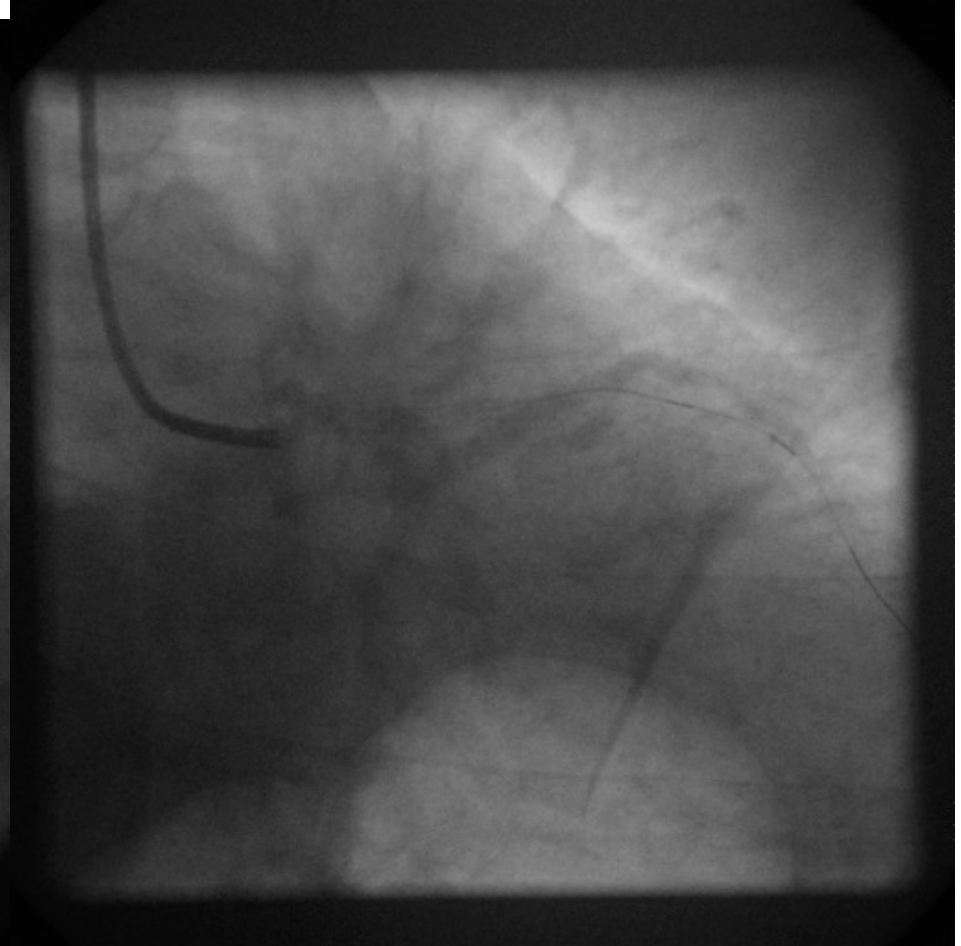
Miocardio salvato



M.A., ♂, 71 anni.
Pregresso IMA inferiore.
Angina instabile



DA: stenosi critica (90%) lunga l tratto.

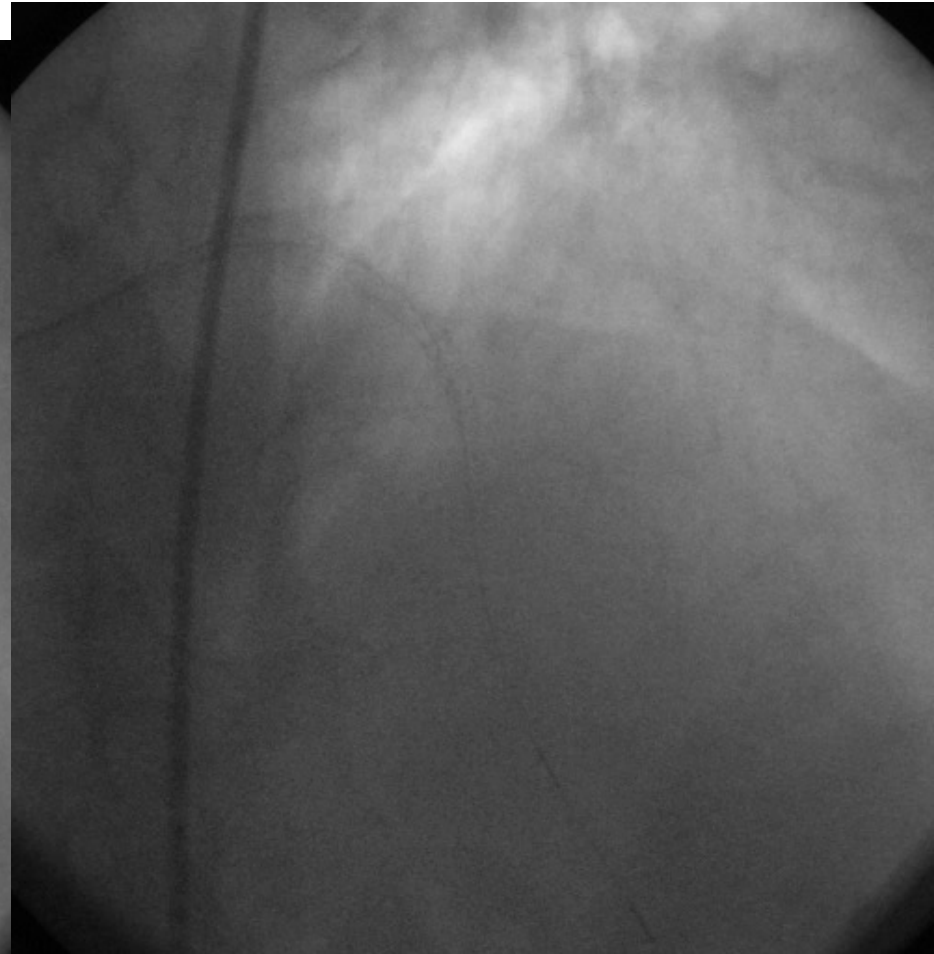
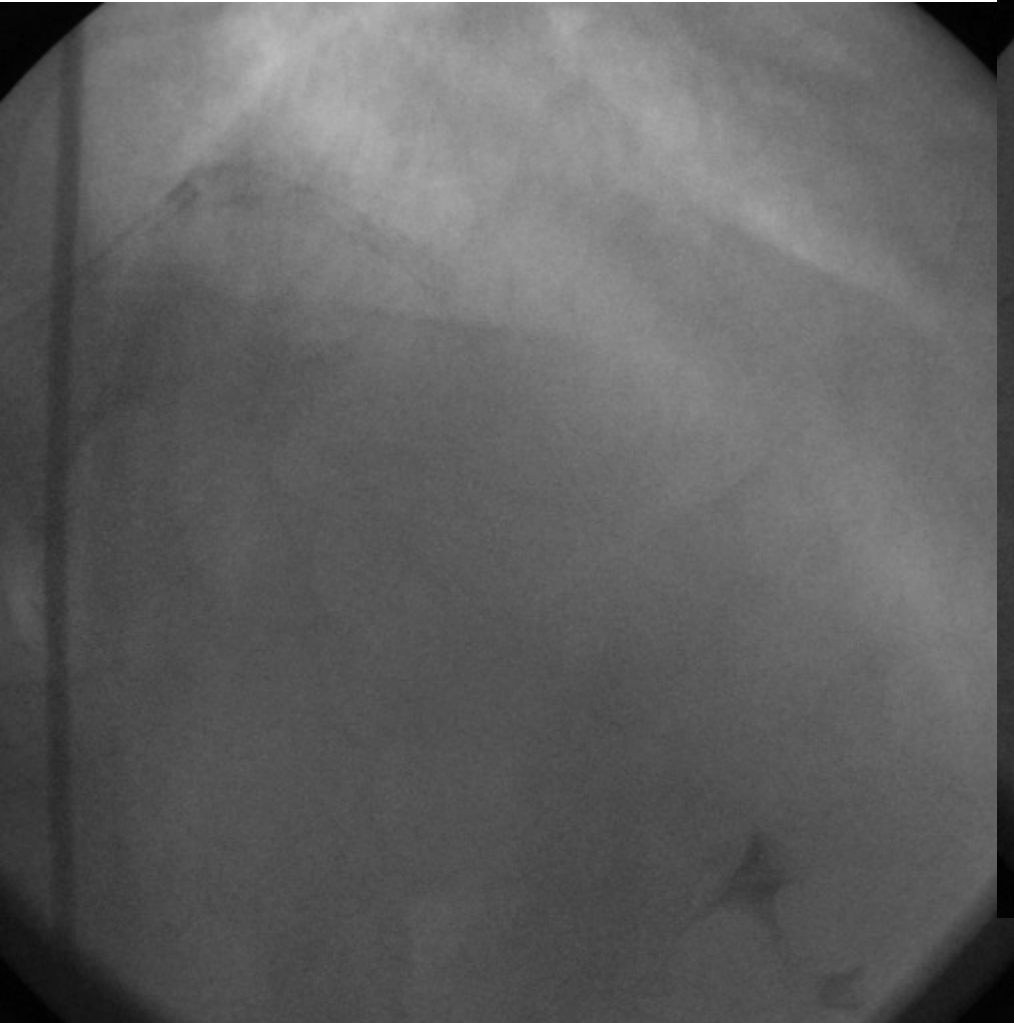


PTCA e stenting DA l tratto

IMA abortito

Occlusione trombotica acuta intrastent:
durata 30 minuti

Eseguito PTCA intrastent e stenting a
valle del I tratto (TIMI 3, MBG 3)

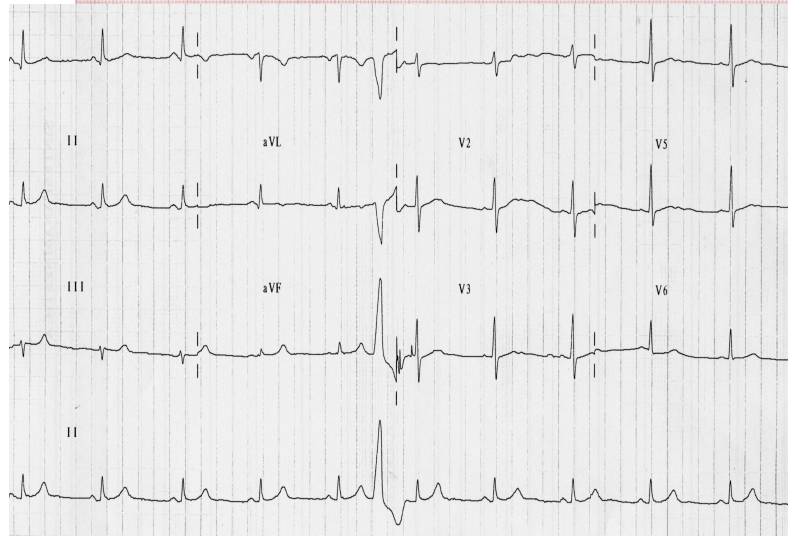
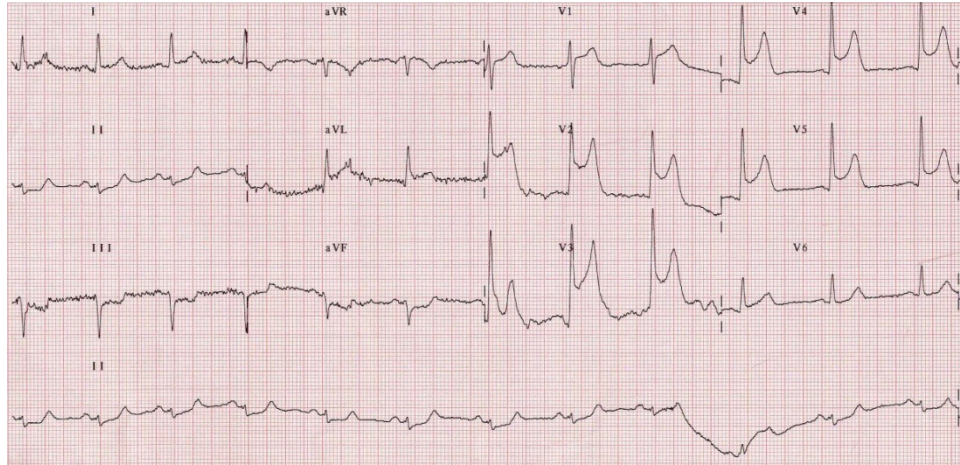


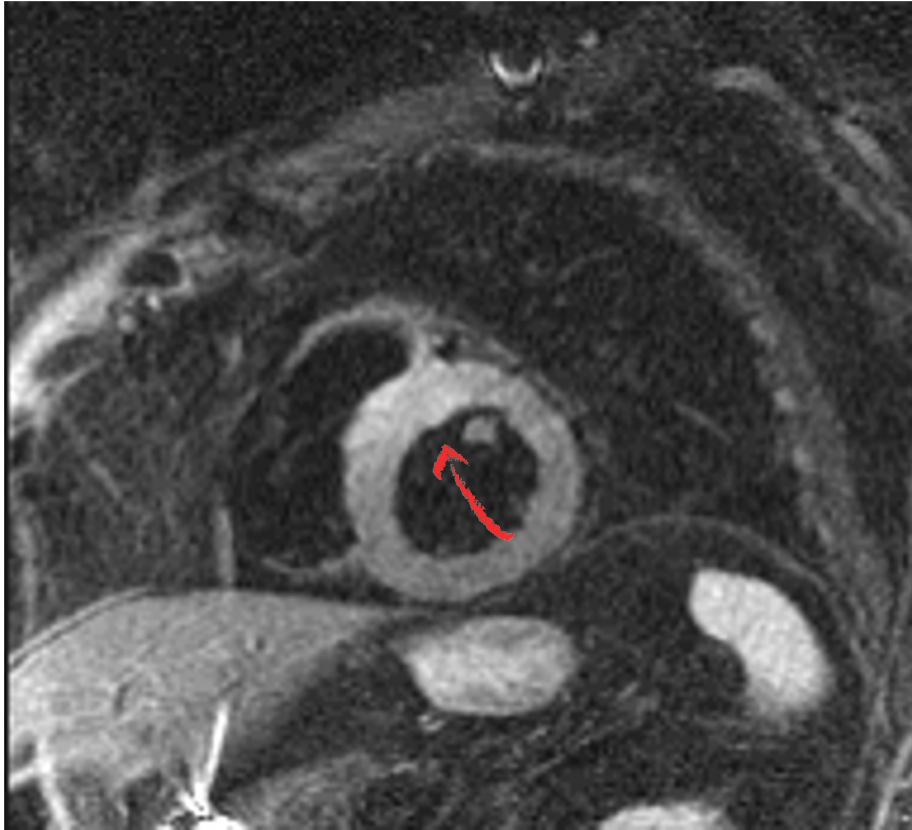
Occlusione acuta
intrastent

30'



Post PTCA intrastent

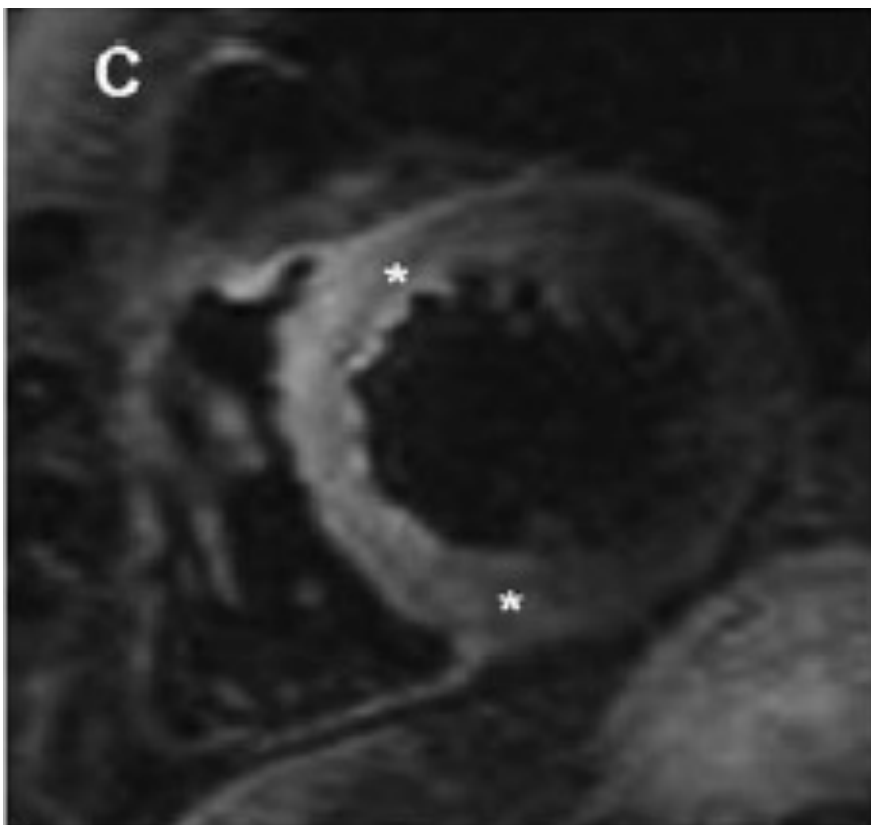




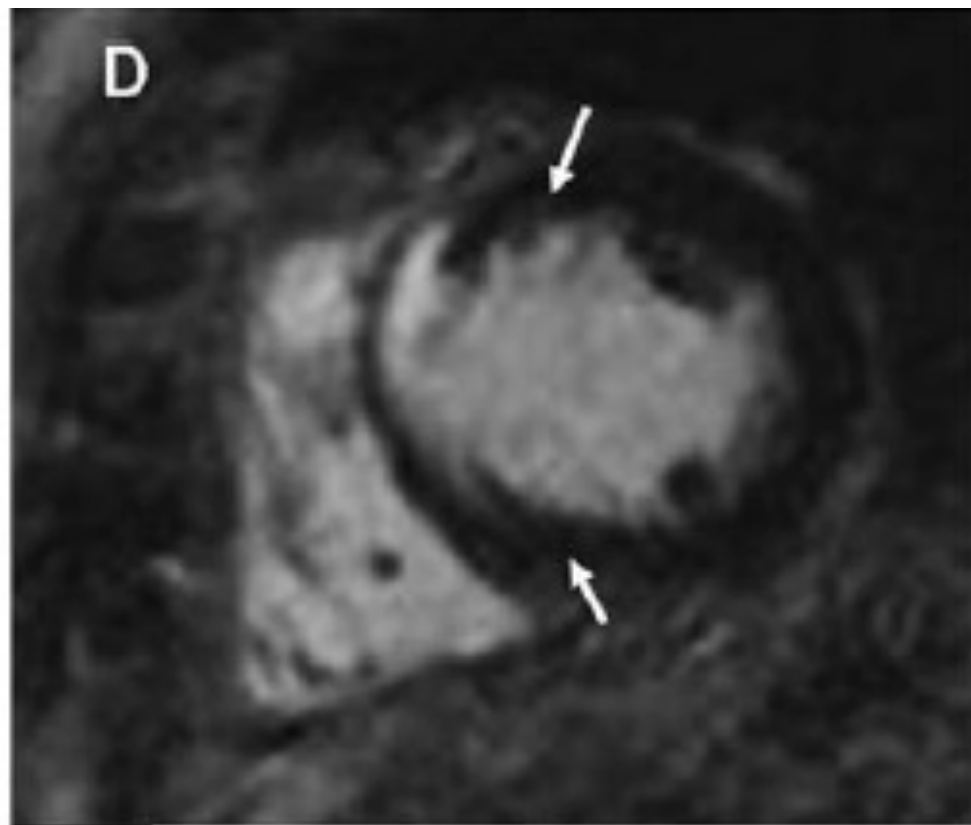
Sequenza per edema



Sequenza post-contrastografica



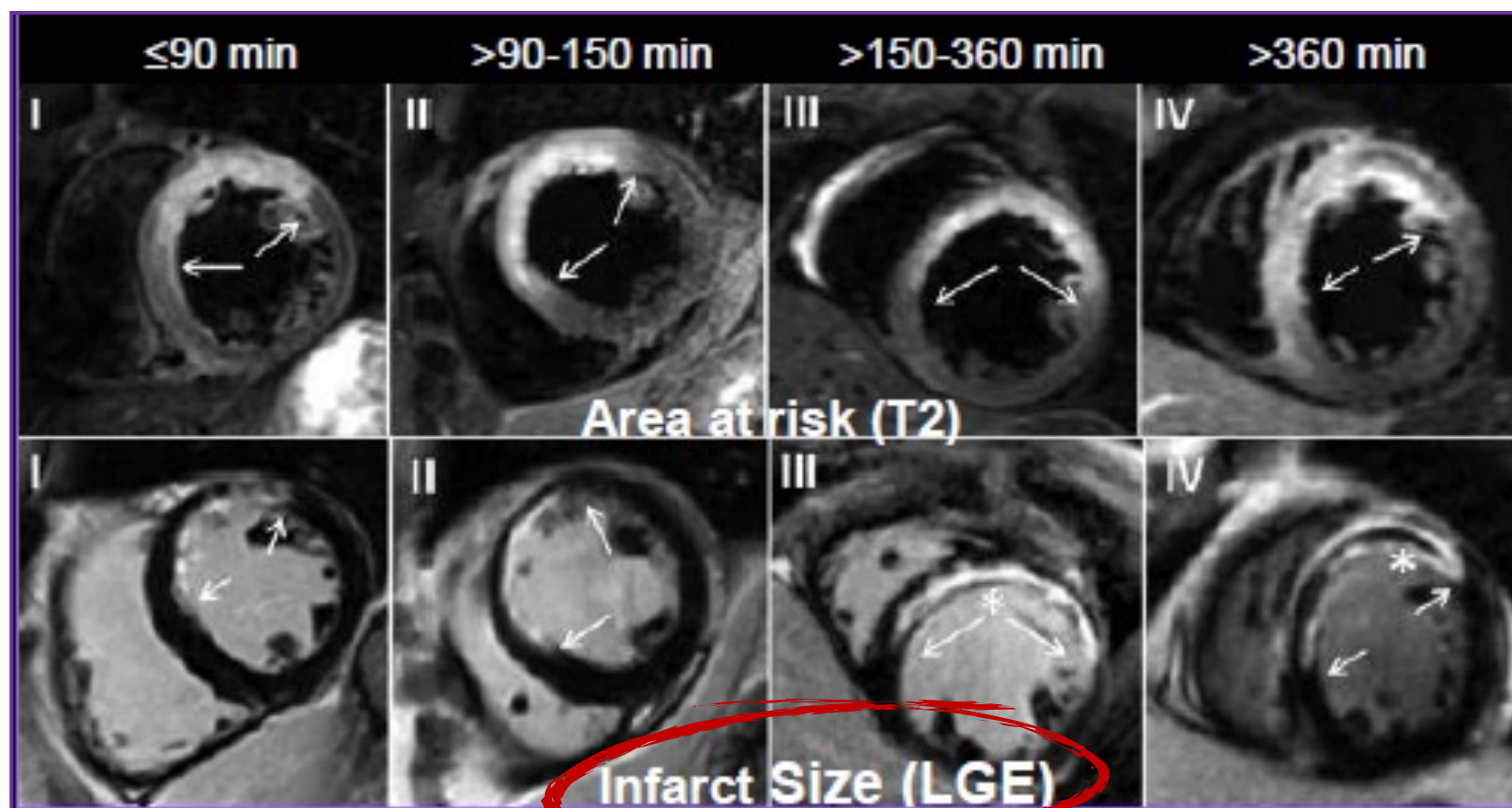
Sequenza per edema



Sequenza post-contrastografica

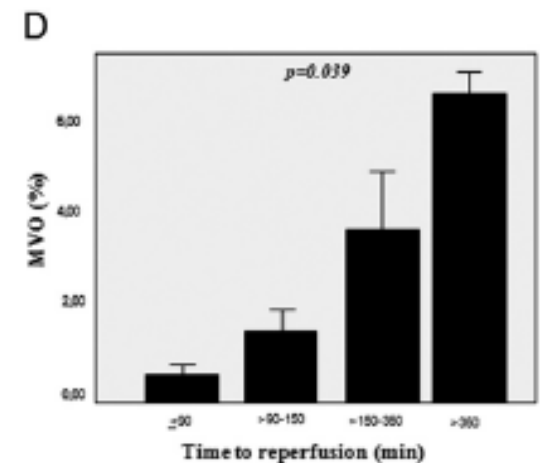
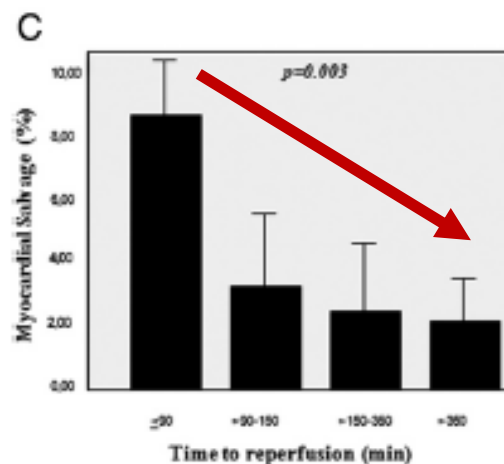
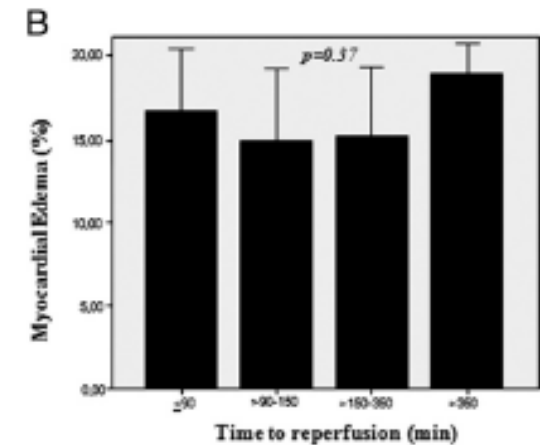
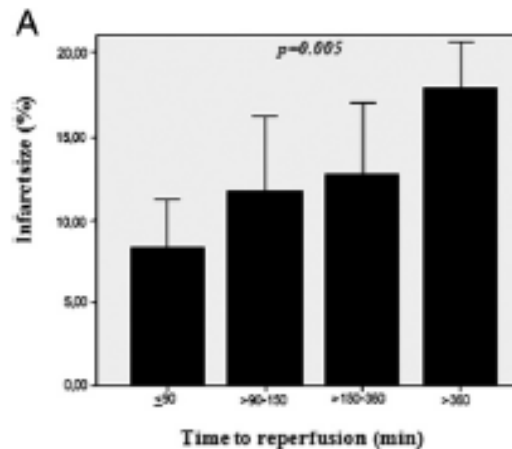
Impact of Primary Coronary Angioplasty Delay on Myocardial Salvage, Infarct Size, and Microvascular Damage in Patients With ST-Segment Elevation Myocardial Infarction

Questo studio ha arruolato 70 pts con STEMI trattati con PCI < 12 h dall'insorgenza dei sintomi.



Impact of Primary Coronary Angioplasty Delay on Myocardial Salvage, Infarct Size, and Microvascular Damage in Patients With ST-Segment Elevation Myocardial Infarction

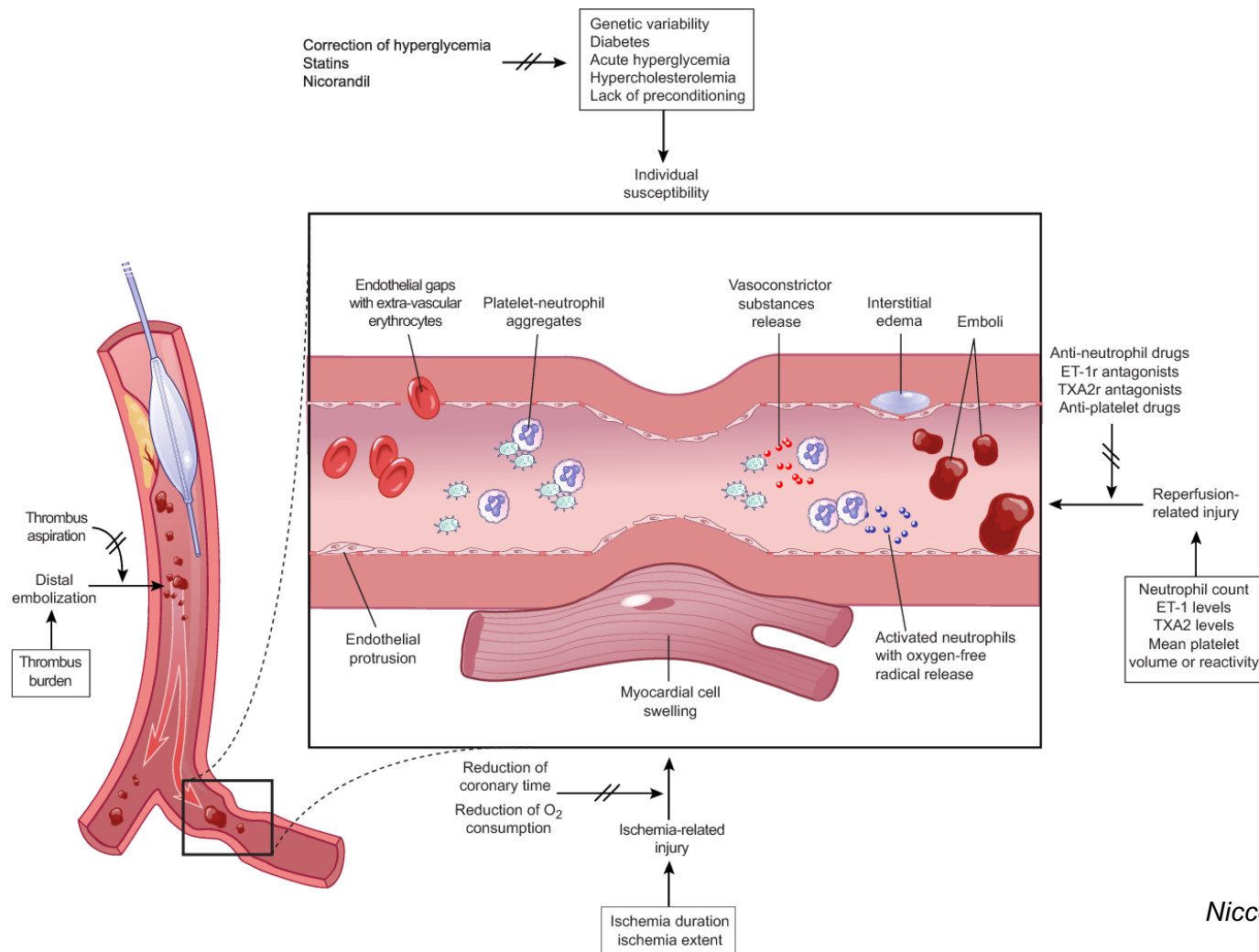
La quota di miocardio salvato si riduce significativamente quando la riperfusione viene effettuata dopo 90 minuti.



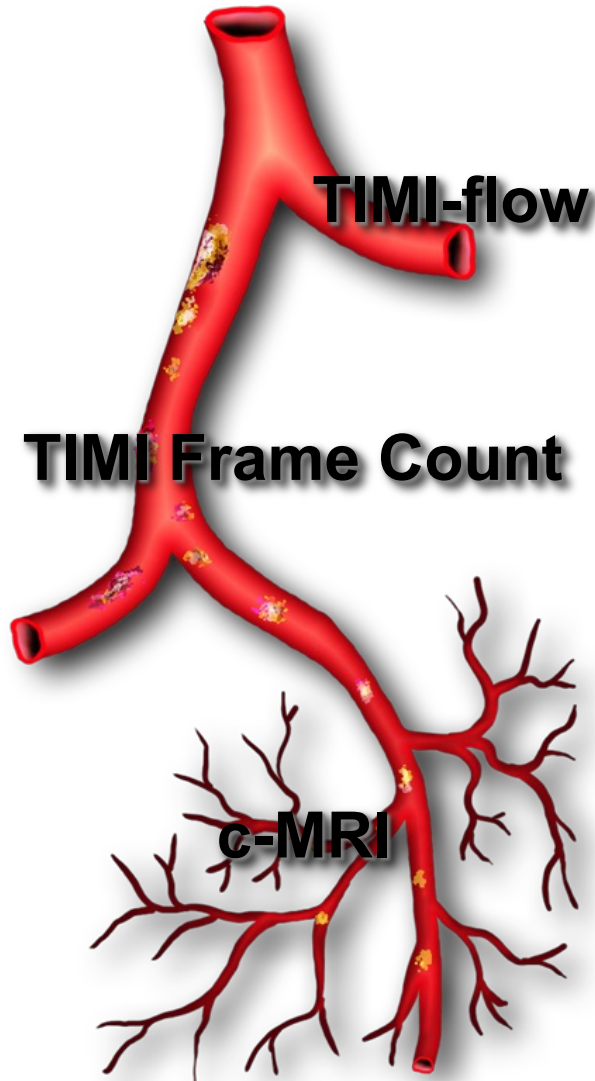
Ruolo della RM cardiaca nel paziente con SCA

- area a rischio
- necrosi
- miocardio salvato
- **no-reflow**
- vitalità
- rimodellamento post-infartuale
- complicanze post-infartuali
- stratificazione prognostica
- diagnosi differenziale

Il no-reflow corrisponde alle zone di mancata riperfusione.



Come valutarlo ?



**ST segment
elevation index**

Myocardial Blush Grade

TMPG

Myocardial Contrast Echo

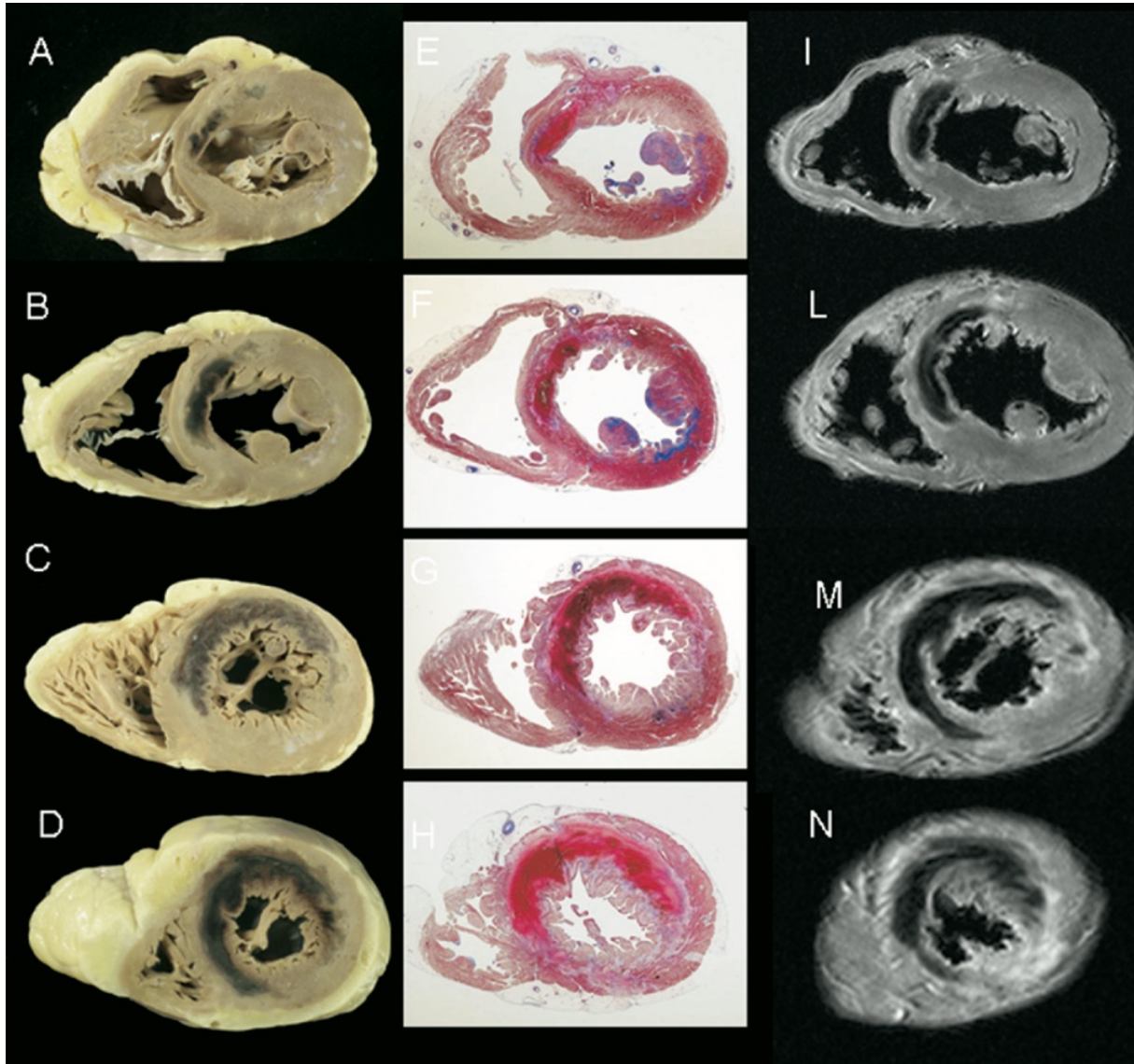
CFR

No-reflow → emorragia

Esame macroscopico

Istologia

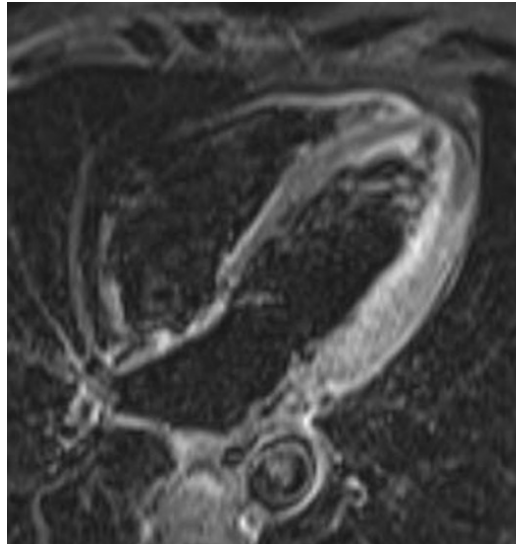
Sequenza per edema



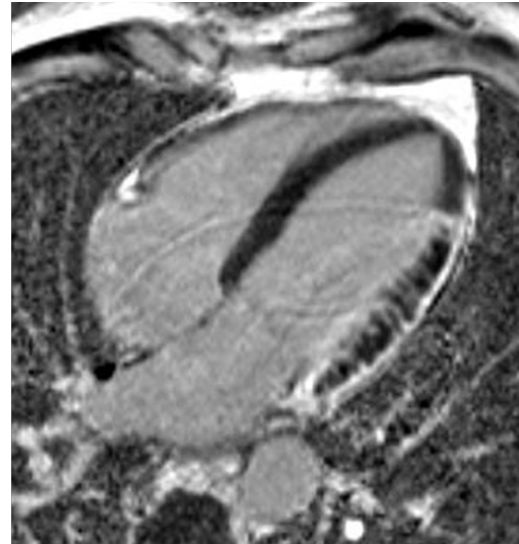
L'emorragia si evidenzia come area ipointensa nel contesto dell'area edematosa iperintensa.



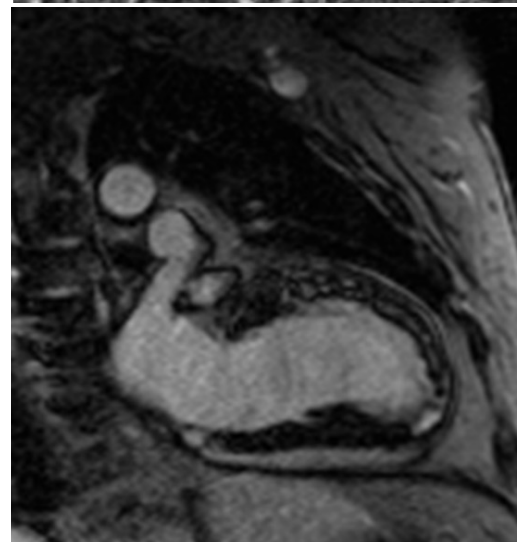
Sequenza per edema



Sequenza per LGE



MVO



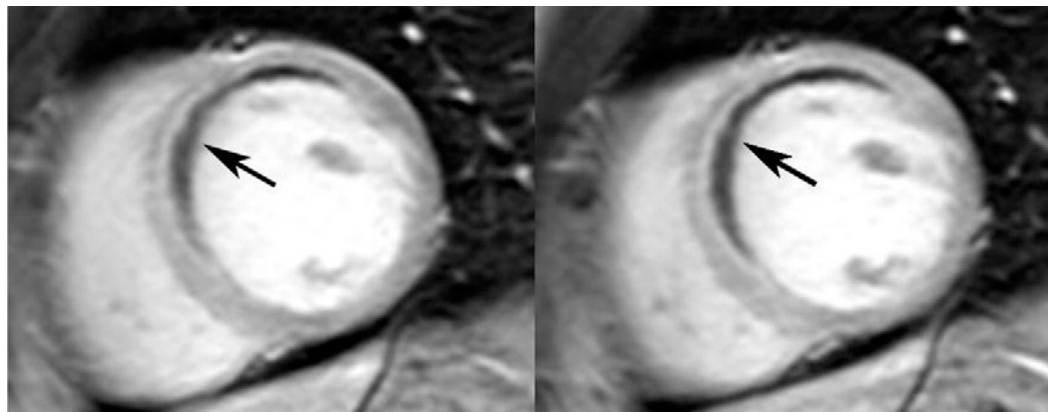
Emorragia

No-reflow

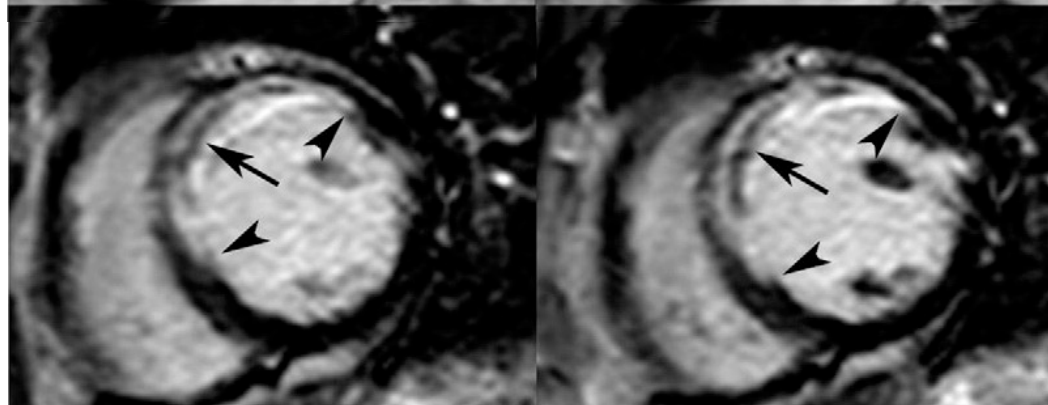


**Sopraslivellamento
persistente del
tratto ST**

Sequenza EGE

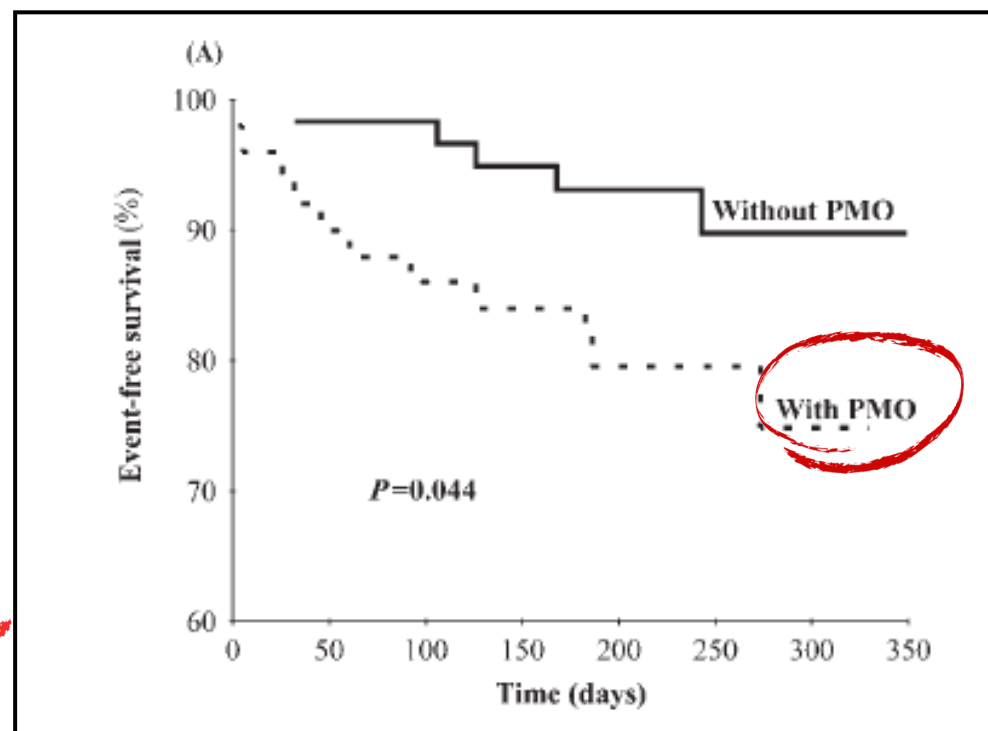


Sequenza LGE



Sequelae of acute myocardial infarction regarding cardiac structure and function and their prognostic significance as assessed by magnetic resonance imaging

No-reflow

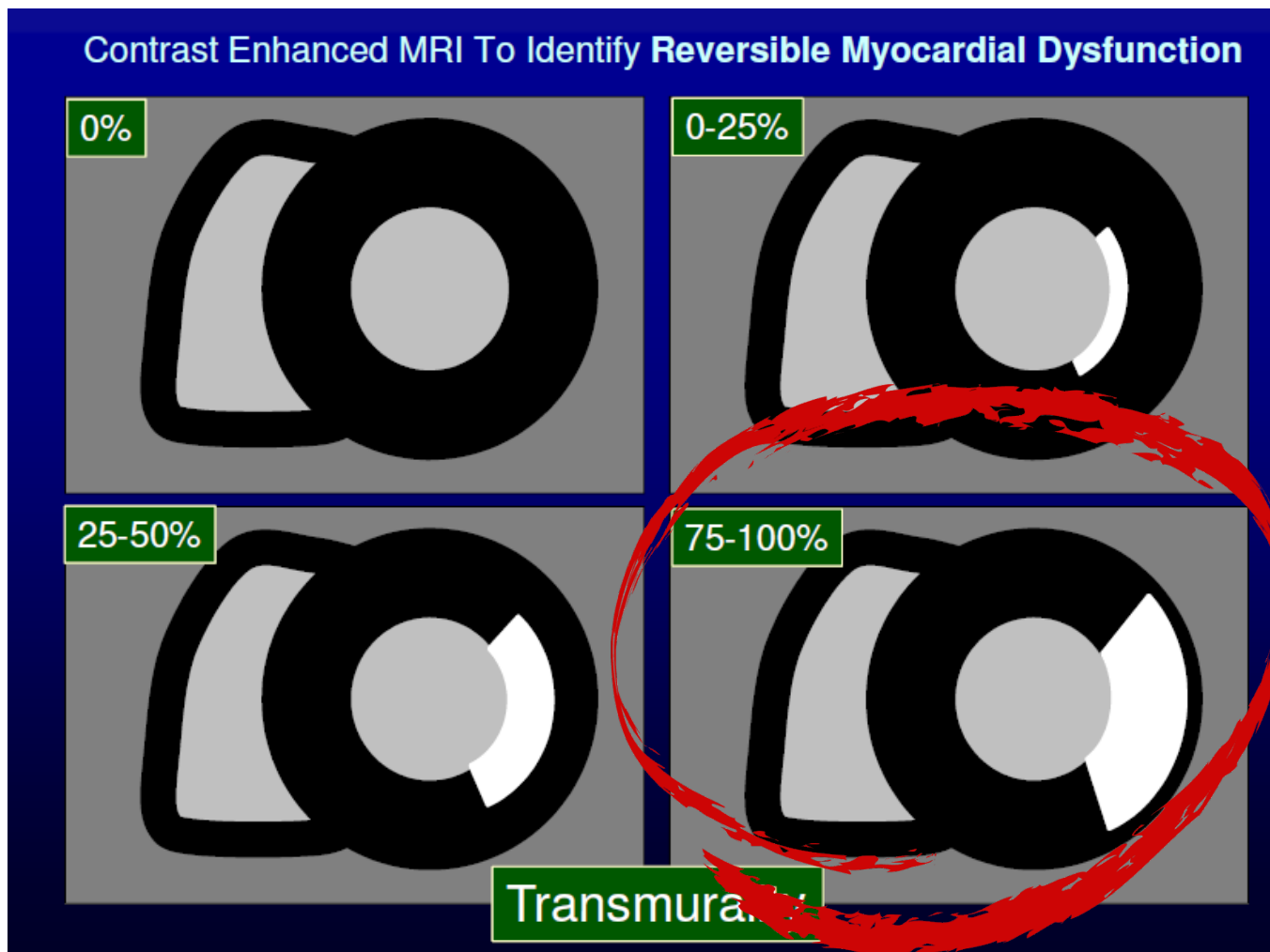


Il no-reflow è un indice prognostico negativo.

Ruolo della RM cardiaca nel paziente con SCA

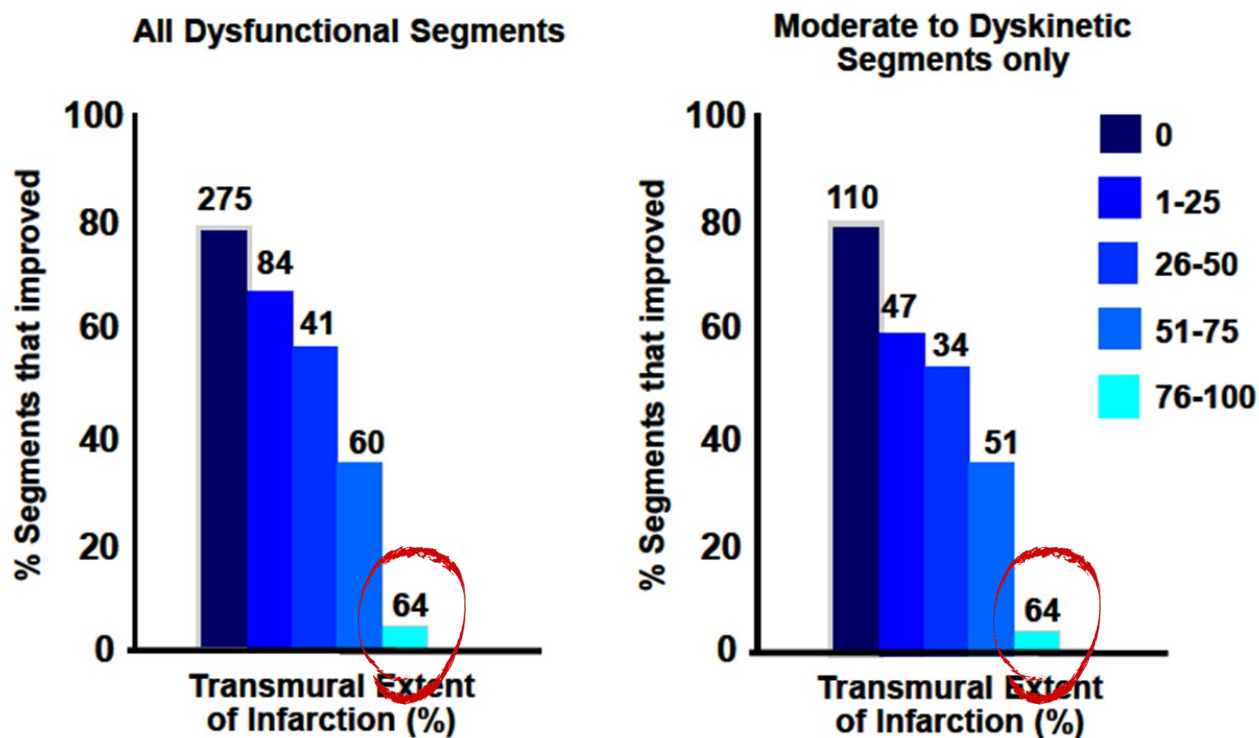
- area a rischio
- necrosi
- miocardio salvato
- no-reflow
- **vitalità**
- rimodellamento post-infartuale
- complicanze post-infartuali
- stratificazione prognostica
- diagnosi differenziale

La vitalità miocardica dipende dal grado di transmuralità della lesione.



**Miocardio
non vitale**

Scar transmuralità predicts recovery of function in patients with chronic LV dysfunction



24 patients with first acute MI (CK-MB>9ug/L)

Choi et al. Circ, 2001

Maggiore è la transmuralità della lesione → peggiore sarà il recupero

Paziente di 69 anni, iperteso e fumatore con storia di cardiopatia ischemica cronica.

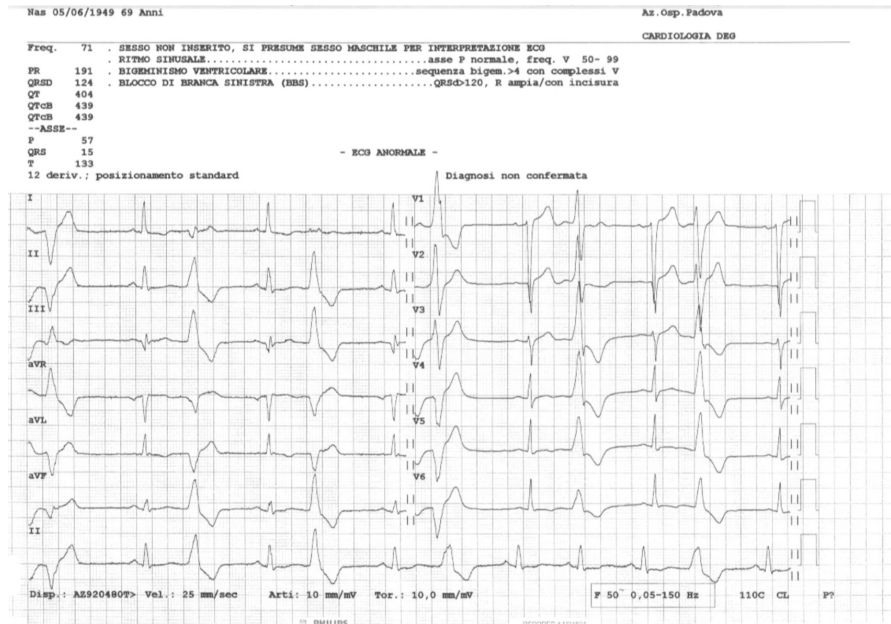
Nel 2004 → studio coronarografico che mostra una coronaropatia subcritica trivasale con indicazione a terapia medica.

Ecocardiogramma: lieve disfunzione ventricolare sinistra (FE 46%) in presenza di ipo-acinesia delle pareti inferiore ed infero-laterale.



Il paziente eseguiva visite cardiologiche periodiche, l'ultima delle quali evidenziava un peggioramento della disfunzione ventricolare sinistra (FE 38%) in presenza di sporadici episodi di dolore toracico e cardiopalmo.

Il paziente viene pertanto ricoverato nel reparto di Cardiologia.



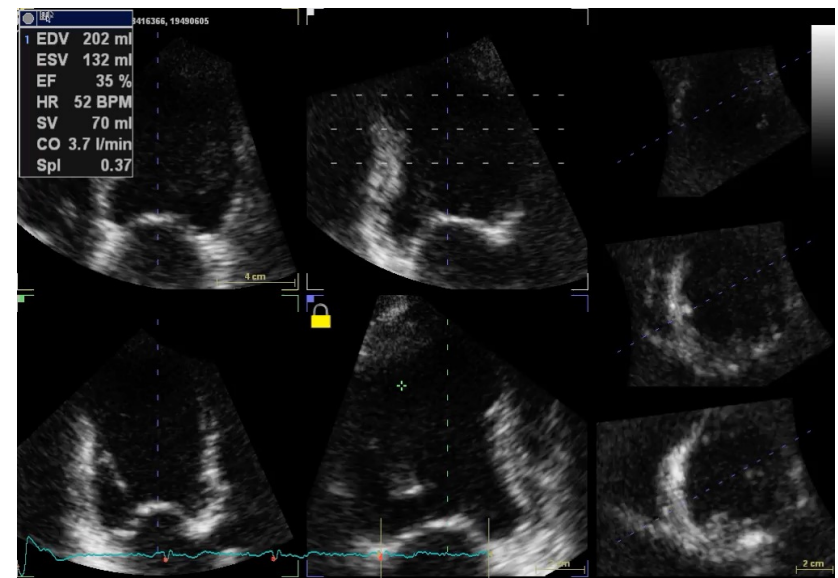
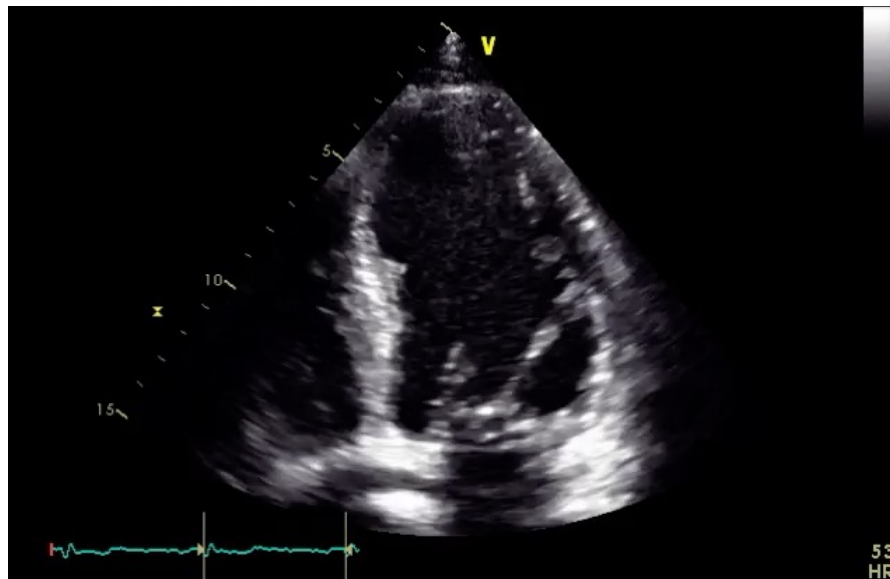
ECG → ritmo sinusale con FC di 71 bpm, interrotto da extrasistoli ventricolari, talvolta ordinate in cadenza bigemina.

Il paziente ripete coronarografia che documenta coronaropatia critica trivasale. Occlusione cronica di CDx al 1° tratto, occlusione funzione di DA e Cx.

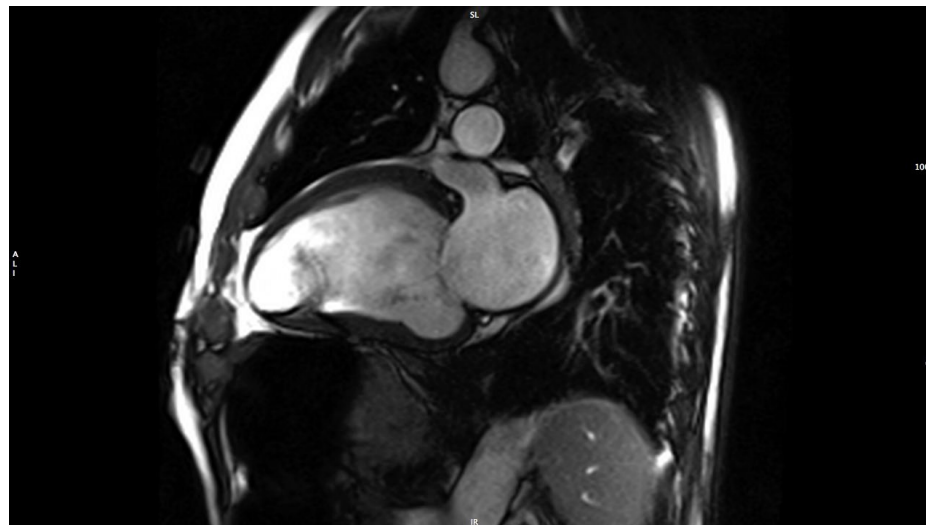
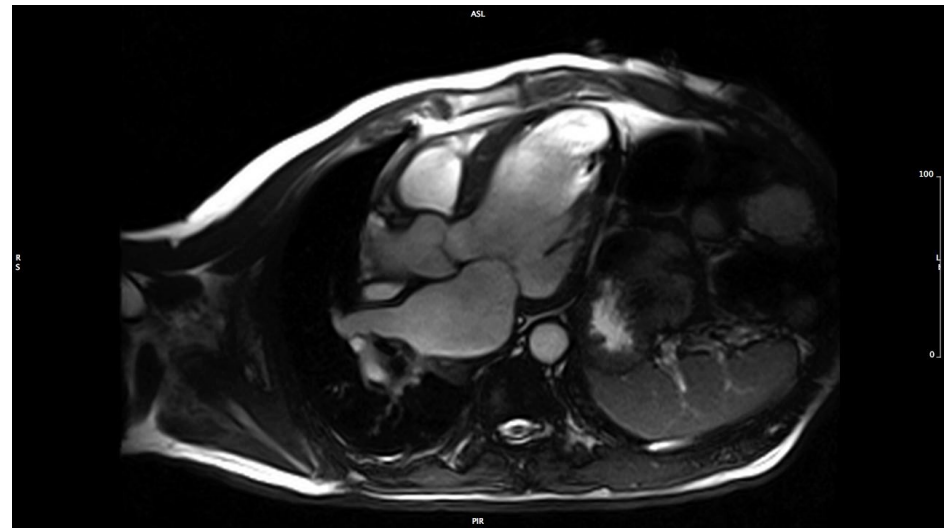
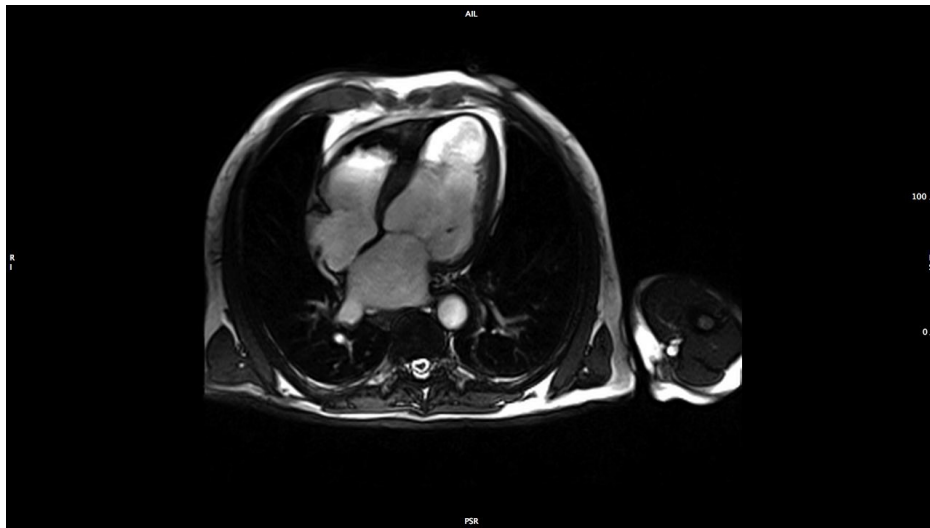
Cosa rivascolarizziamo?



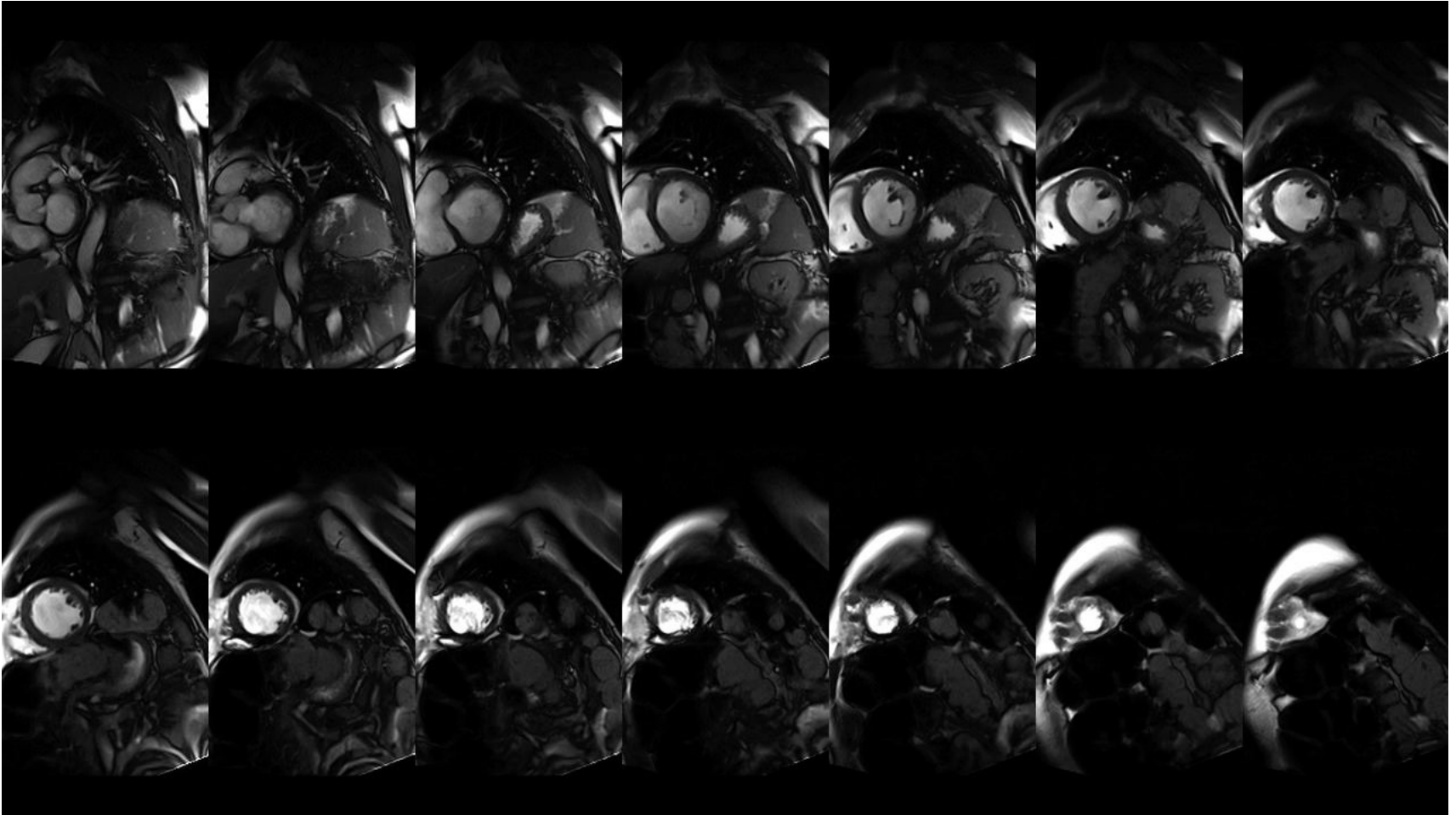
Ecocardiogramma 2D



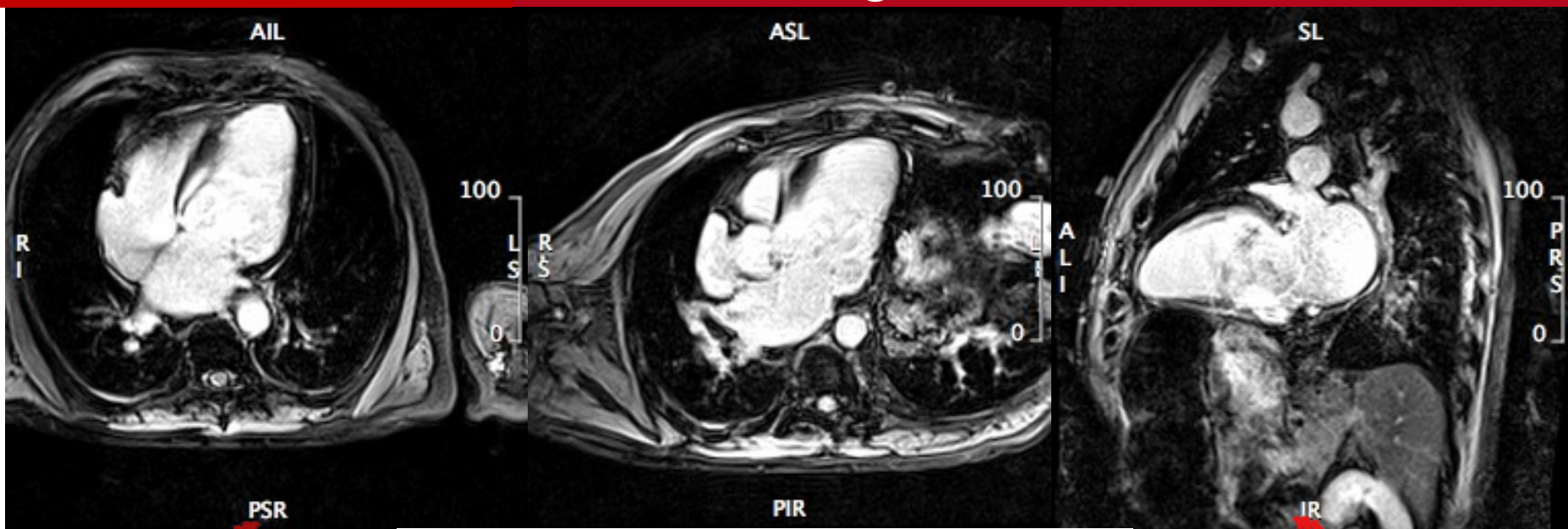
RM cardiaca: la cinetica



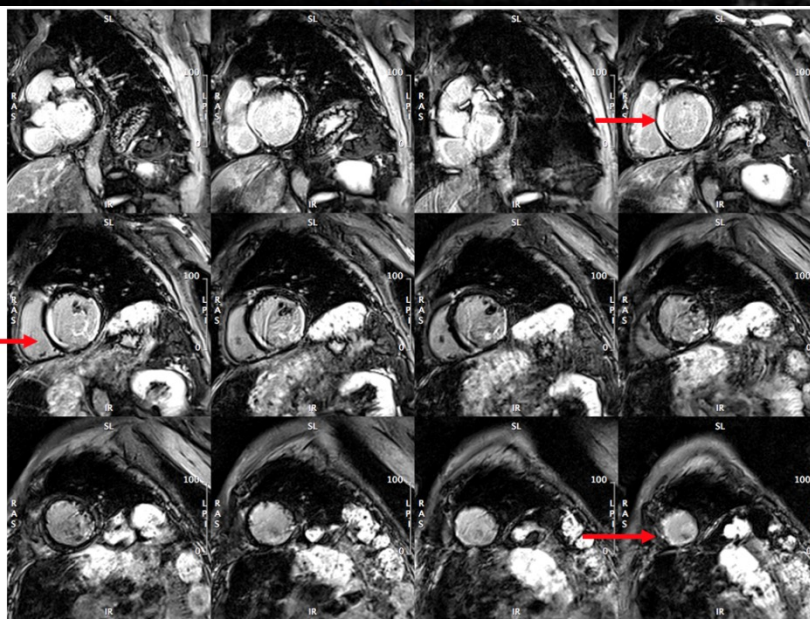
RM cardiaca: la cinetica



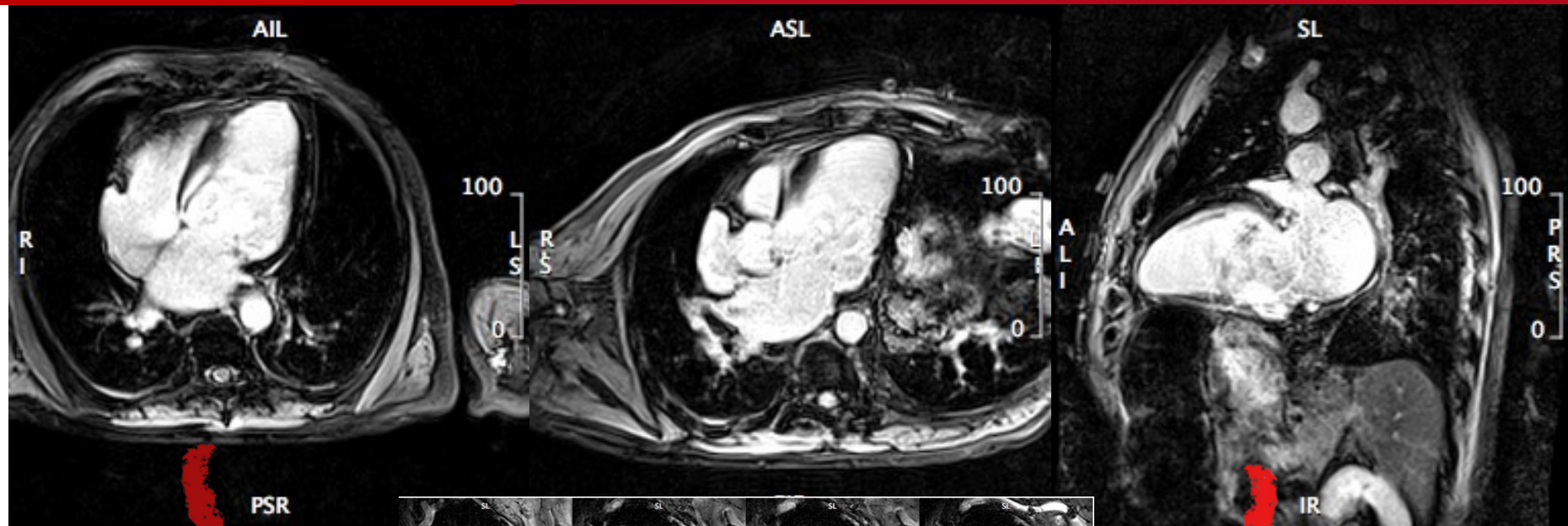
RM cardiaca: Late gadolinium enhancement



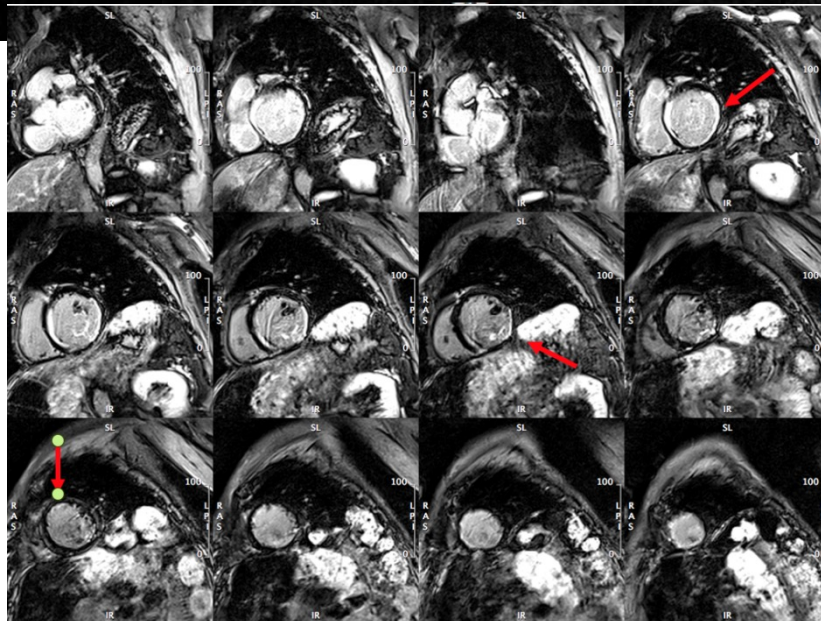
LGE
transmurale
($<75\%$)



RM cardiaca: Late gadolinium enhancement

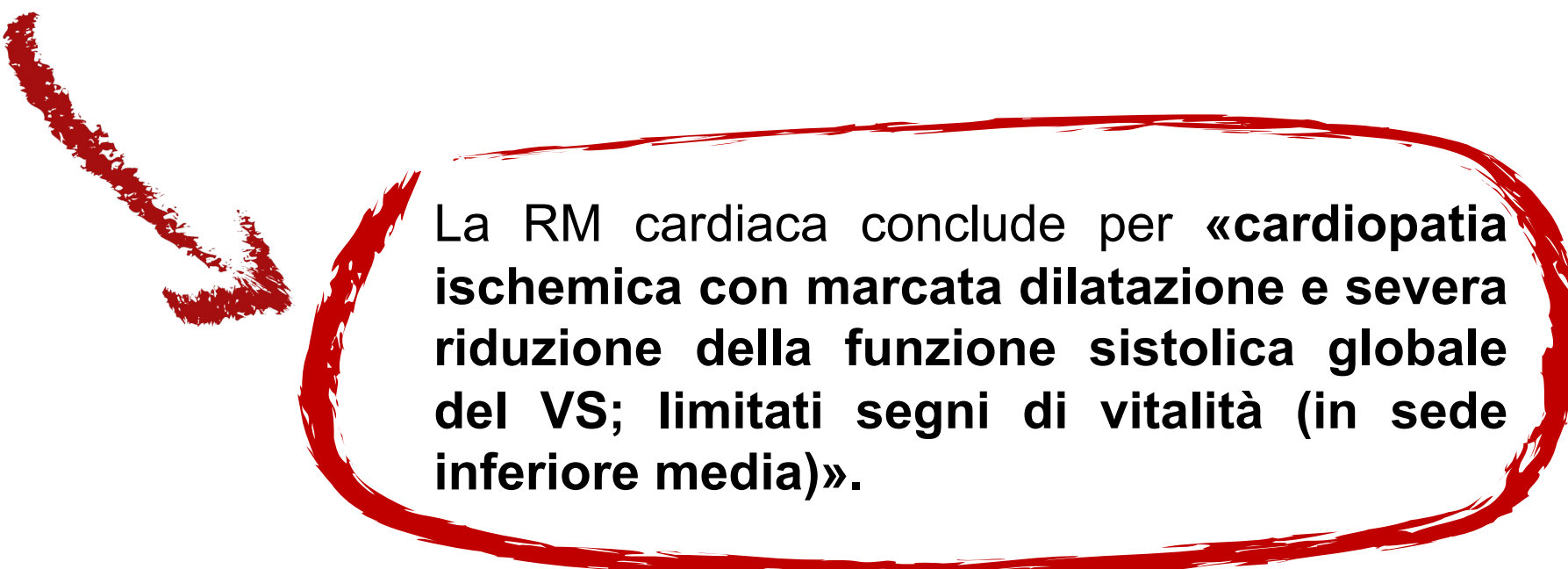


LGE ad
estensione non
transmurale



Come concludere il referto?

- **patologia cardiaca** → cardiopatia ischemica con marcata dilatazione e severa riduzione della funzione sistolica globale del VS
- **risposta al quesito clinico** → poca vitalità residua



La RM cardiaca conclude per «**cardiopatia ischemica con marcata dilatazione e severa riduzione della funzione sistolica globale del VS; limitati segni di vitalità (in sede inferiore media)**».

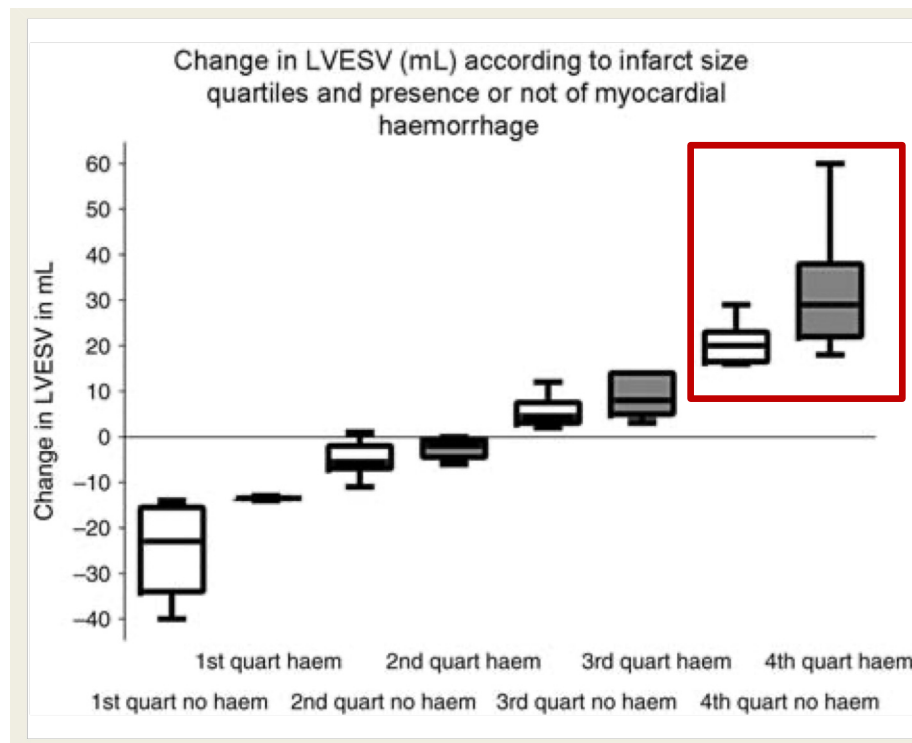
Ruolo della RM cardiaca nel paziente con SCA

- area a rischio
- necrosi
- miocardio salvato
- no-reflow
- vitalità
- **rimodellamento post-infartuale**
- complicanze post-infartuali
- stratificazione prognostica
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Rimodellamento post-infartuale

Variable	LV End-Systolic Volume at Baseline				Δ LV End-Systolic Volume			
	Univariable		Multivariable		Univariable		Multivariable	
	β	p Value	β	p Value	β	p Value	β	p Value
MVO during first-pass perfusion imaging	10.53	0.07	—	—	8.26	0.005	—	—
MVO on LGE imaging	14.57	0.007	—	—	9.83	0.0003	8.67	0.001
Extent of MVO (% of segments)	0.92	<0.0001	—	—	0.42	0.001	—	—
TIMI 2	-2.61	0.71	—	—	-0.29	0.94	—	—
MBG <2	-5.92	0.44	—	—	1.09	0.78	—	—
Incomplete ST-segment resolution	4.15	0.46	—	—	4.36	0.13	—	—
Infarct size (% of LV)	1.20	<0.0001	1.20	<0.0001	0.35	0.01	—	—

Nijveldt JACC 2010



Ganame European Heart Journal 2009

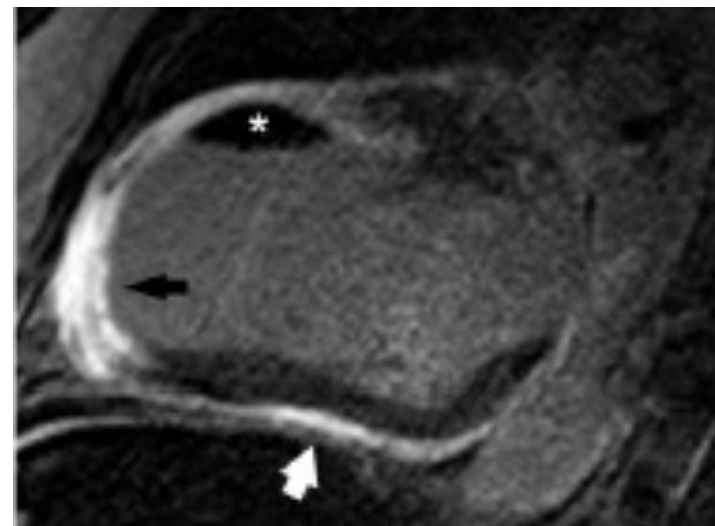
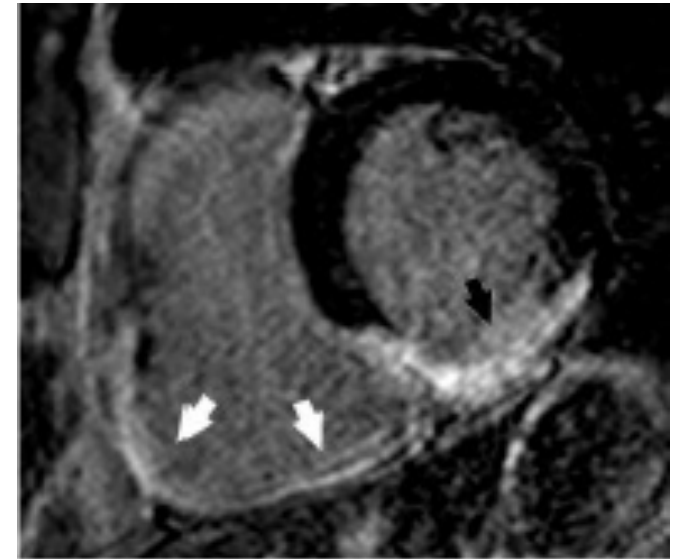
Ruolo della RM cardiaca nel paziente con SCA

- area a rischio
- necrosi
- miocardio salvato
- no-reflow
- vitalità
- rimodellamento post-infartuale
- **complicanze post-infartuali**
- stratificazione prognostica
- diagnosi differenziale

Sequelae of acute myocardial infarction regarding cardiac structure and function and their prognostic significance as assessed by magnetic resonance imaging

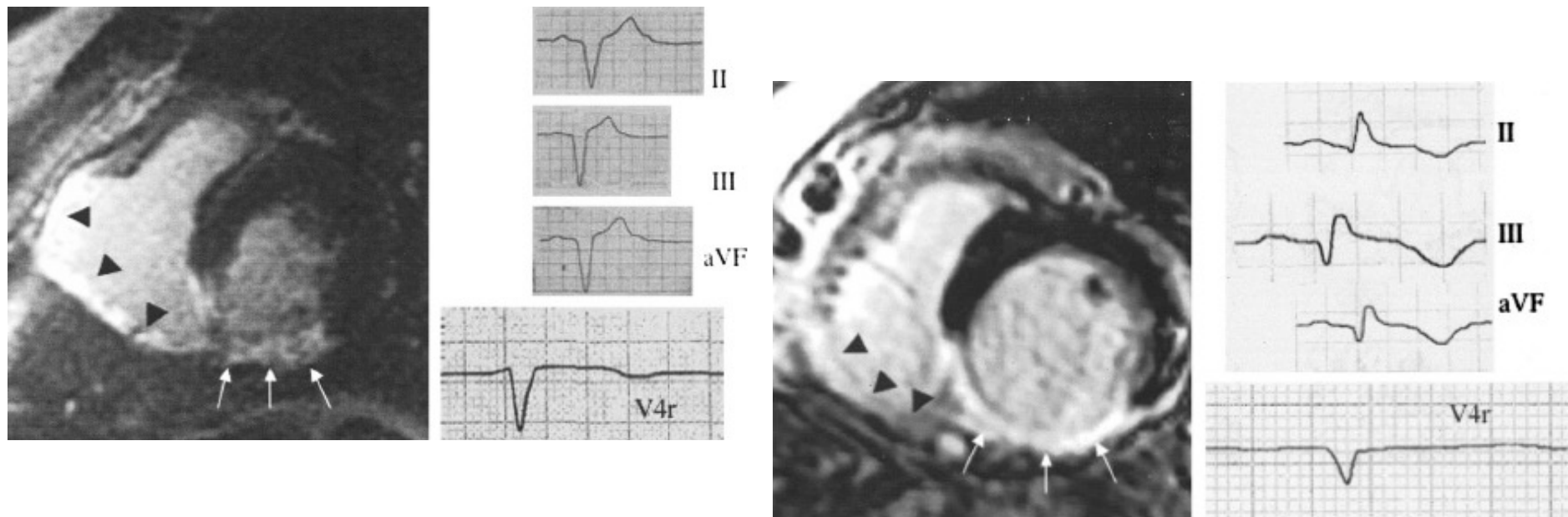
Complicanze post-infartuali

Number of patients	110
Localization of AMI	
Anteroseptal	39 (35.5)
Anterior	4 (3.6)
Anterolateral	1 (0.9)
Lateral	10 (9.1)
Posterolateral	16 (14.5)
Inferior	24 (21.8)
Inferoseptal	9 (8.2)
Septal	3 (2.7)
Apical	4 (3.6)
Morphological data	
IS (%)	11.9 ± 7.3
IMO (%)	2.8 ± 2.3
RV infarction	18 (16.4)
RV abnormal wall motion	47 (42.7)
Infarction of papillary muscle	28 (25.5)
Pericardial enhancement	44 (40.0)
Local pericardial effusion	60 (54.5)
Circular pericardial effusion	12 (10.9)
Segments with abnormal wall motion, <i>n</i>	5.1 ± 2.4
Quantitative and functional parameters	
LVEF (%)	57.0 ± 10.7
LVEDV (mL)	144.7 ± 33.2
LVESV (mL)	63.3 ± 25.3
RVEF (%)	64.6 ± 7.6
RVEDV (mL)	126.9 ± 34.6



FOCUS ISSUE: CARDIAC IMAGING

Contrast-Enhanced Cardiovascular Magnetic Resonance Imaging of Right Ventricular Infarction



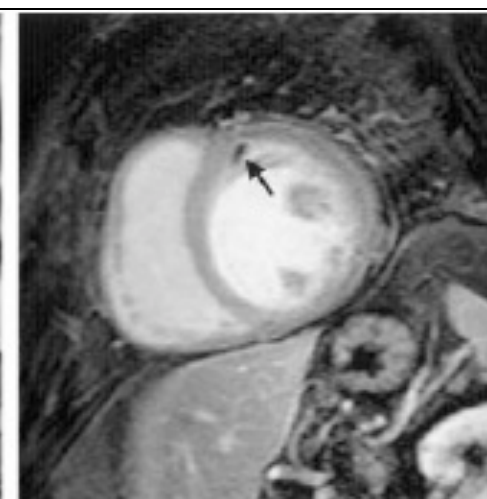
LGE della parete inferiore del VS che si estende
alla contigua parete diaframmatica del VD.

Visualization of Ventricular Thrombi With Contrast-Enhanced Magnetic Resonance Imaging in Patients With Ischemic Heart Disease

Complicanze
post-infartuali

Comparison of Patient Characteristics Between Positive and Negative Group

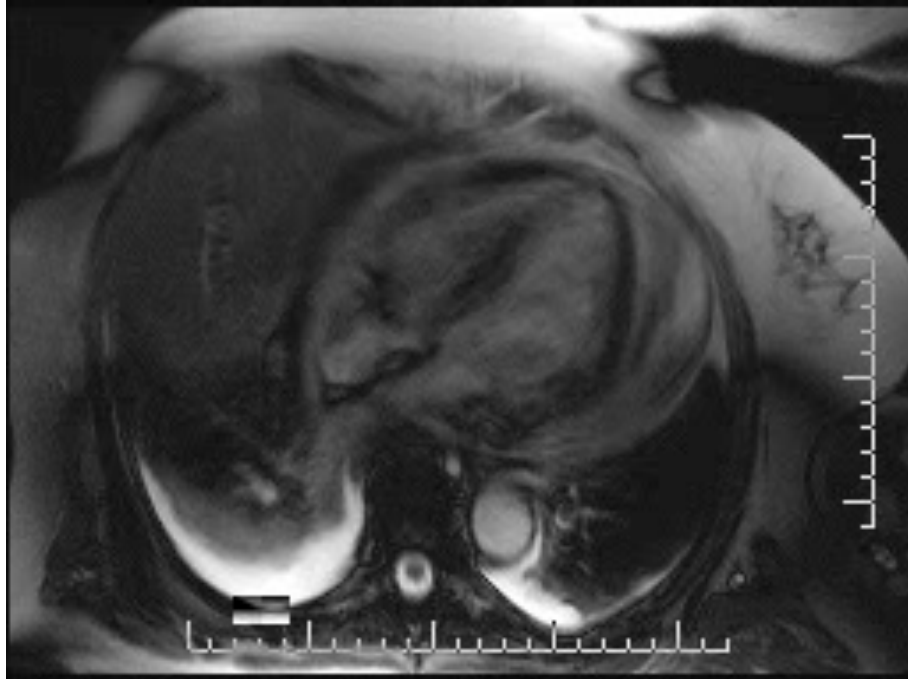
Patient Characteristic	Patients With Thrombus Assessed by CE-MRI (n=12)	Patients Without Thrombus Assessed by CE-MRI (n=45)	P
Age/Sex	59.7±12.5 (10 M, 2F)	62.2±9.9 (36 M, 9 F)	0.40
End-diastolic volume, mL	209±67	170±60	0.010
Ejection fraction, %	34±14	46±16	0.039
Ischemic heart disease type			
Acute myocardial infarction	1	10	...
Chronic myocardial infarction	4	7	...
Ischemic cardiomyopathy	7	28	...
Areas of delayed enhancement, n (%)			
LAD	11 (92)	23 (51)	0.014
LCx	4 (33)	10 (22)	0.51
RCA	6 (50)	26 (58)	0.81
Areas of no-reflow, n (%)			
LAD	4 (33)	4 (9)	0.081
LCx	0	1 (2)	0.63
RCA	0	2 (4)	0.47
Wall motion score			
LAD	2.0±0.8	3.3±1.5	0.013
LCx	3.7±1.2	4.3±0.9	0.14
RCA	3.5±1.5	3.3±1.3	0.72
Ventricular aneurysm, n (%)	4 (33)	2 (4)	0.023



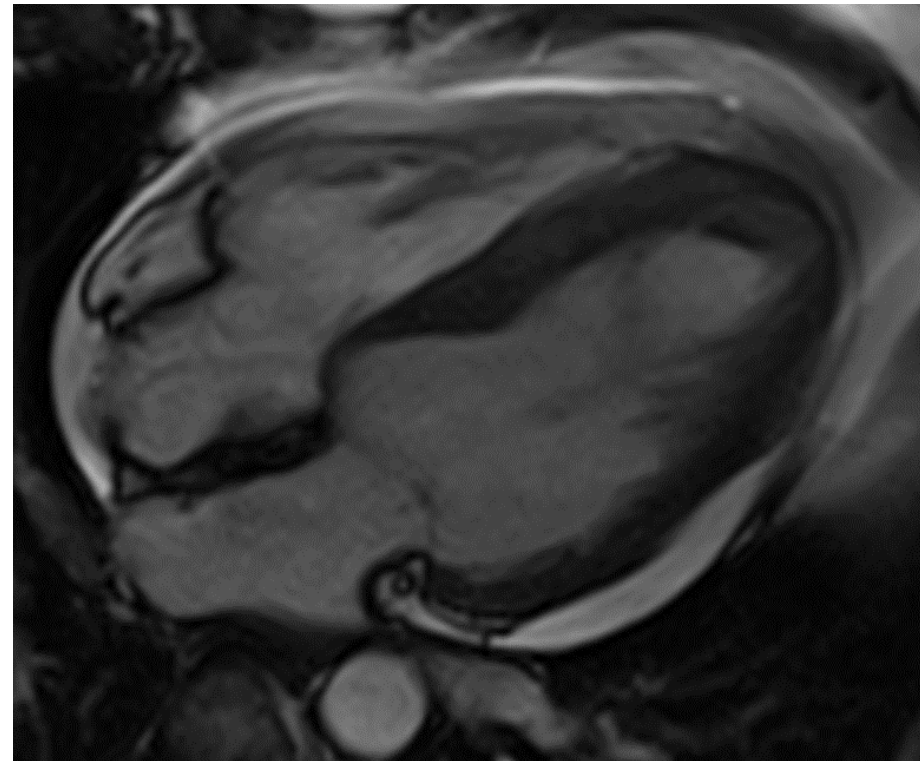
Complicanze post-infartuali



Complicanze post-infartuali

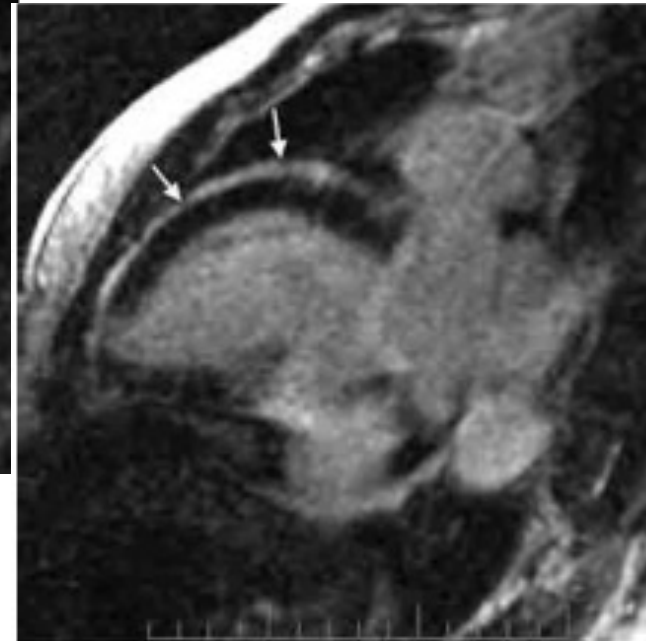
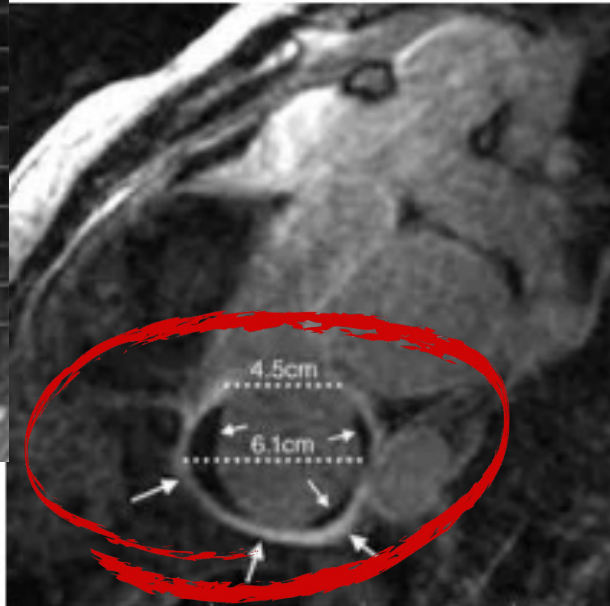
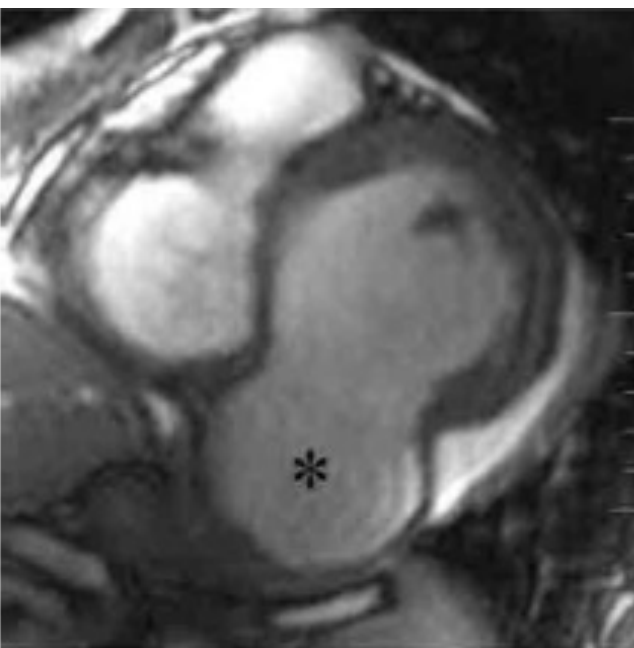


Versamento ematico



Versamento non ematico

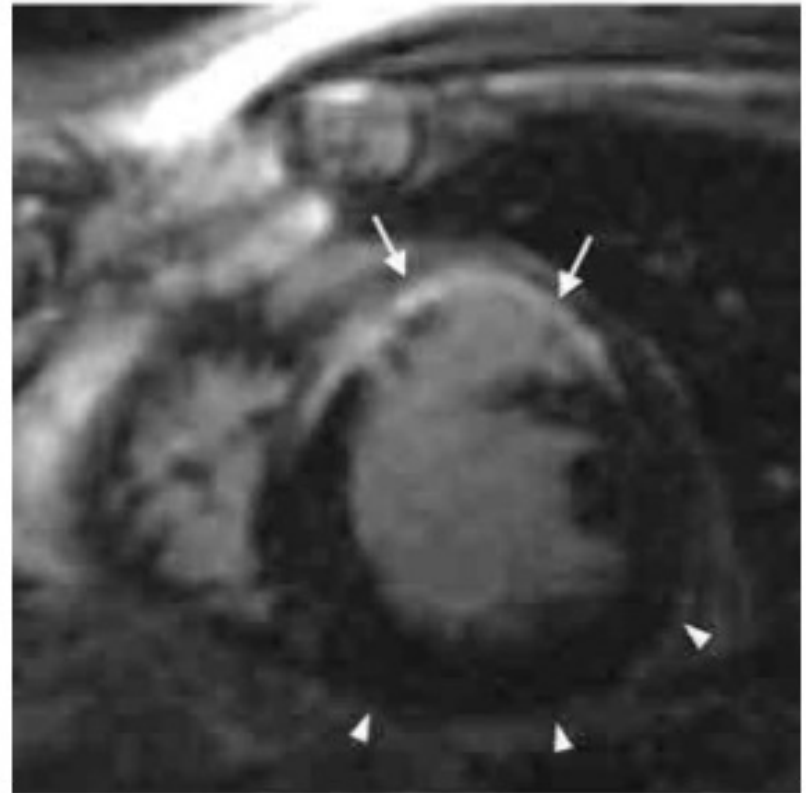
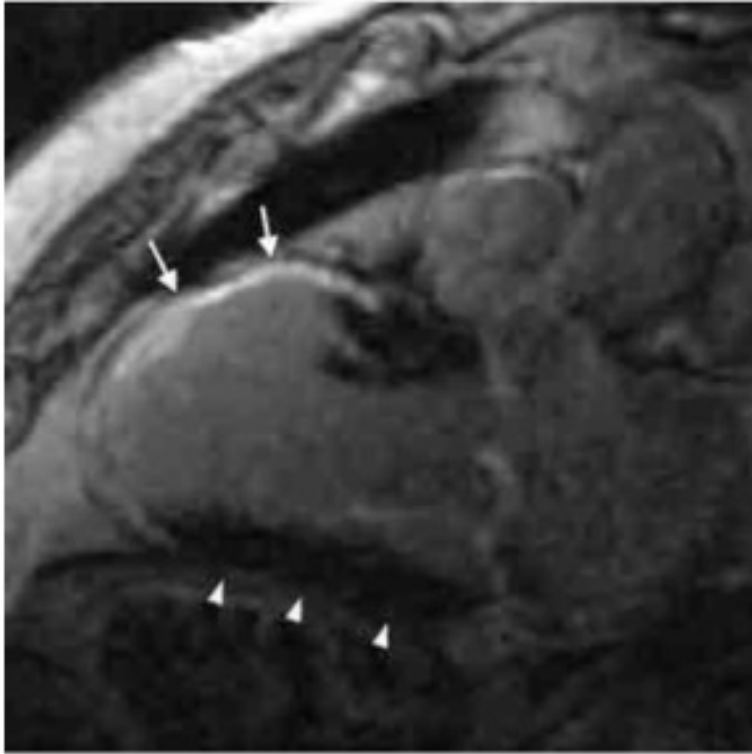
PSEUDOANEURISMA o FALSO ANEURISMA



Come riconoscerlo?

- diametro colletto << diametro interno
- enhancement del pericardio contiguo

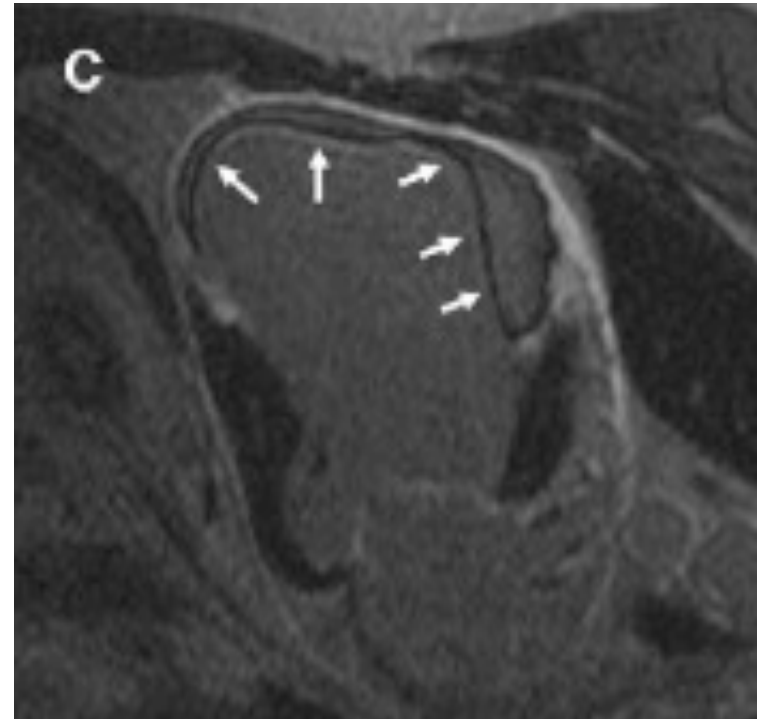
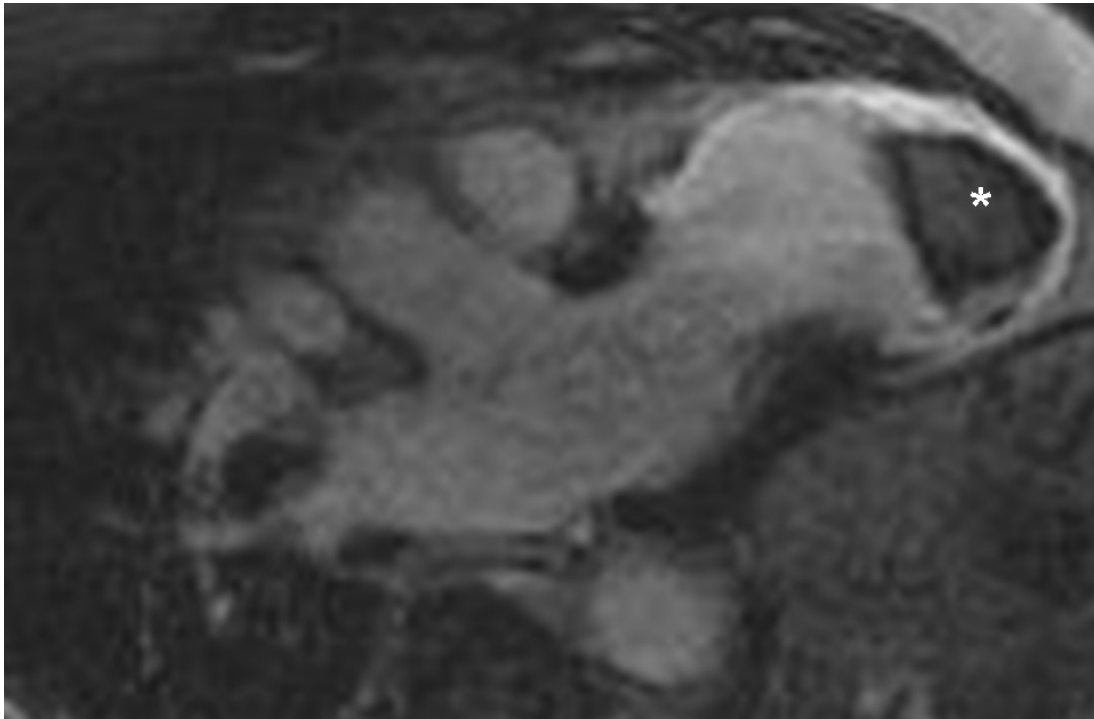
ANEURISMA VERO IN ASSENZA DI ROTTURA



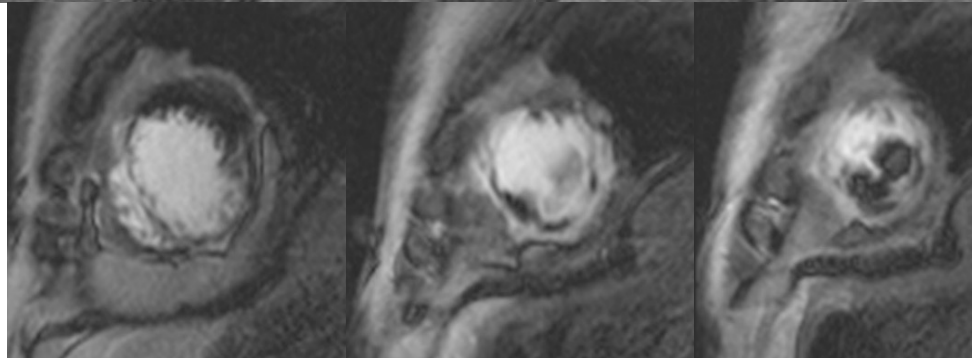
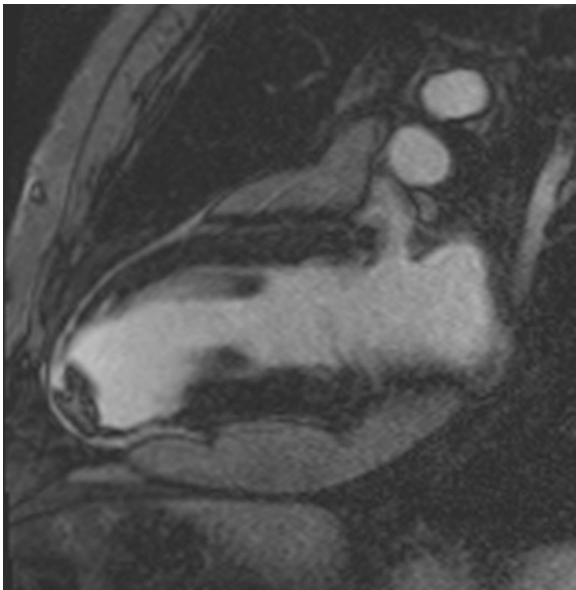
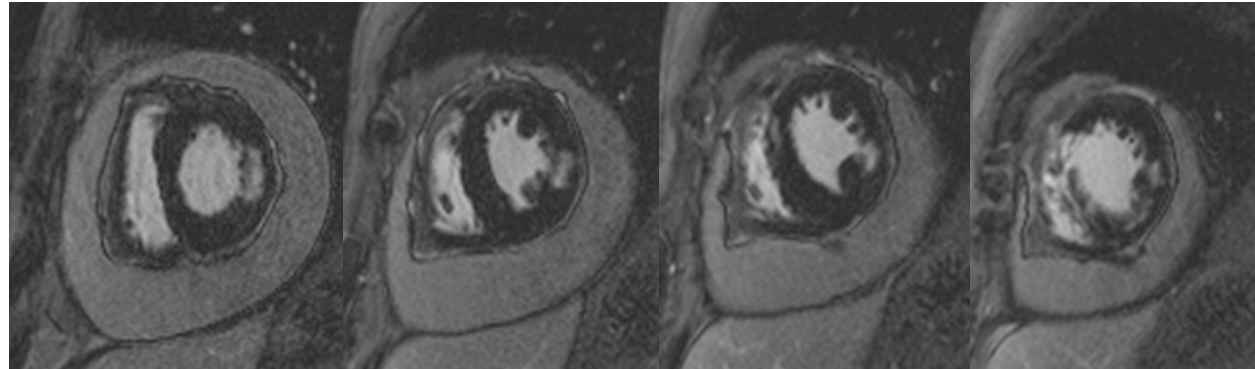
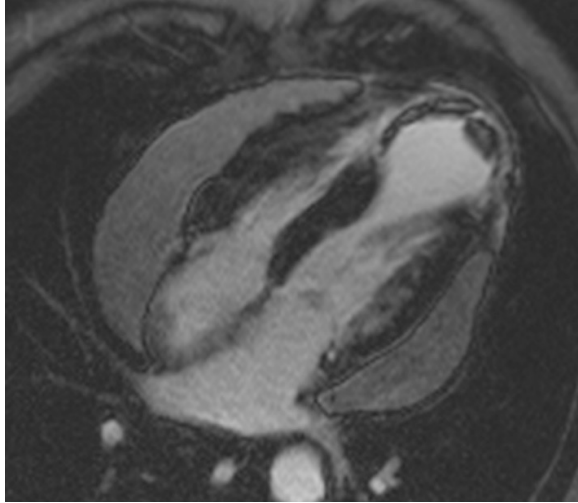
Come riconoscerlo?

- diametro colletto >> diametro interno
- non enhancement del pericardio contiguo

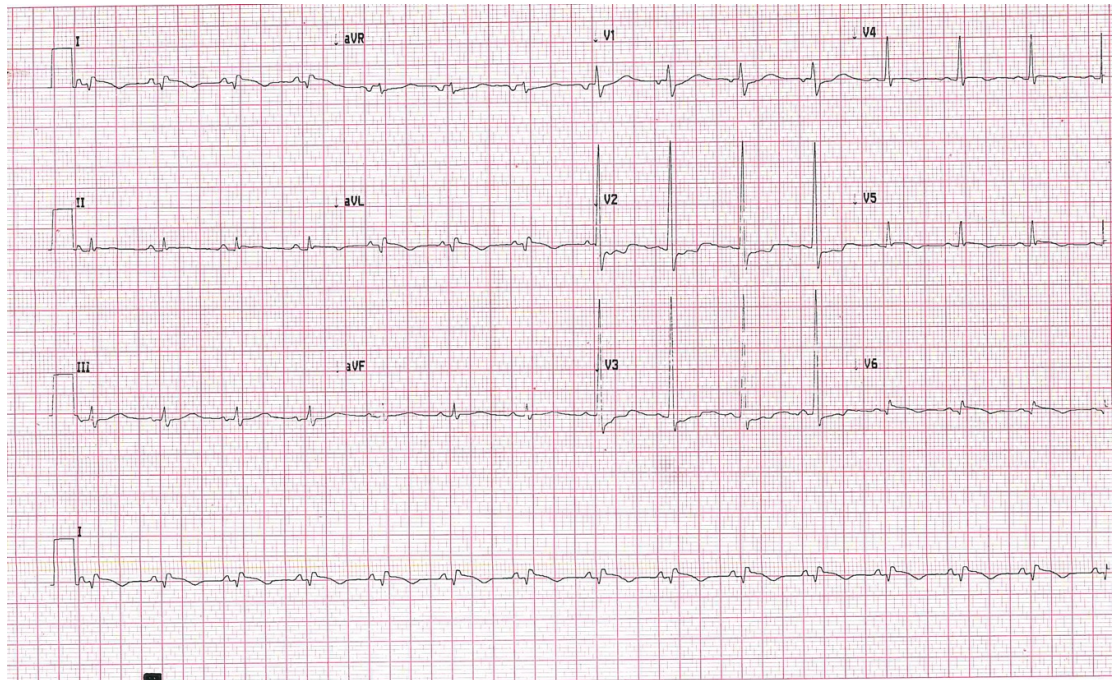
ANEURISMA CON ROTTURA



**FALSO ANEURISMA CON
EMOPERICARDIO**

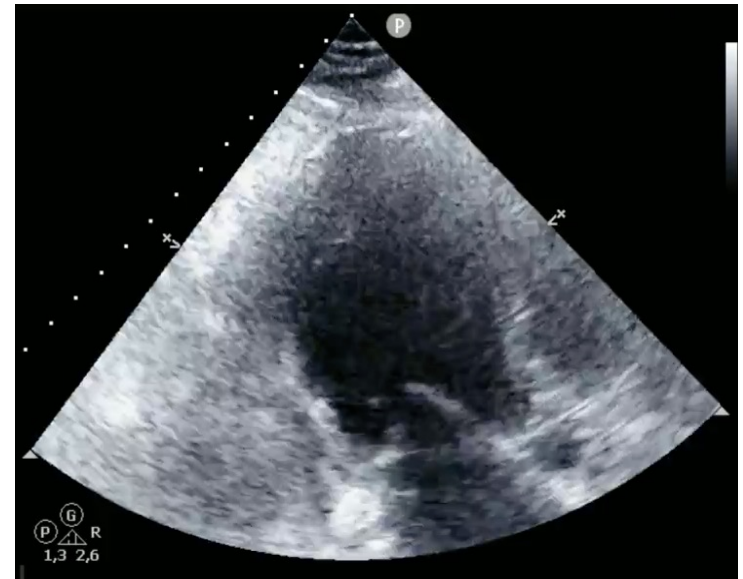
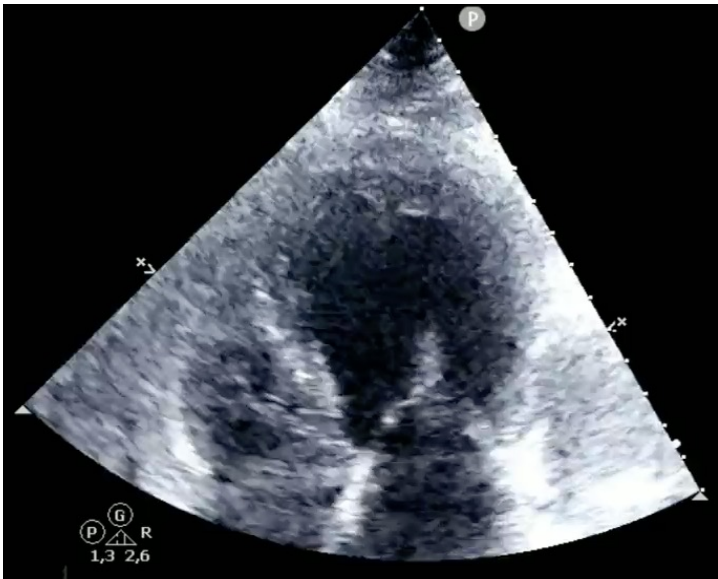


Marzo 2020: uomo iperteso di 63 anni iperteso con edema polmonare acuto → polmonite COVID-19 relata



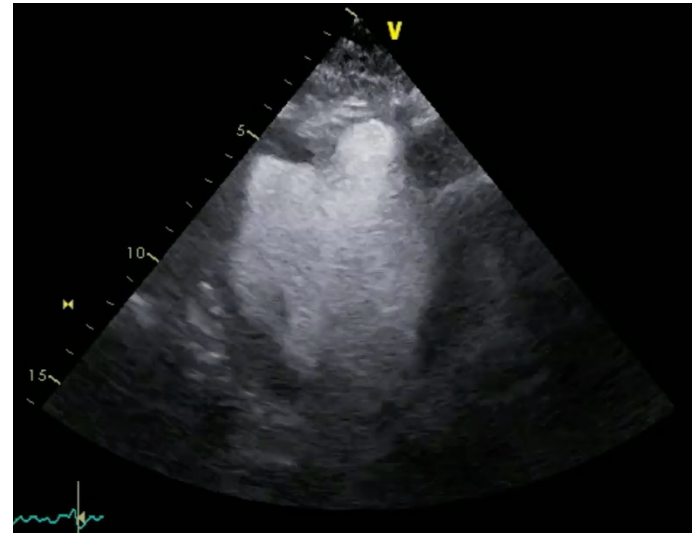
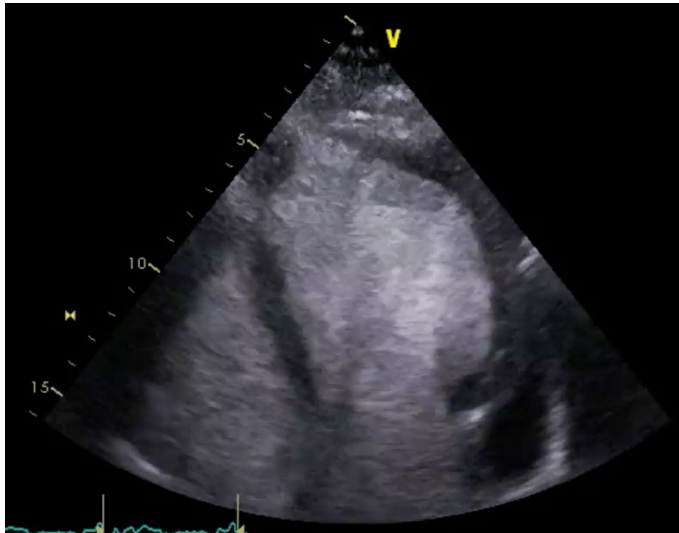
INFARTO MIOCARDICO TARDIVO

Ecocardiogramma all'ingresso



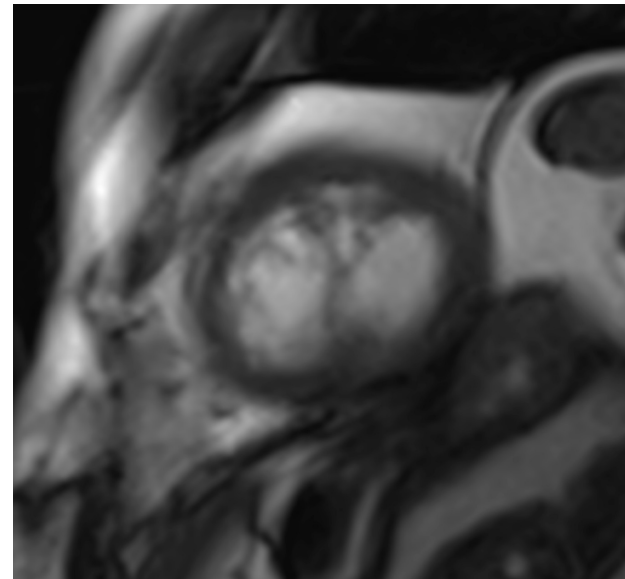
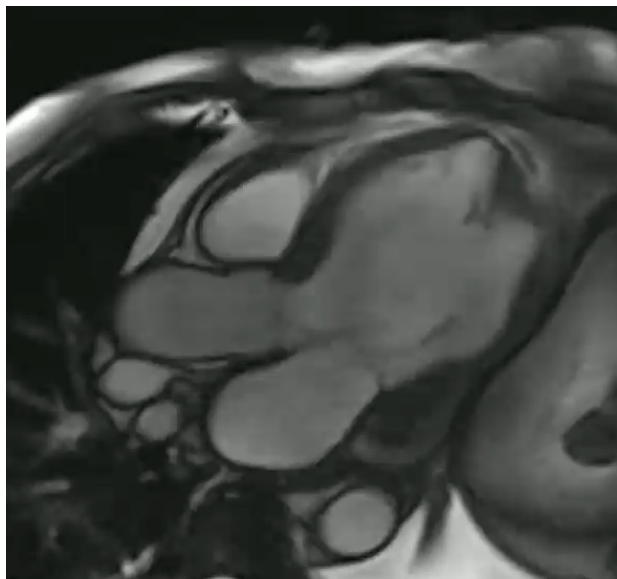
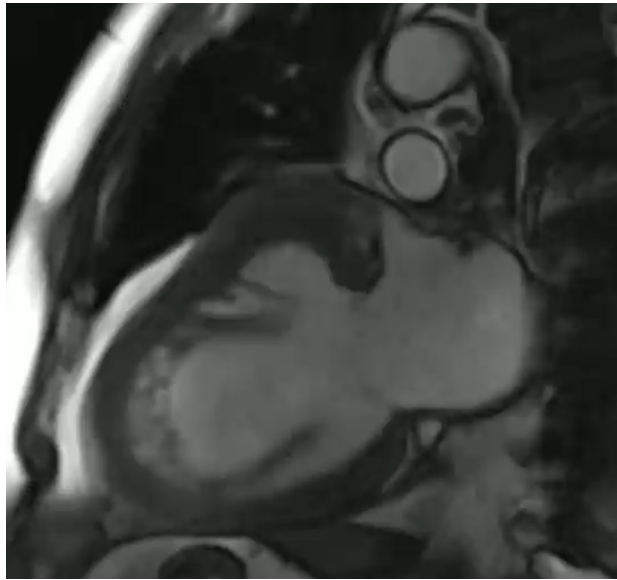
Severa disfunzione ventricolare sinistra (FE 33%) con alterazioni della cinetica in sede anteriore, laterale, inferiore ed apicale.

Ecocardiogramma con contrasto

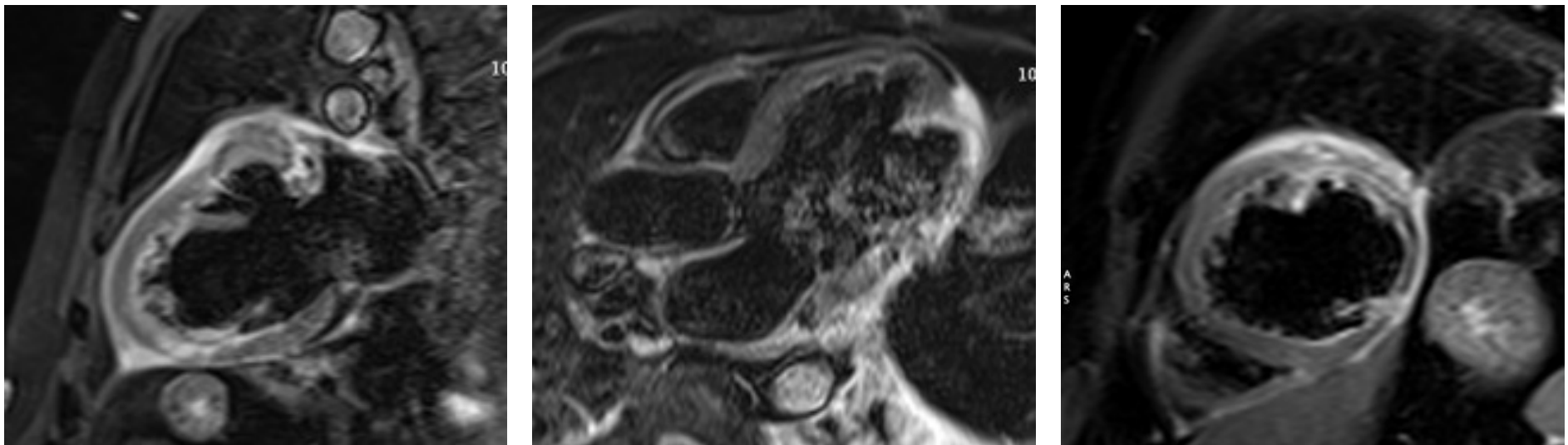


PSEUDOANEURISMA APICALE

RM cardiaca: La cinetica

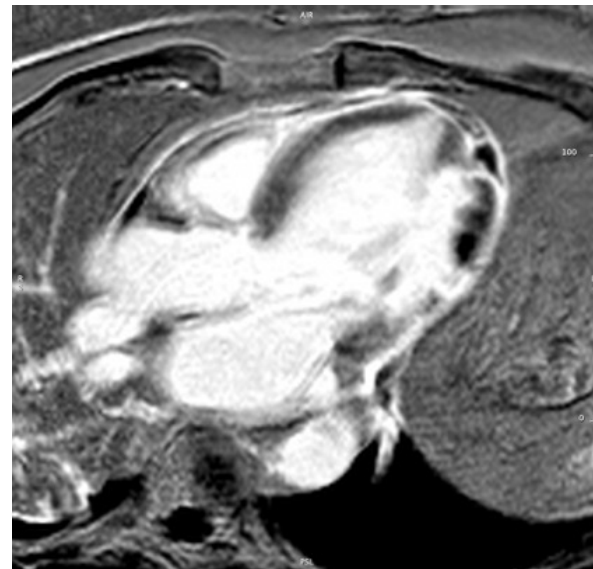
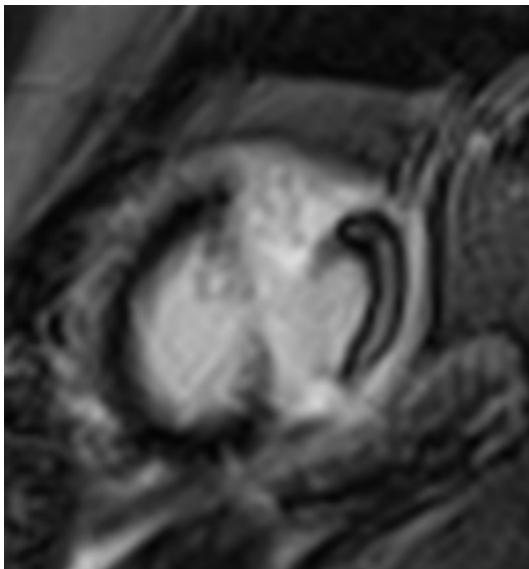
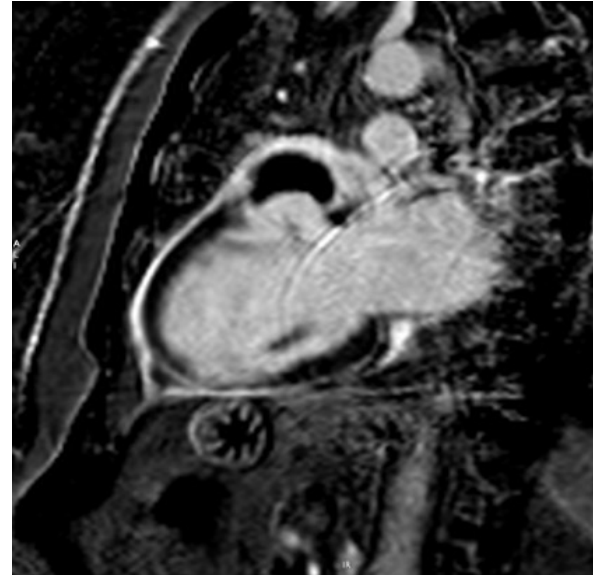
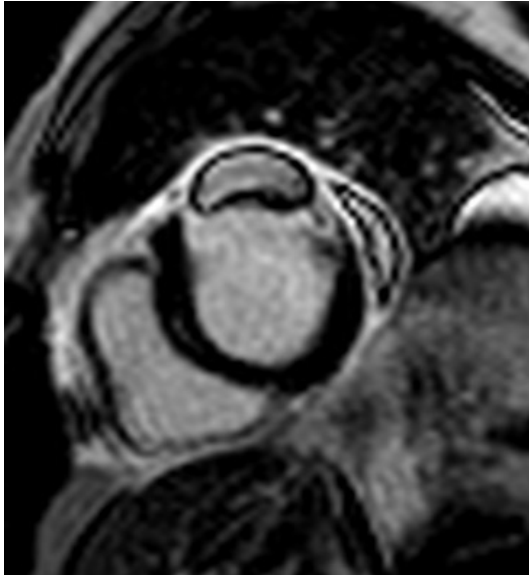


RM cardiaca: l'edema miocardico



- Edema del pericardio con versamento
- Ipointensità laterale → danno microvascolare

RM cardiaca: Late gadolinium enhancement



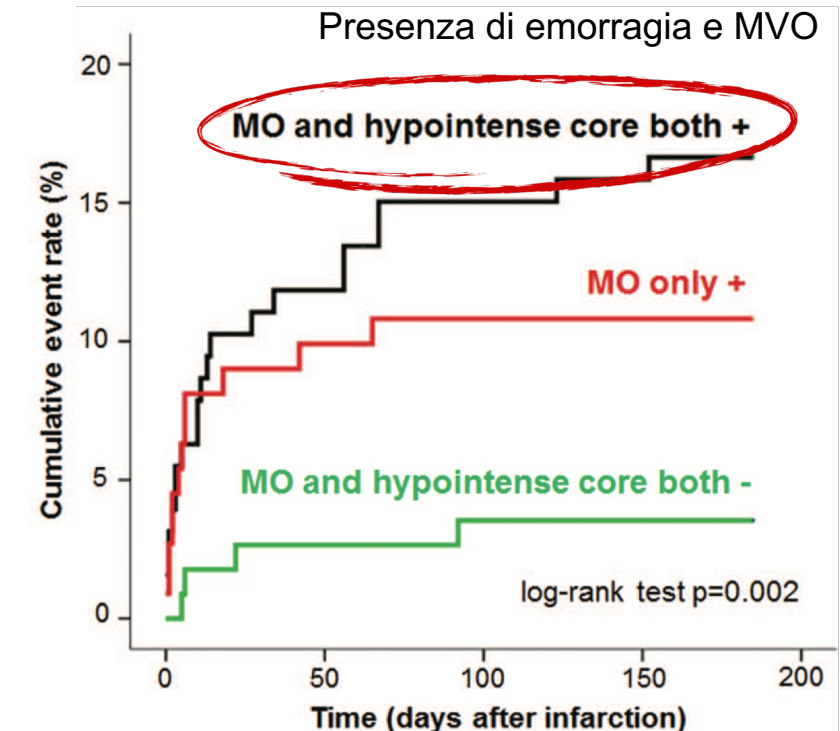
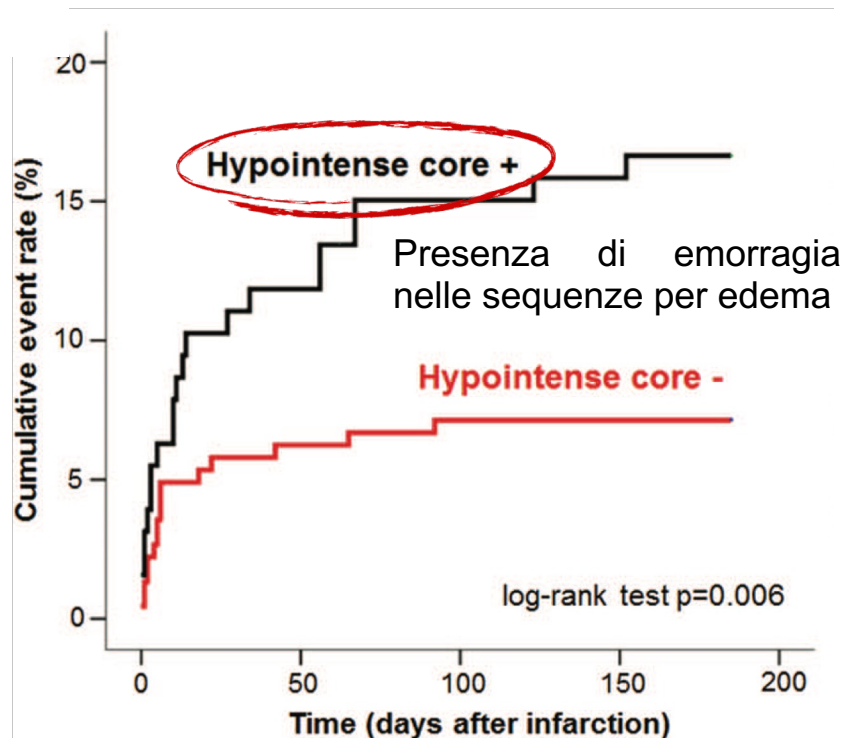
Ruolo della RM cardiaca nel paziente con SCA

- area a rischio
- necrosi
- miocardio salvato
- no-reflow
- vitalità
- rimodellamento post-infartuale
- complicanze post-infartuali
- **stratificazione prognostica**
- diagnosi differenziale

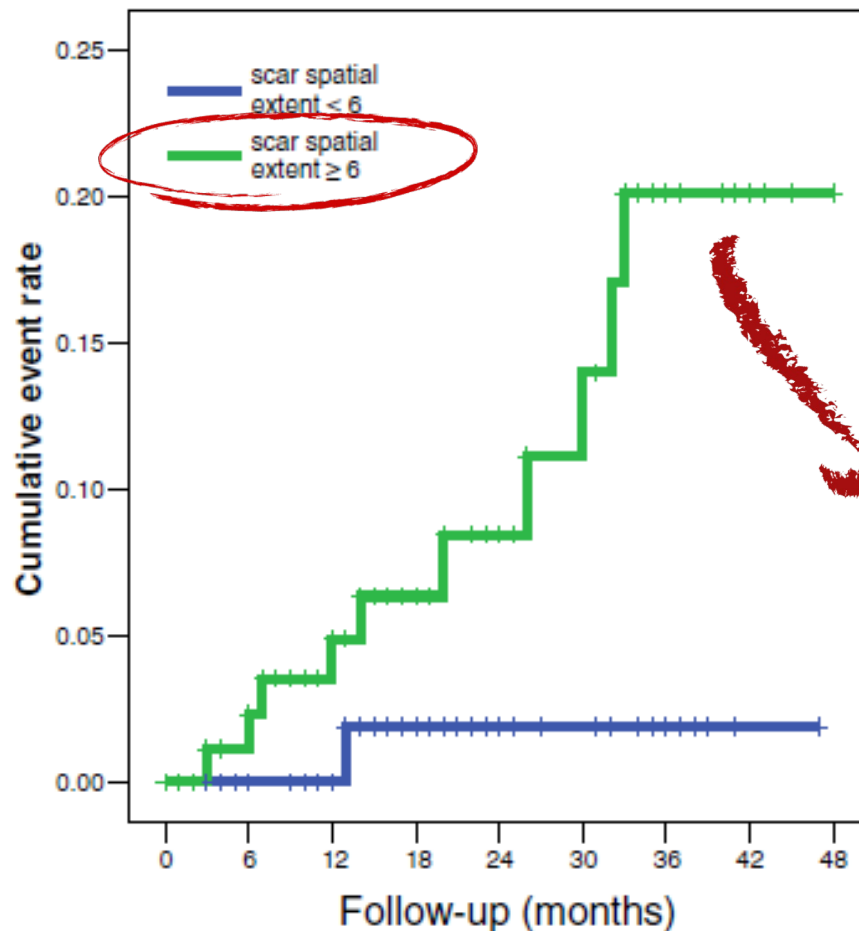
Stratificazione prognostica

Prognostic Value and Determinants of a Hypointense Infarct Core in T2-Weighted Cardiac Magnetic Resonance in Acute Reperfused ST-Elevation–Myocardial Infarction

Questo studio ha valutato 346 pts con IMA trattati con PCI < 12 h dall'insorgenza dei sintomi e sottoposti a RM cardiaca nel follow-up.



Prognostic Value of Myocardial Infarct Size and Contractile Reserve Using Magnetic Resonance Imaging



La presenza di fibrosi è un fattore prognostico negativo per l'incidenza di eventi cardiaci avversi.

Ruolo della RM cardiaca nel paziente con SCA

- area a rischio
- necrosi
- miocardio salvato
- no-reflow
- vitalità
- rimodellamento post-infartuale
- complicanze post-infartuali
- stratificazione prognostica
- **diagnosi differenziale**



European Heart Journal (2007) 28, 1242–1249
doi:10.1093/eurheartj/ehm113

Clinical research
Imaging

The role of cardiovascular magnetic resonance in patients presenting with chest pain, raised troponin, and unobstructed coronary arteries

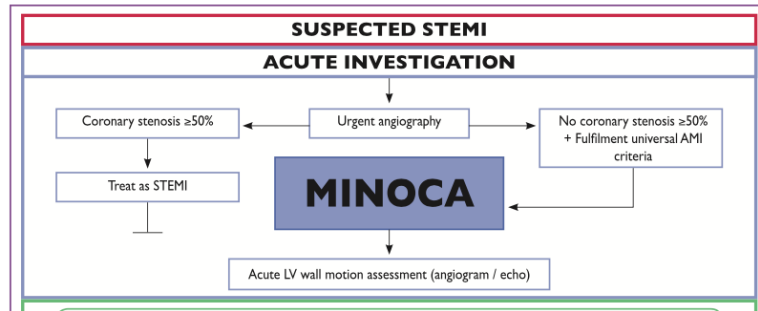
Ravi G. Assomull^{1,2}, Jonathan C. Lyne¹, Niall Keenan¹, Ankur Gulati¹, Nicholas H. Bunce³, Simon W. Davies¹, Dudley J. Pennell^{1,2}, and Sanjay K. Prasad*

¹Cardiovascular Magnetic Resonance Unit, Royal Brompton Hospital, London SW3 6NP, UK; ²National Heart and Lung Institute, Imperial College, London, UK; and ³Department of Cardiology, St George's Hospital, London, UK



- infarto miocardico acuto
- miocardite
- sindrome di Tako-Tsubo

2017 ESC Guidelines for the management of acute myocardial infarction in patients presenting with ST-segment elevation

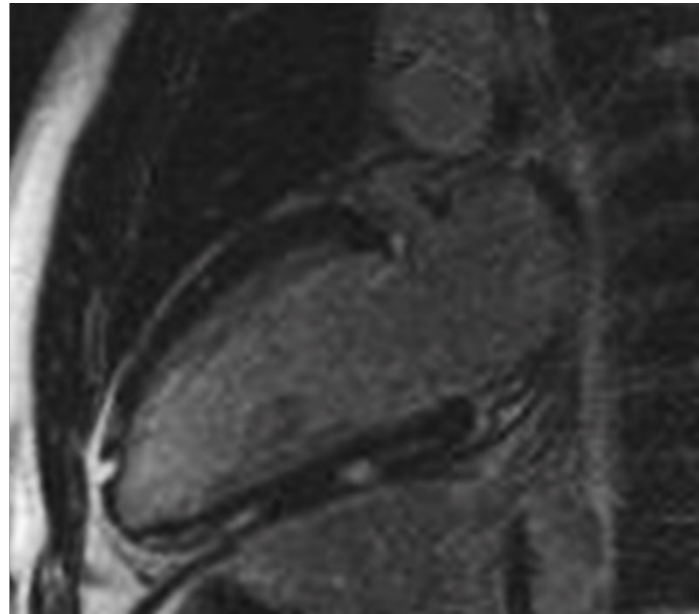
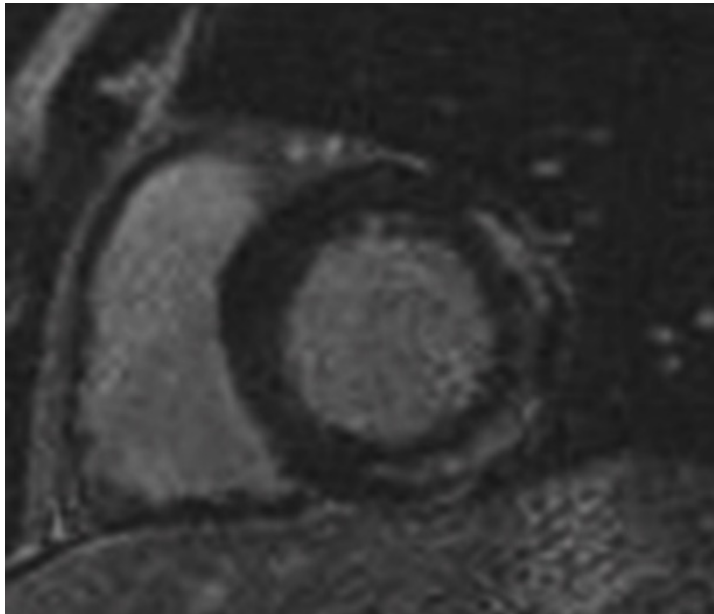
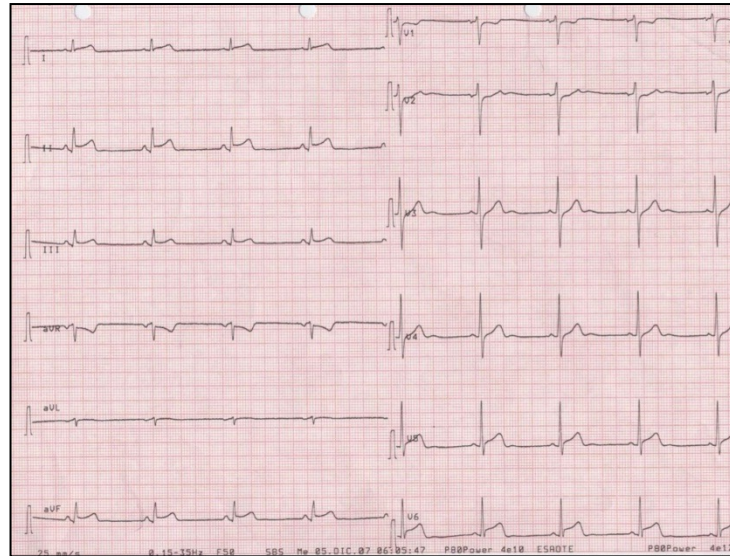


SUSPECTED DIAGNOSIS AND FURTHER DIAGNOSTIC TESTS		
	Non-invasive	Invasive
Myocarditis	TTE Echo (pericardial effusion) CMR (myocarditis ² , pericarditis)	Endomyocardial biopsy (myocarditis)
Coronary (epicardial/microvascular)	TTE Echo (Regional wall motion abnormalities, embolic source) CMR (small infarction) TOE/Bubble Contrast Echo (Patent foramen ovale, atrial septal defect)	IVUS/OCT (plaque disruption/dissection) Ergonovine/Ach test¹ (spasm) Pressure/Doppler wire (microvascular dysfunction)
Myocardial disease	TTE Echo CMR (Takotsubo, others)	
Pulmonary Embolism	D-dimer (Pulmonary embolism) CT scan (Pulmonary embolism) Thrombophilia screen	
Oxygen supply/demand imbalance-Type 2 MI	Blood tests, Extracardiac investigation	

Caso clinico

Uomo di 40 anni, fumatore attivo, con dolore toracico oppressivo.

Coronarie indenni.



Donna di 70 anni con episodio di dolore toracico oppressivo.
Coronarie indenni.



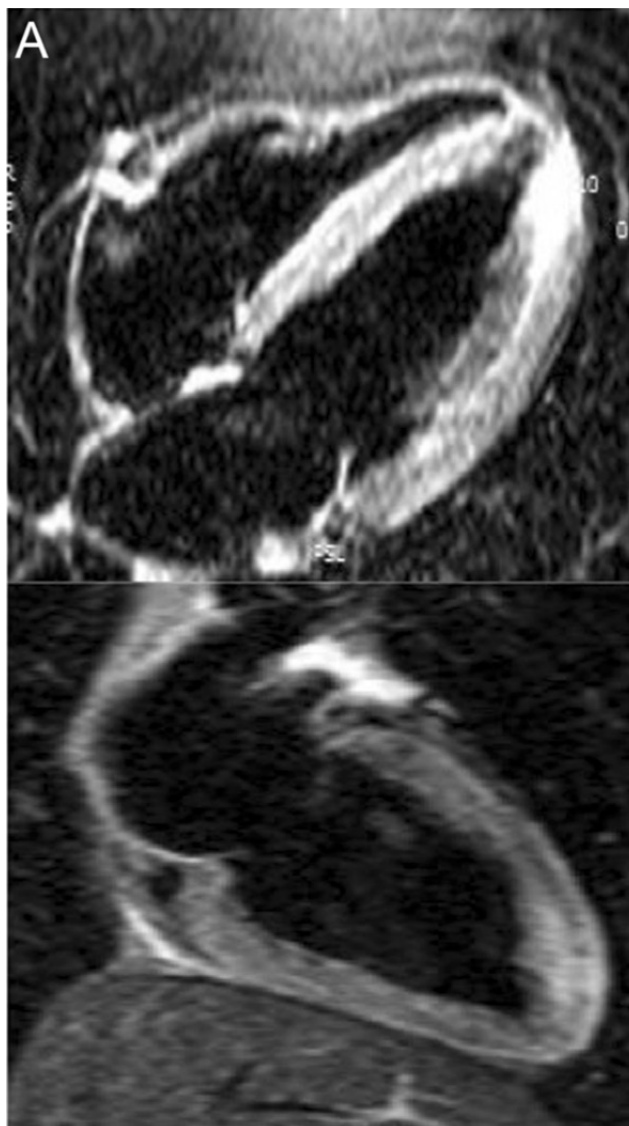
Sequenza per edema



Sequenza LGE

Uomo di 60 anni
con episodio di
dolore toracico
oppressivo.
Coronarie
indenni.

Sequenze per edema



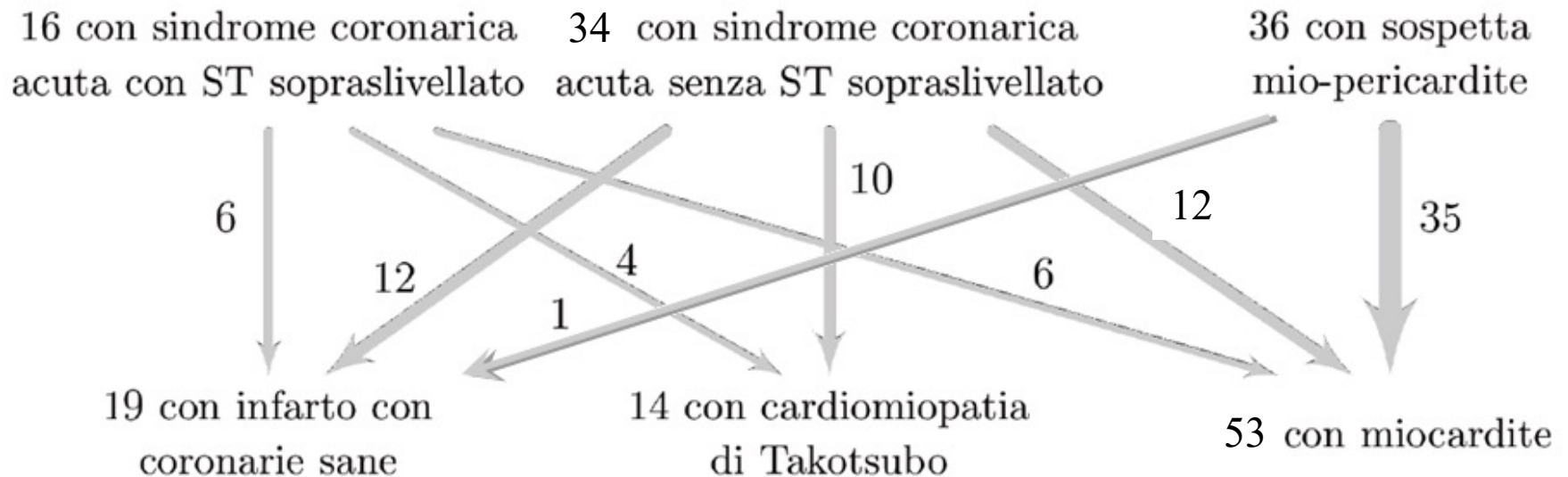
Sequenze LGE



Diagnosi differenziale

Dolore toracico, ↑ troponina e coronarie indenni

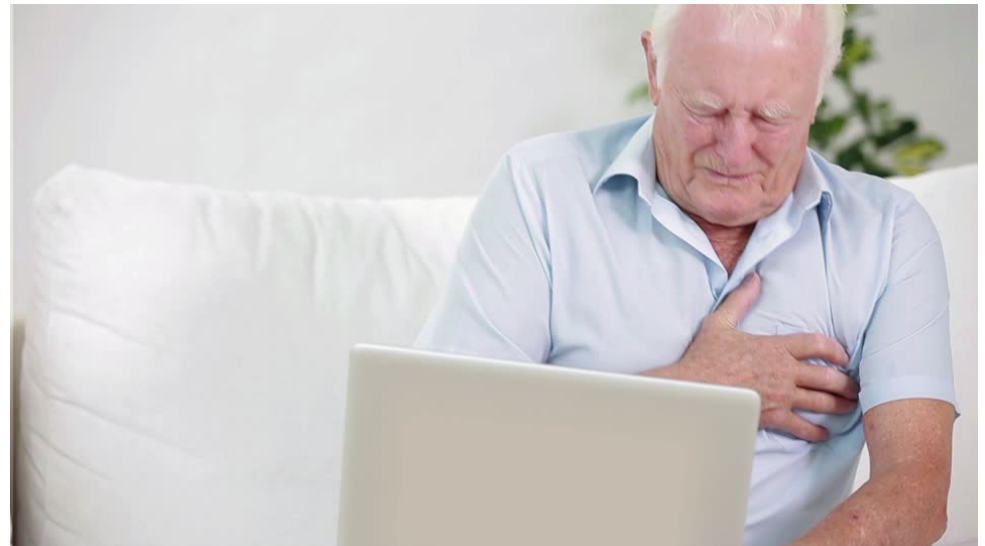
86 pazienti



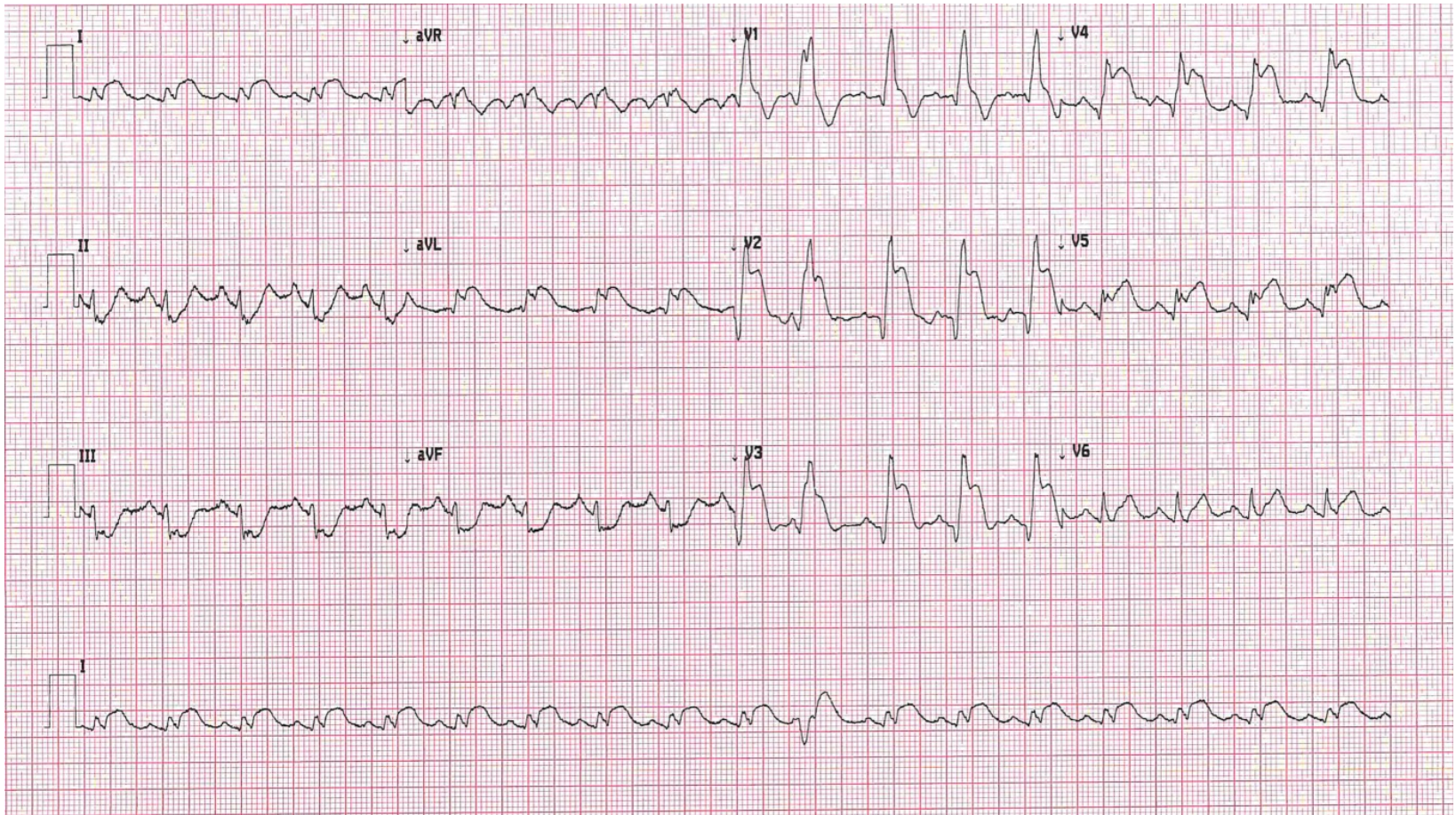
Nel 38 % dei pazienti, la diagnosi finale è stata modificata dai reperti di RM con le conseguenti ricadute in termini di terapia e strategie di prevenzione secondaria.

Paziente di 61 anni, iperteso, dislipidemico, vasculopatico e sovrappeso, lamenta insorgenza di intenso dolore all'arto superiore sinistro dopo cena.

Il paziente assume autonomamente antidolorifico, interpretando il dolore come effetto collaterale della statina.



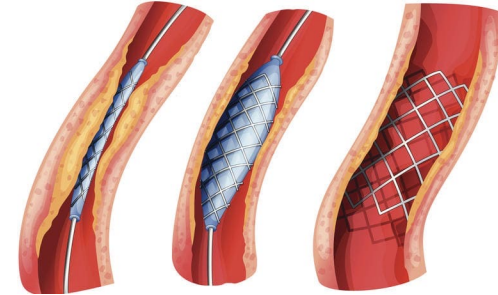
Per la persistenza del dolore che successivamente è diventato oppressivo restrosterale il paziente si è recato presso il PS.



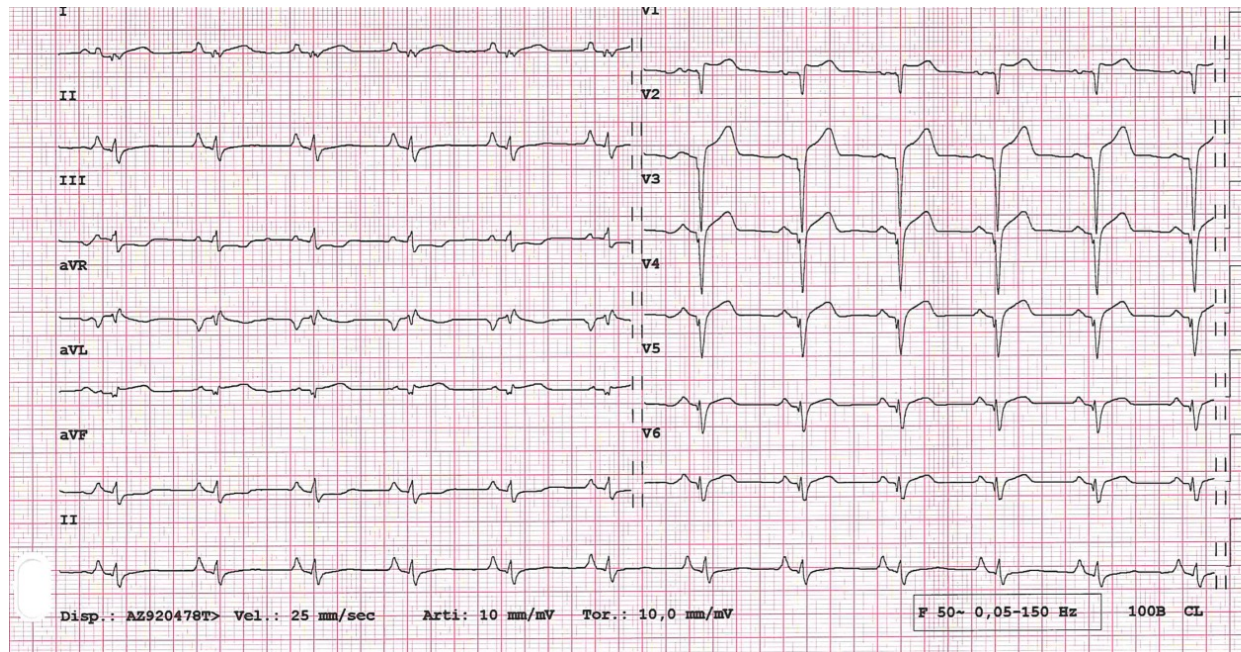
ECG → tachicardia sinusale con FC di 102 bpm. BBD con sopraslivellamento del tratto ST in sede antero-laterale e sottoslivellamento speculare nelle derivazioni inferiori.

Coronarografia e PCI primaria

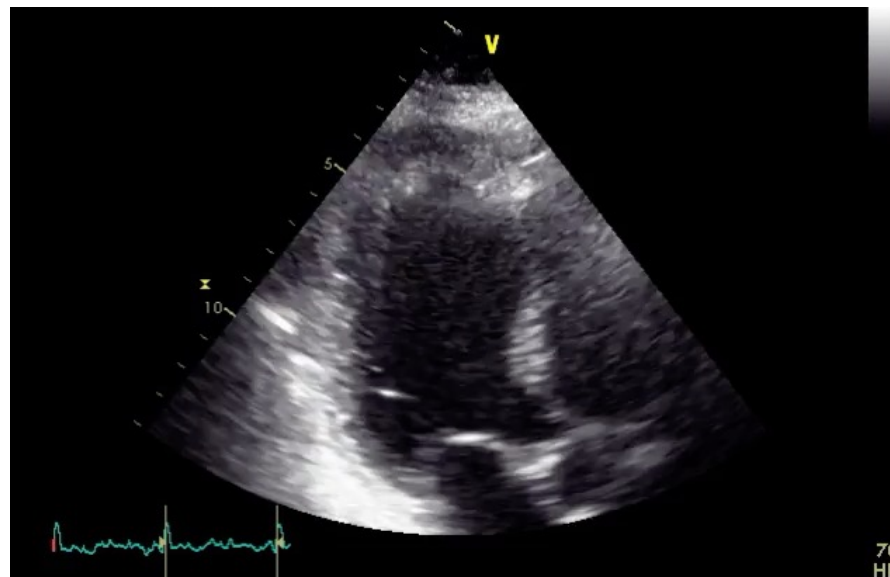
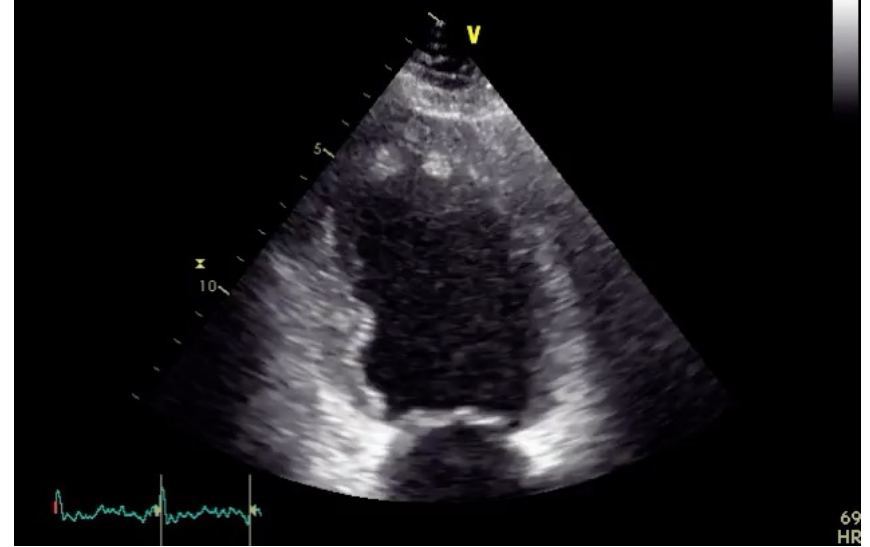
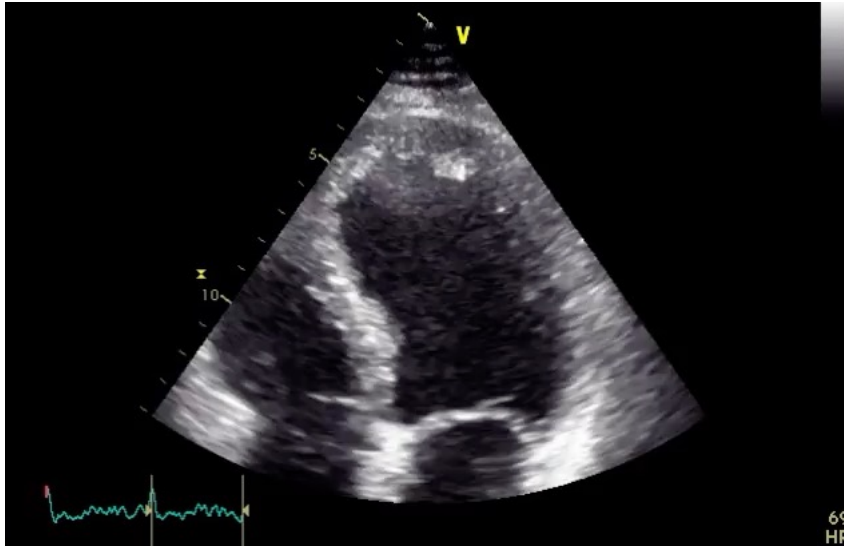
Il paziente viene condotto in sala di emodinamica per eseguire PCI primaria.



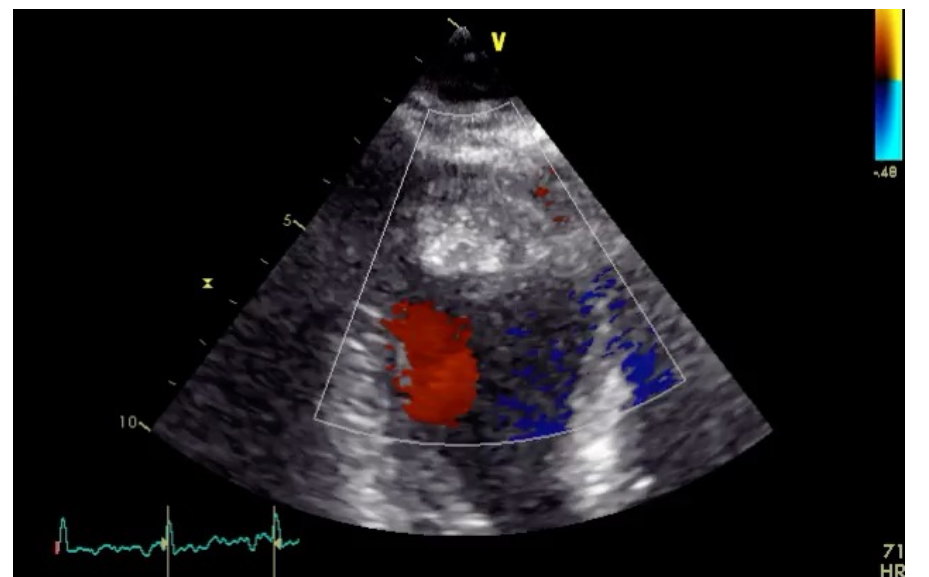
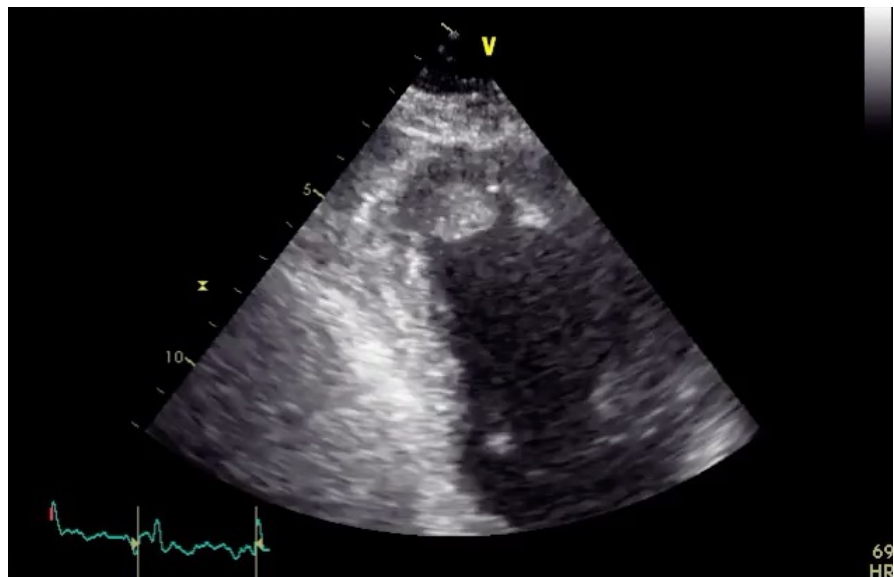
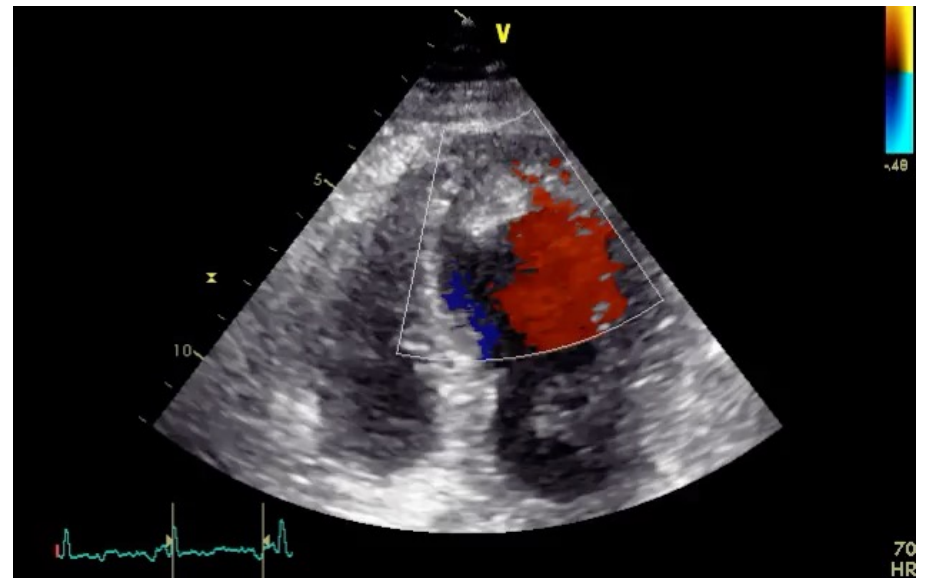
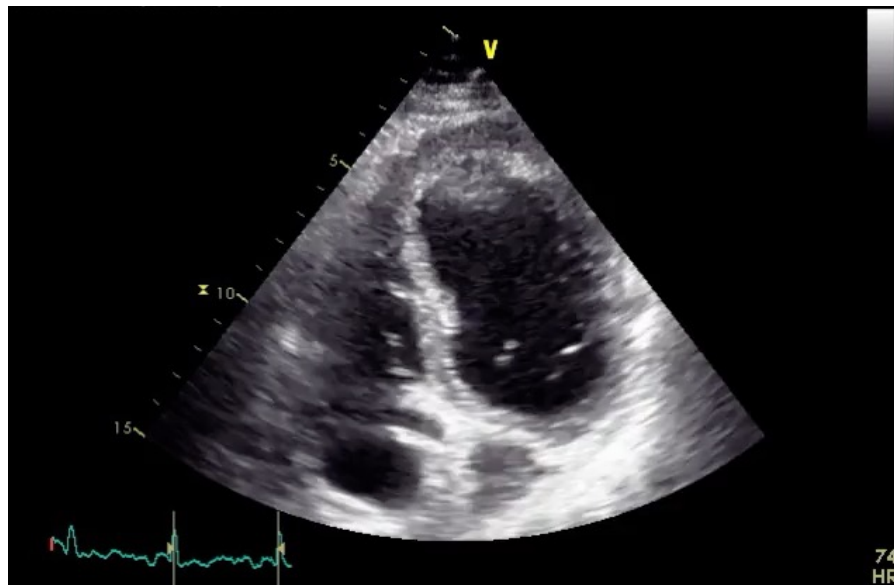
La coronarografia concludeva per → **STEMI anterolaterale con stenosi subocclusiva di DA I tratto (culprit lesion)**. Eseguito stenting diretto medicato su DA I tratto.



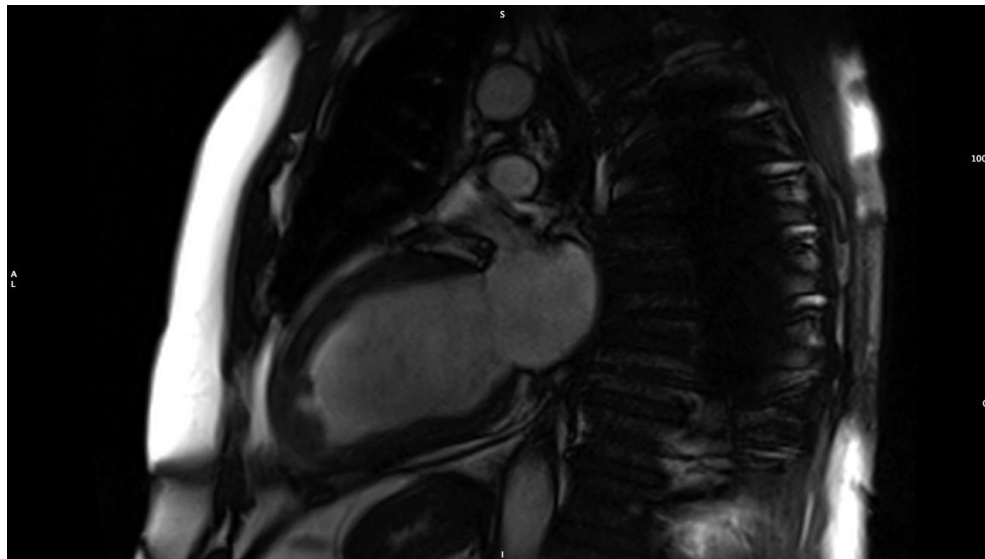
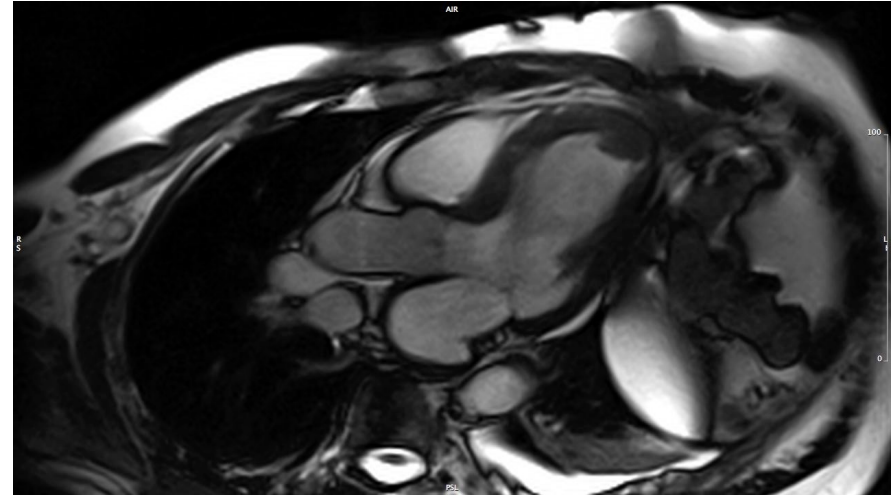
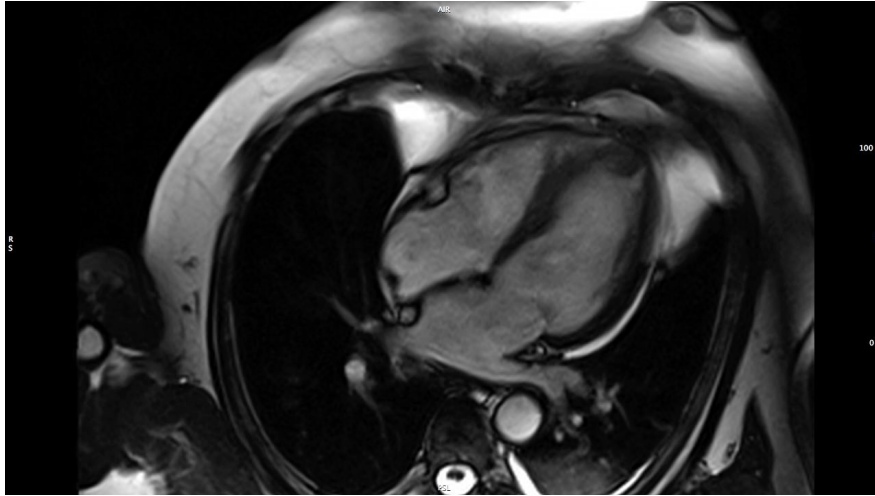
Ecocardiogramma 2D



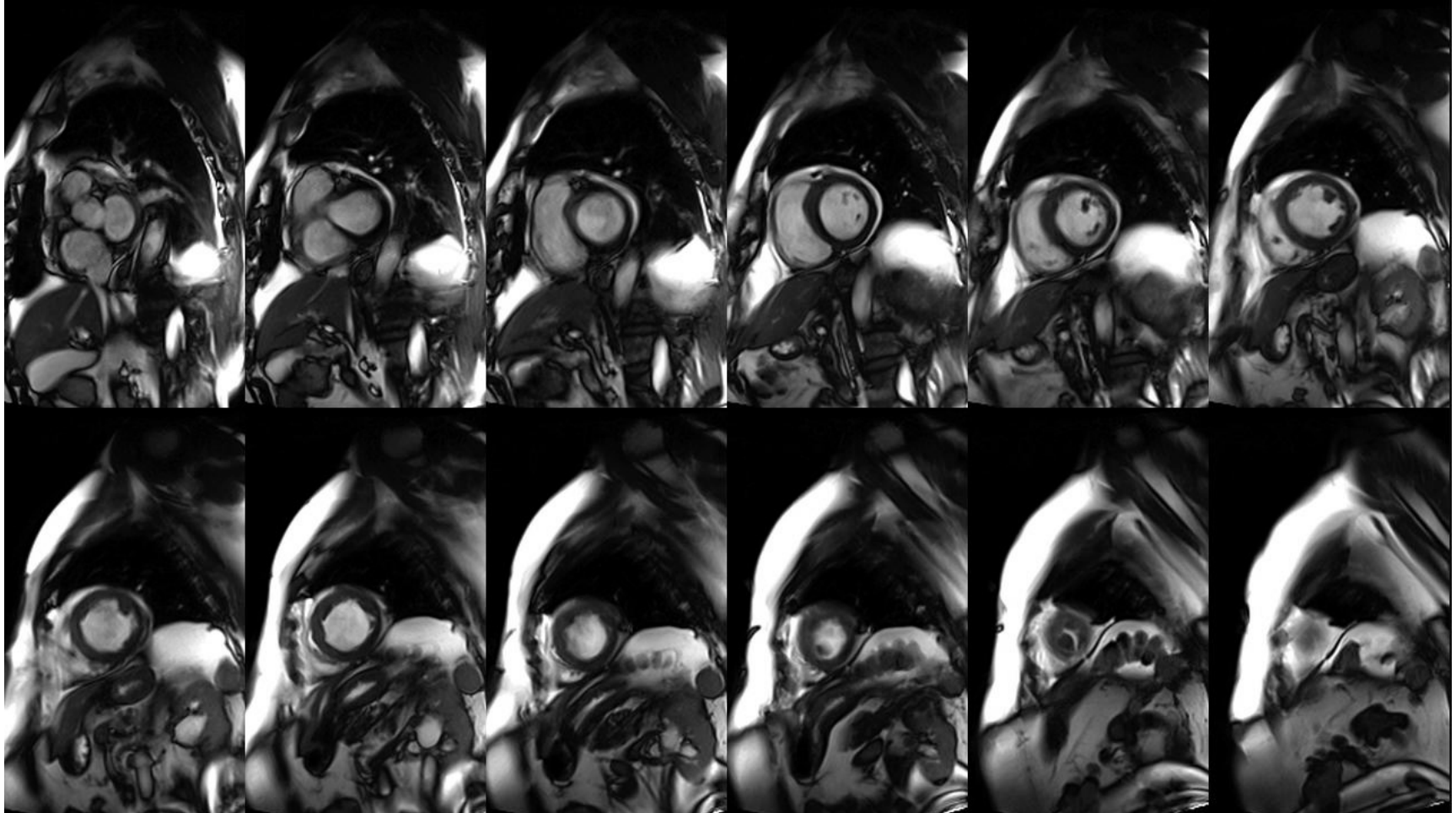
Ecocardiogramma 2D



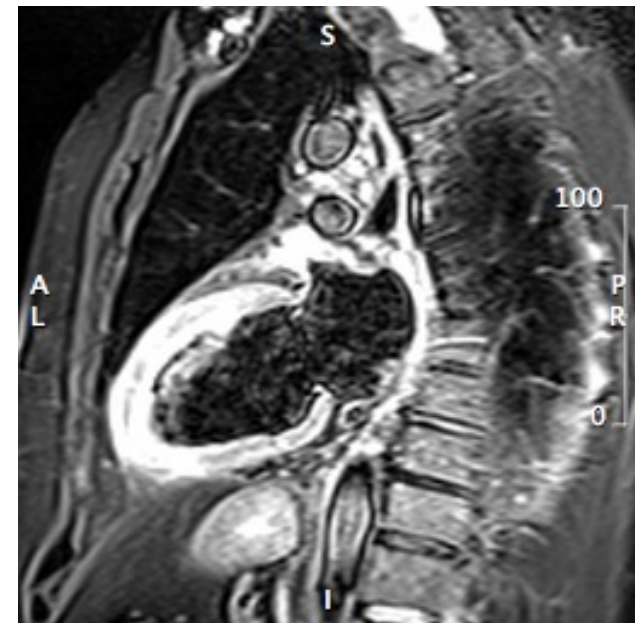
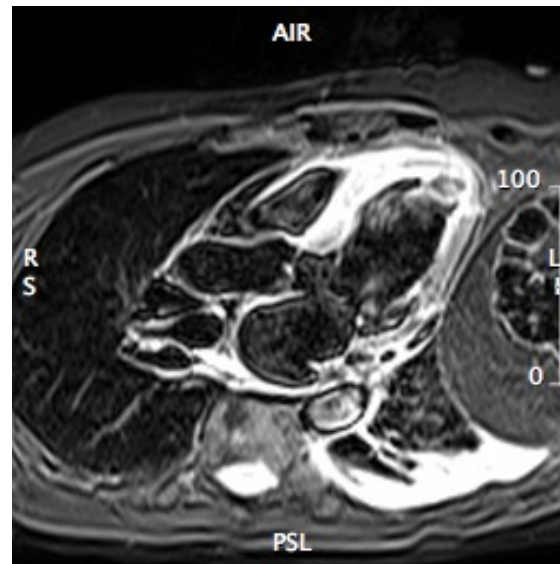
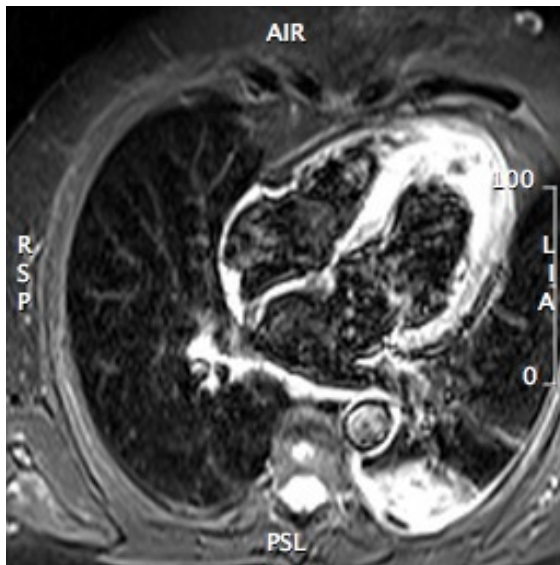
RM cardiaca: la cinetica



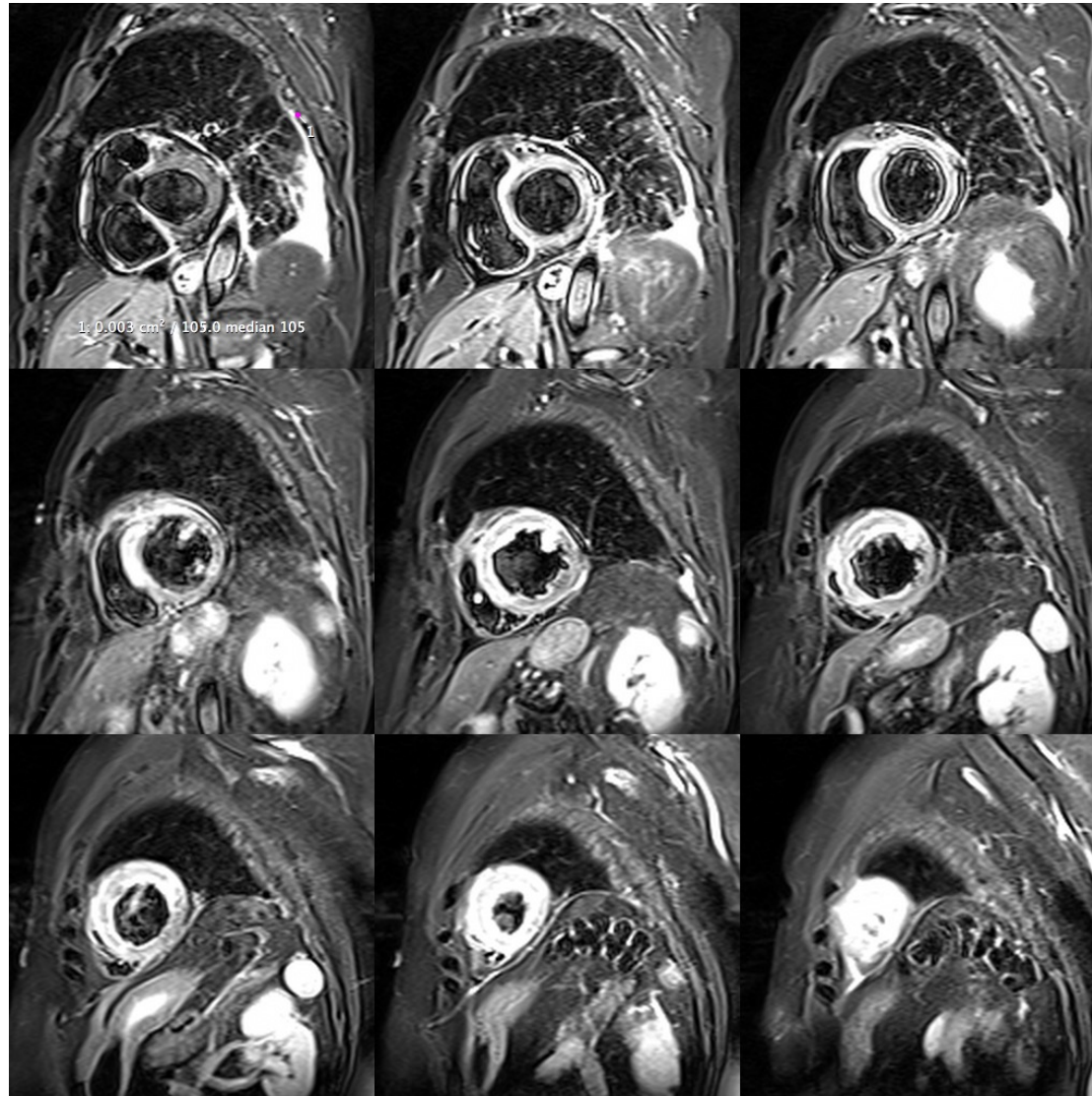
RM cardiaca: la cinetica



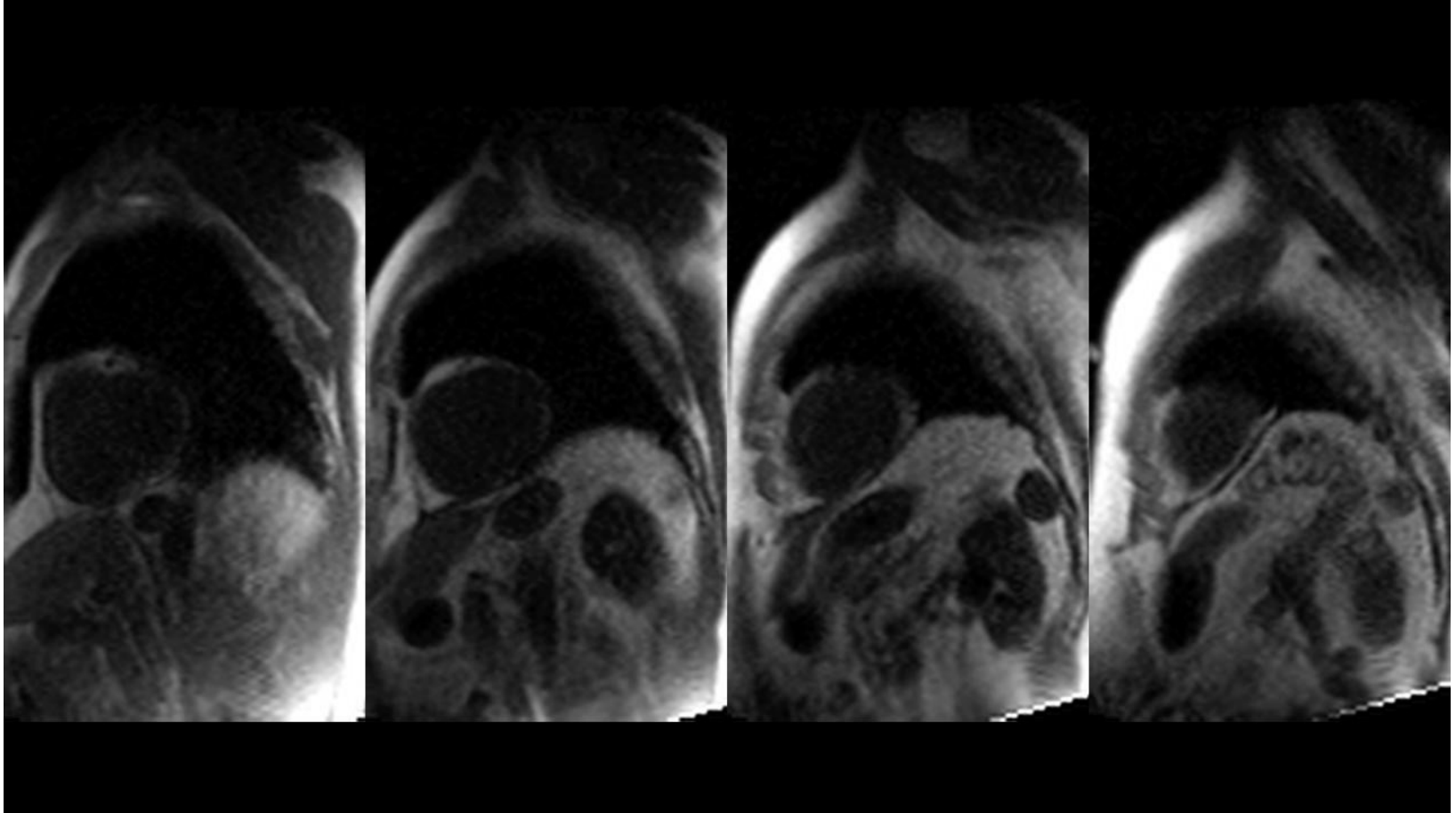
RM cardiaca: l'edema miocardico



RM cardiaca: l'edema miocardico

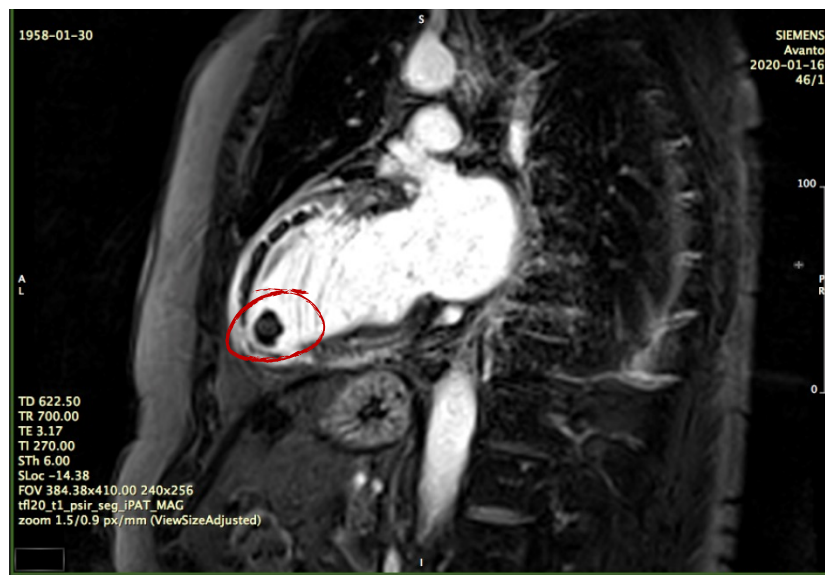
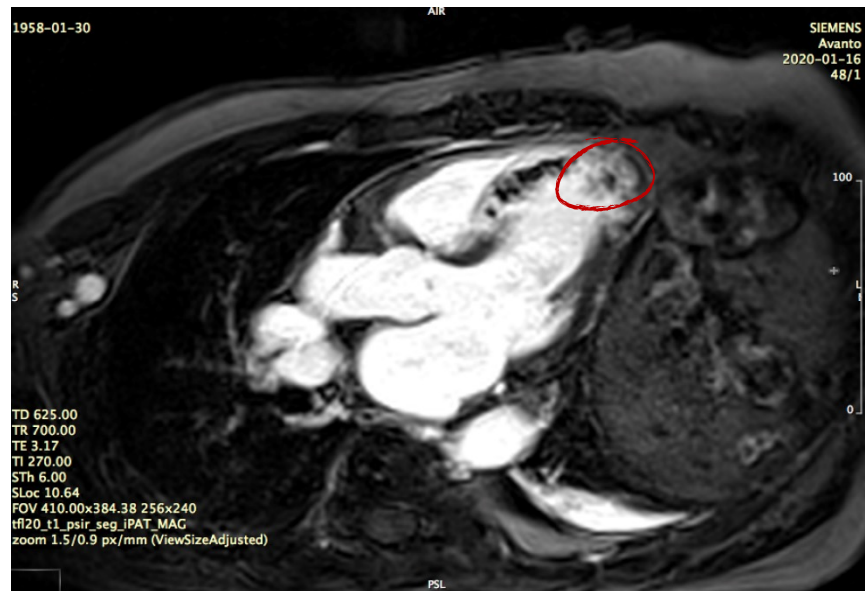
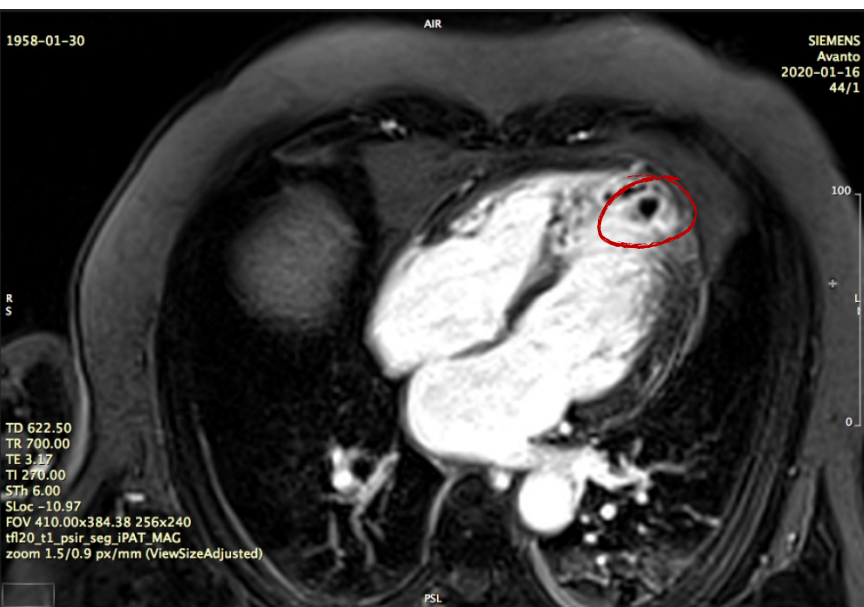


RM cardiaca: la perfusione miocardica

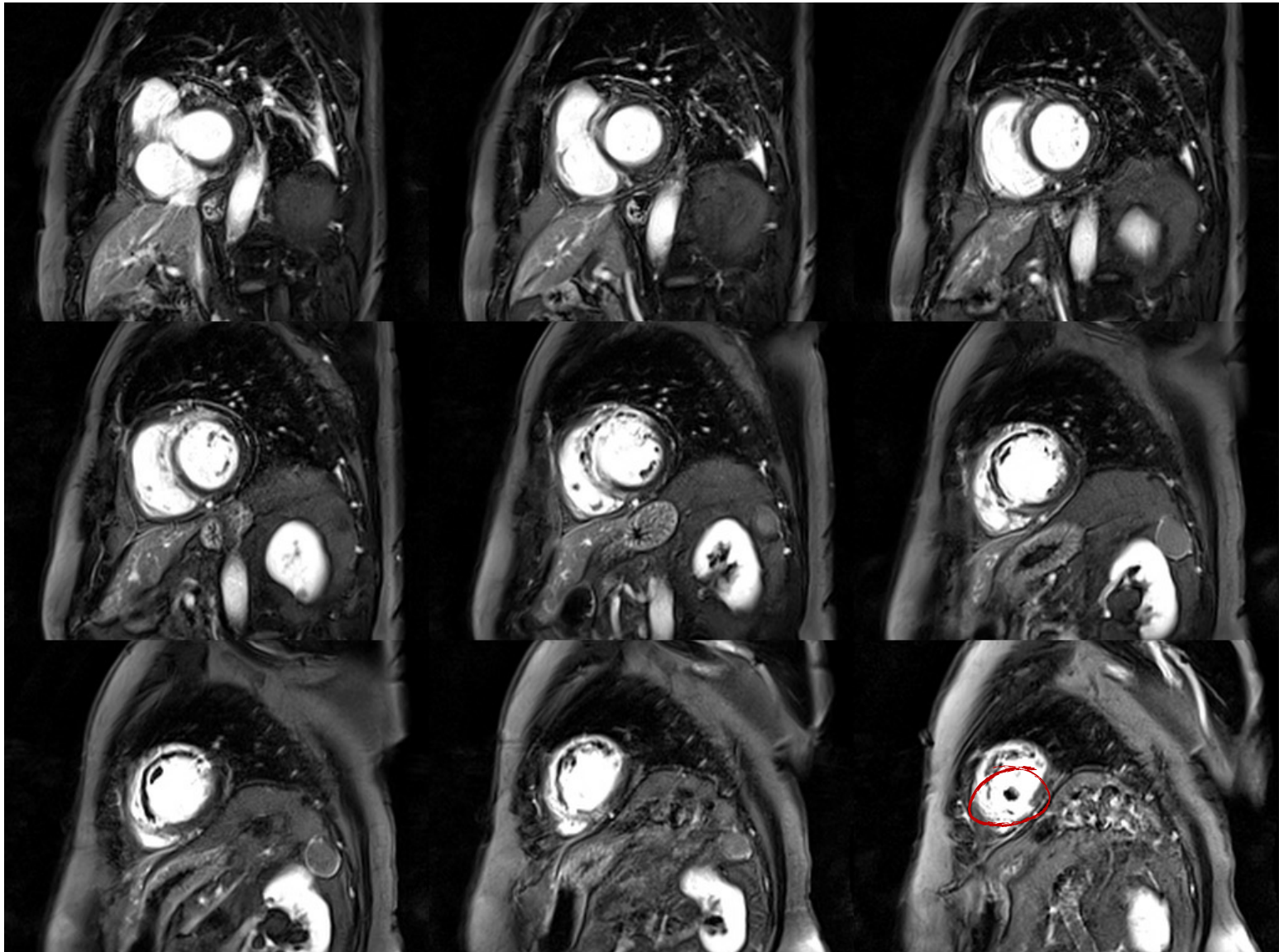


«first pass» → estesa area di ipoperfusione transmurale a carico del setto medio, parete anteriore media, dell'apice.

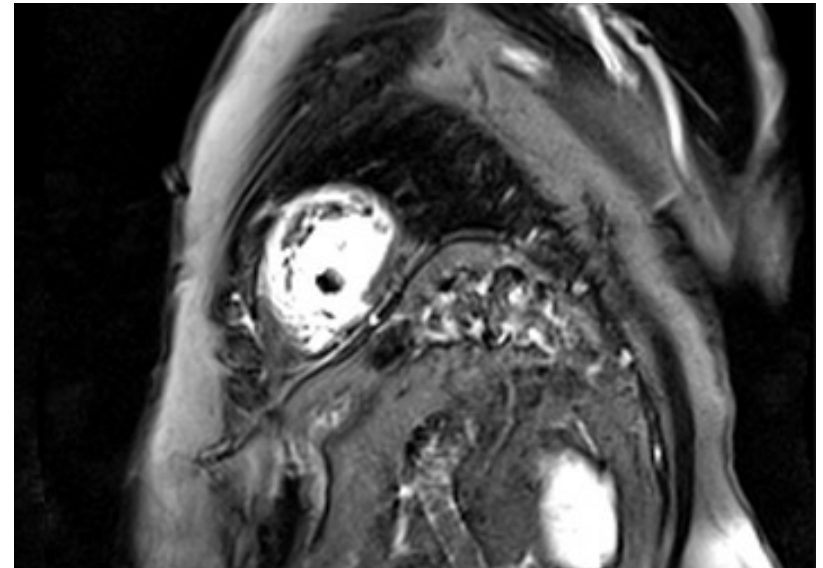
RM cardiaca: Late gadolinium enhancement



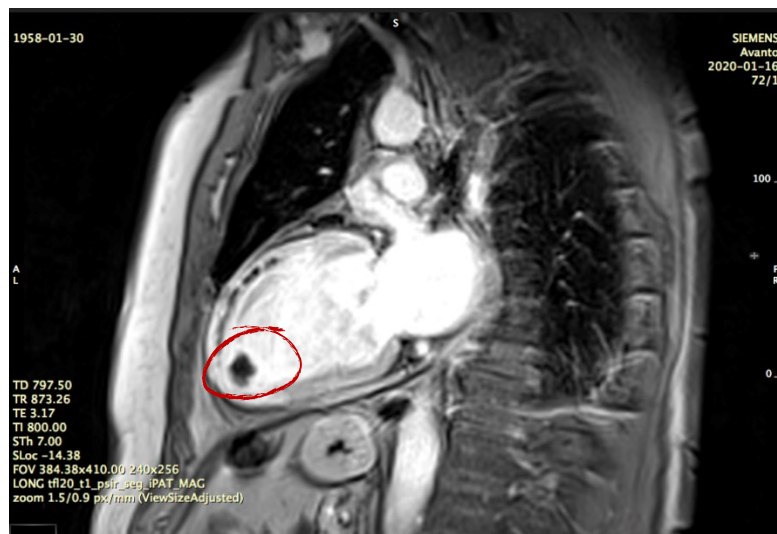
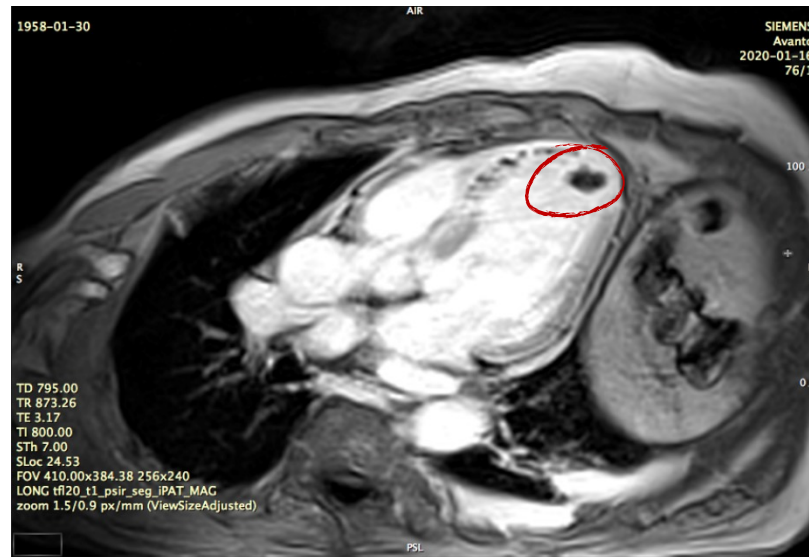
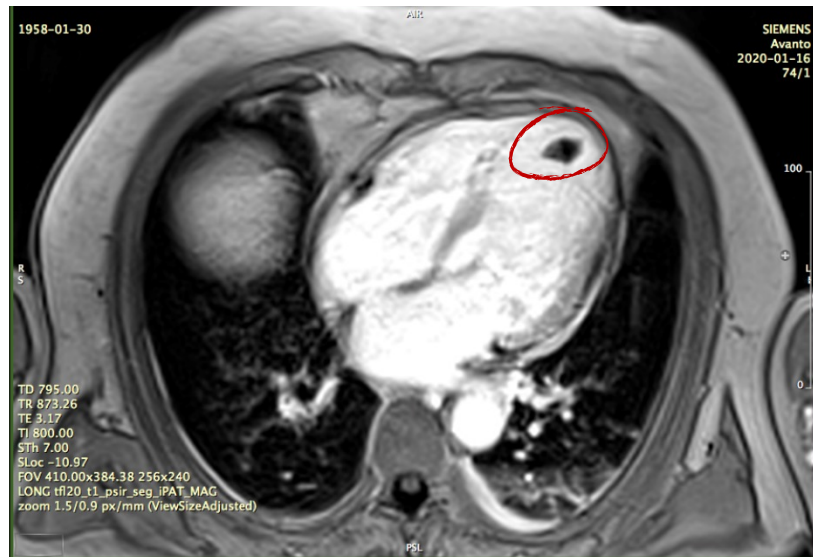
RM cardiaca: Late gadolinium enhancement



RM cardiaca: Late gadolinium enhancement



RM cardiaca: sequenze con TI lungo



Come concludere il referto?

- **patologia cardiaca** → infarto miocardico acuto
- **localizzazione in base alle alterazioni della cinetica, dell'edema, del «first pass» e del LGE** → sede antero-laterale ed apicale
- **caratterizzazione tissutale ed estensione del LGE** → LGE transmurale nelle zone ipo-acinetiche con segni di «dark zone»
- **ulteriori reperti utili da segnalare** → trombosi endocavitaria apicale



La RM cardiaca conclude per «infarto miocardico acuto antero-laterale ed apicale transmurale con estesi segni di «dark zone» compatibili con danno microvascolare. Trombosi endocavitaria apicale»

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