

CMR in Pericardial disease

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30-09-22

.....and a bit of Mark W.....



EACVI
European Association of
Cardiovascular Imaging
 European Society of Cardiology

DOI

- I have nothing to disclose

Pericardium

➤ Congenital Absence

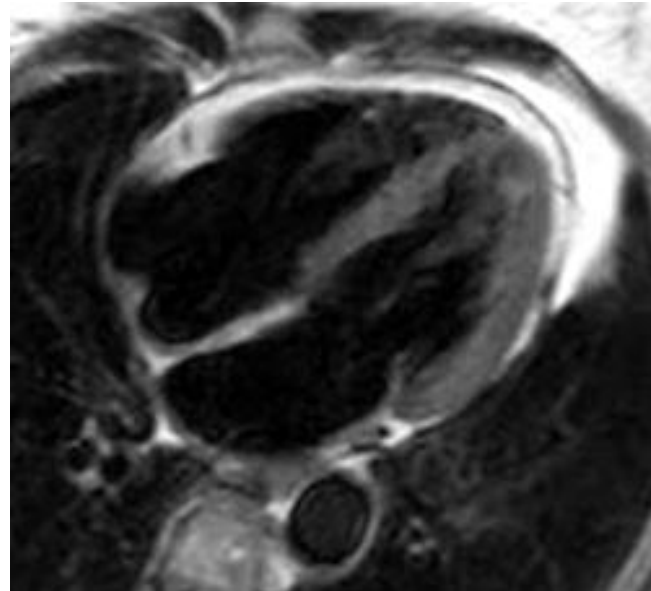
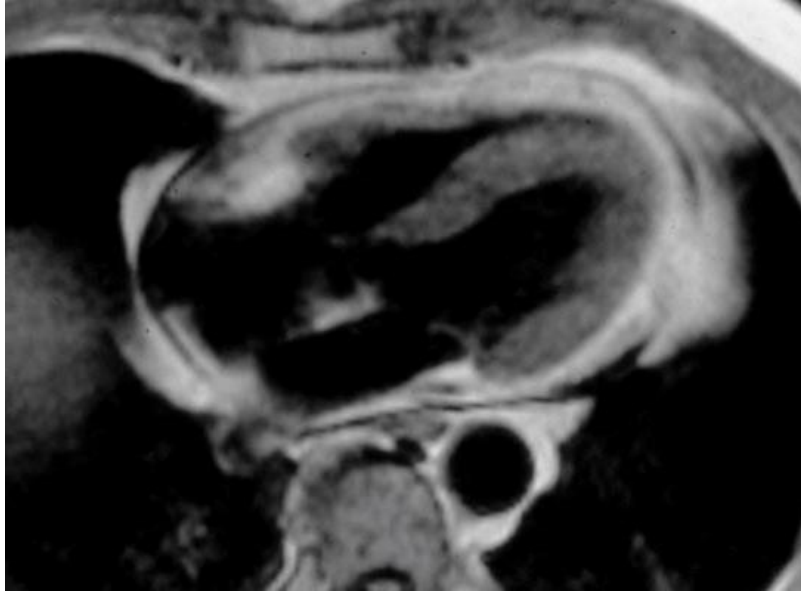
Fluid

This is not a diagnosis!

EASY MARKS!!!!!!!

There are no questions!!!!

Normal pericardium



Normal thickness: 1-3 mm

Congenital Absence of the Pericardium

CMR in Pericardial Disease

Congenital Absence of the Pericardium

Due to premature atrophy of left duct of Curvier

Failure of nourishment of left pleuro-pericardial membrane

Failure of pericardium to develop

Male: Female 3:1

Loss of support of heart

Cardiac Ptosis

Herniation

Displacement into left hemithorax

CMR in Pericardial Disease

Congenital Absence of the Pericardium: CMR

Easily demonstrate displacement of heart

Pilot images

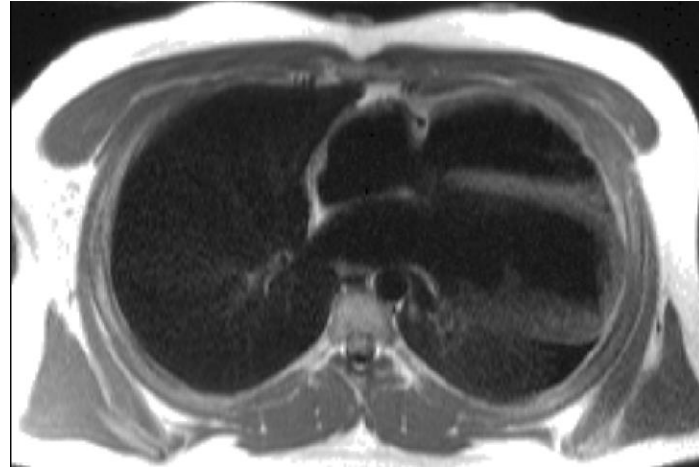
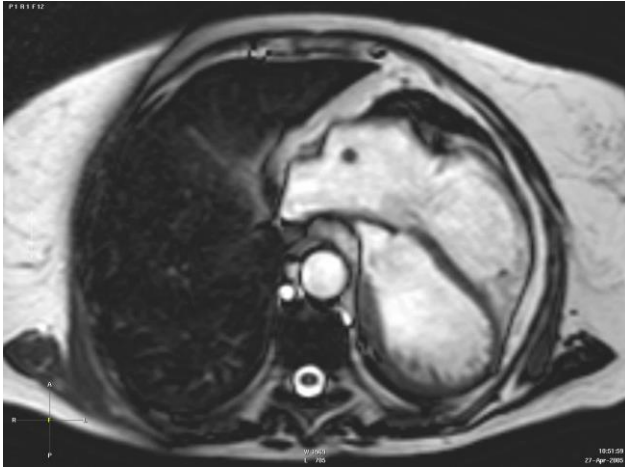
HASTE/Black blood/T1 images

May demonstrate defect in pericardium

Need sufficient pericardial fat for this

CMR in Pericardial Disease

Congenital Absence of the Pericardium: CMR



CMR in Pericardial Disease

Pericardial Cysts



Congenital

If large may be noted as a mass on CXR

Common at right diaphragmatic border

Contain proteinaceous fluid

Do NOT cross tissue planes

CMR in Pericardial Disease

Pericardial Cysts: CMR



Dark on T1 weighted TSE

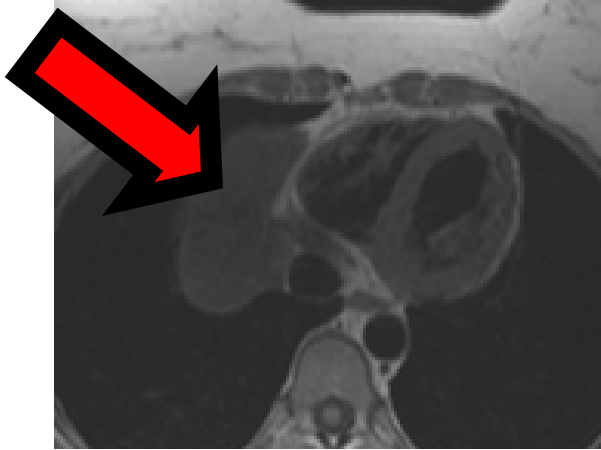
Note does NOT becomes bright if fat saturation is on!

Bright on cine imaging (SSFP)

Bright on T2 weighted TSE

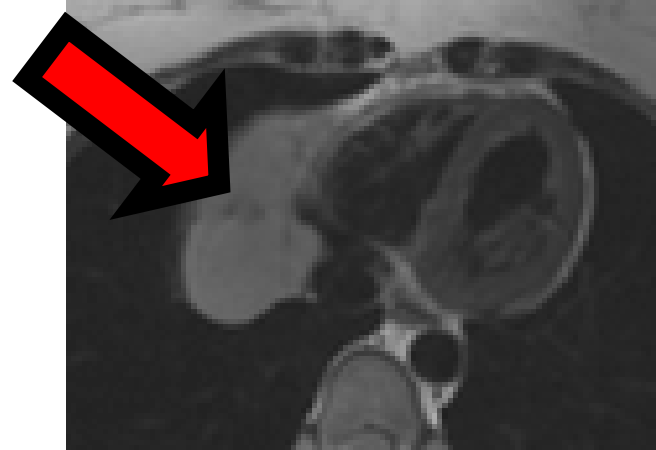
CMR in Pericardial Disease

Pericardial Cysts: CMR



T1 weighted TSE

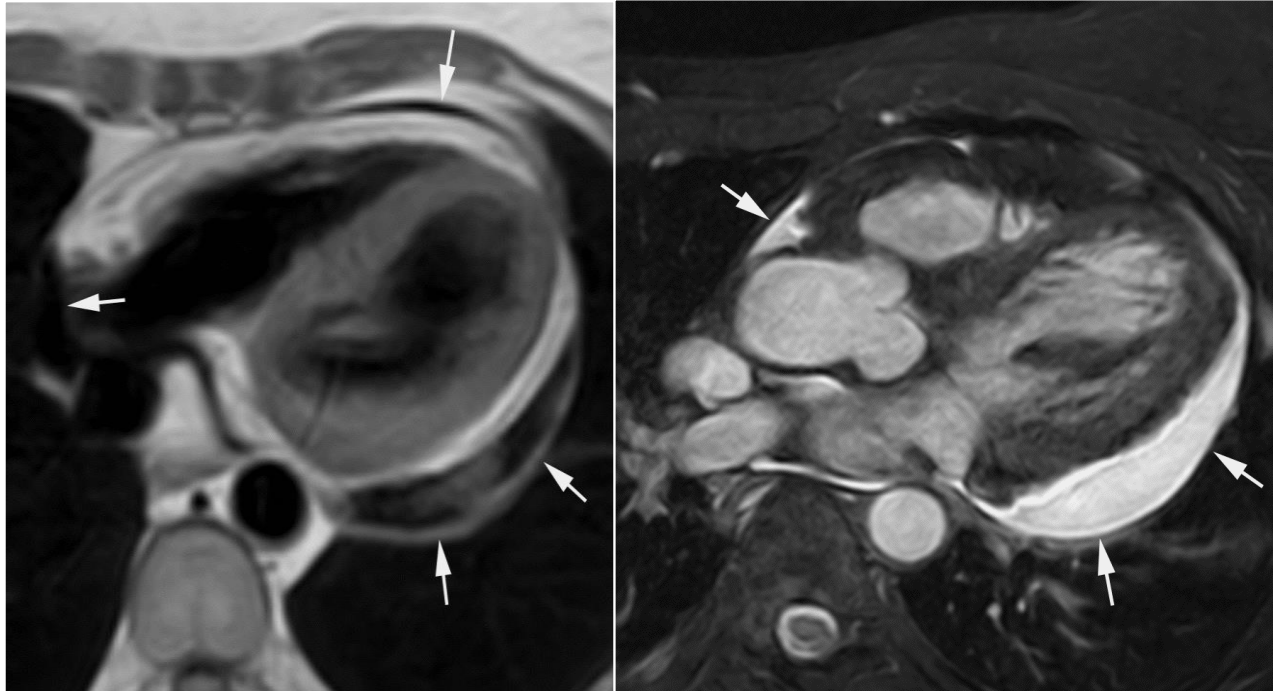
Hypointense (dark) signal in
the pericardial cyst.

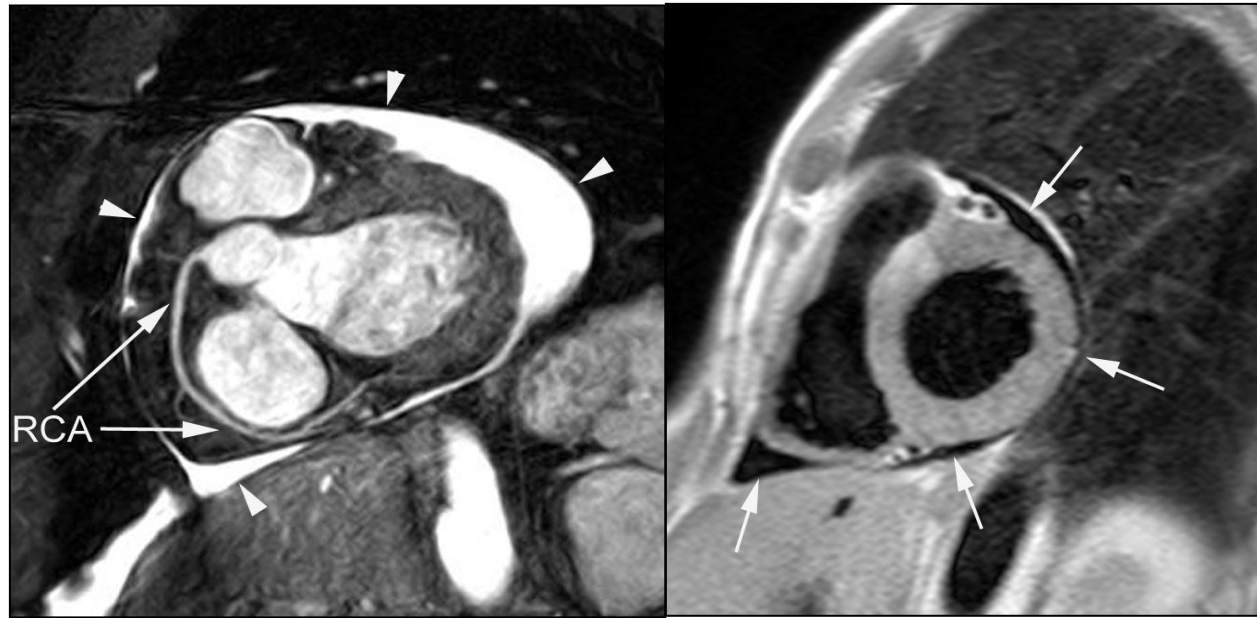


T2 weighted TSE

Hyperintense (bright) signal in
the pericardial cyst
(proteinaceous fluid).

Pericardial Effusion





Sensitivity: > echo

Fluid characterization: transudate – inflammatory - blood

Quantification

Diastolic filling

PERI-MYOCARDITIS: some clinical definitions..... and the second counts

MYOPERICARDITIS = acute pericarditis and:

Elevation of cardiac markers of injury (trop I or T, CK-MB fraction)

Wo new onset of focal or diffuse LV dysfunction by echo or CMR

PERIMYOCARDITIS = acute pericarditis and:

Elevation of cardiac markers of injury (trop I or T, CK-MB fraction)

new onset of focal or diffuse LV dysfunction by echo or CMR

MYOCARDITIS

PERICARDITIS



PERICARDITIS OR MYOPERICARDITIS ?

MYOPERICARDITIS	OR	CI	P value
Arrhythmias	17.6	5.7-54.1	<0.001
Male gender	6.4	2.3-18.4	0.01
Age<40 yrs	6.1	2.2-16.9	0.01
ST elevation	5.4	1.4-20.5	0.013
Recent fever	2.8	1.1-7.7	0.044
PERICARDIAL	EFFUSION	LESS	FREQUENT

Imazio M, Heart 2007

- ITIS: MAGNETIC RESONANCE

PERICARDITIS:

Pericardial thickening

Pericardial enhancement

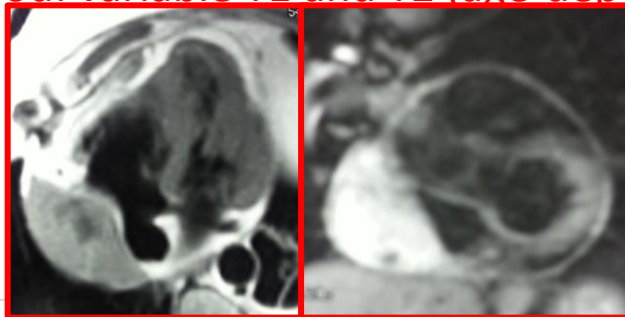
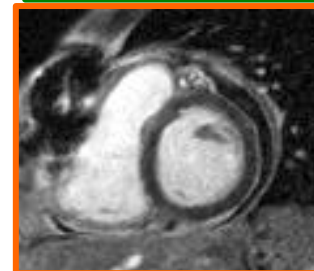
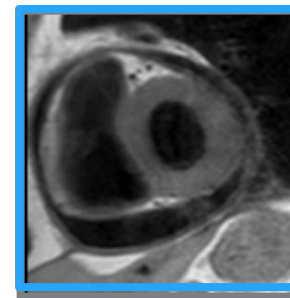
Pericardial effusion characterization:

Transudate: low T1, high T2

Essudate: low-intermed T1, intermed T2

Chilous

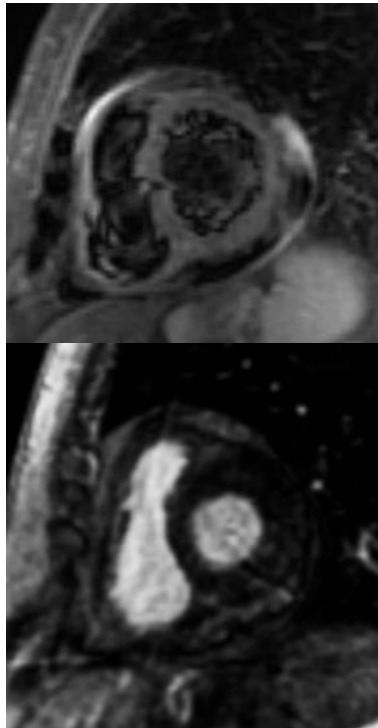
Blood: variable T1 and T2 (age-dependent)



- ITIS: MAGNETIC RESONANCE

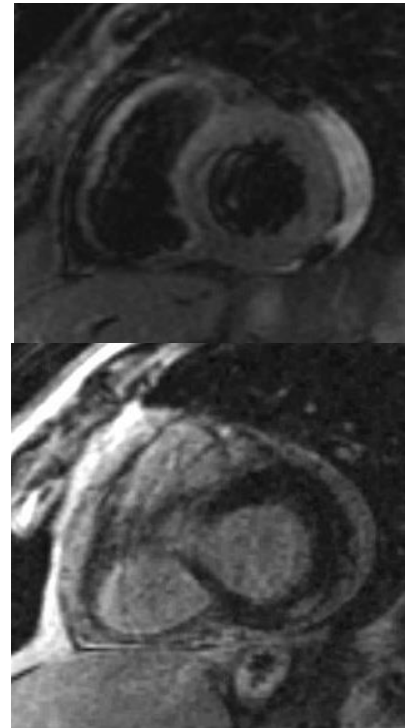
MYOPERICARDITIS

EF 61%

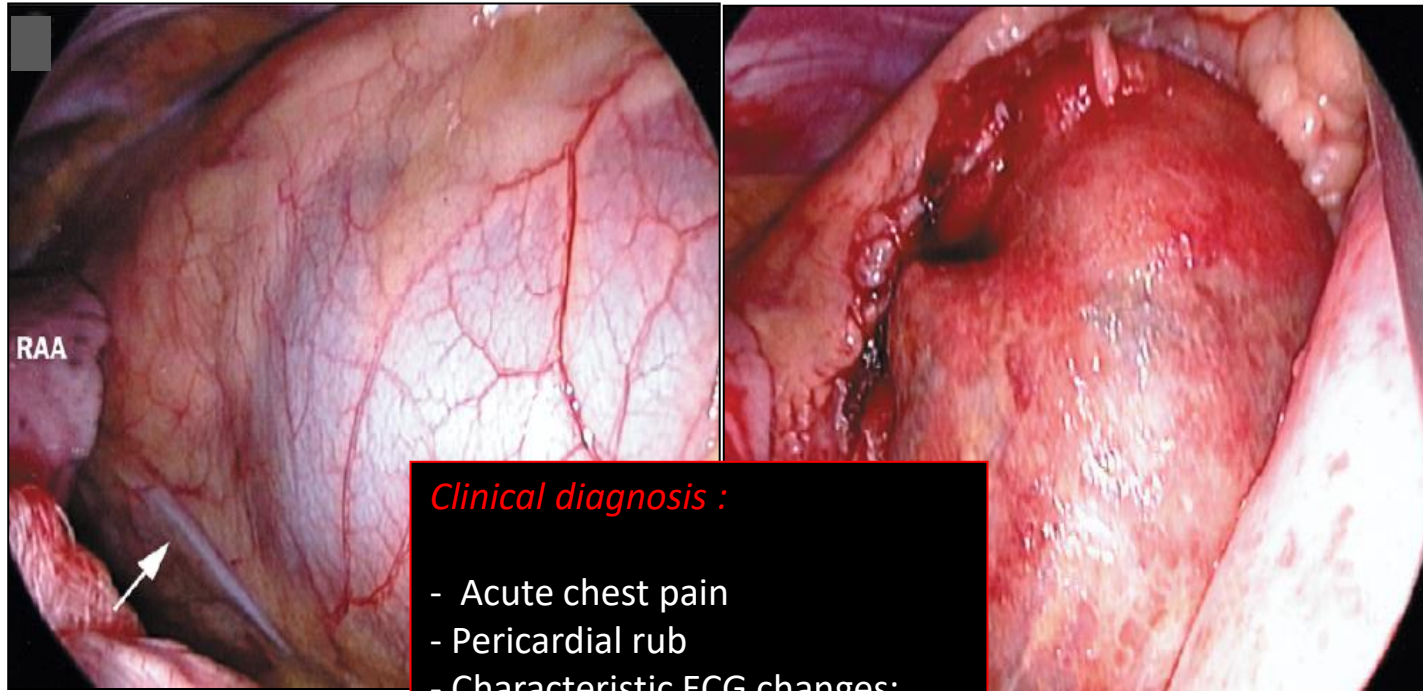


PERIMYOCARDITIS

EF 49%



Acute Pericarditis



Clinical diagnosis :

- Acute chest pain
- Pericardial rub
- Characteristic ECG changes:
 - widespread ST elevation
 - T inversion

Acute Pericarditis

- Common (1% at autopsy)¹

Friman G et al Scand J Infect Dis Suppl 1993; 88: 7–10

- Variable etiology

- Fibrinous “sicca” pericarditis

- Pericardial layers thickening +/- effusion

- Possible development of constrictive pericarditis

- Inflammation amount at pathology correlates with enhancement amount

Taylor AM et al Eur Radiol 2006

- D/d: effusion vs constriction

Causes of acute pericarditis

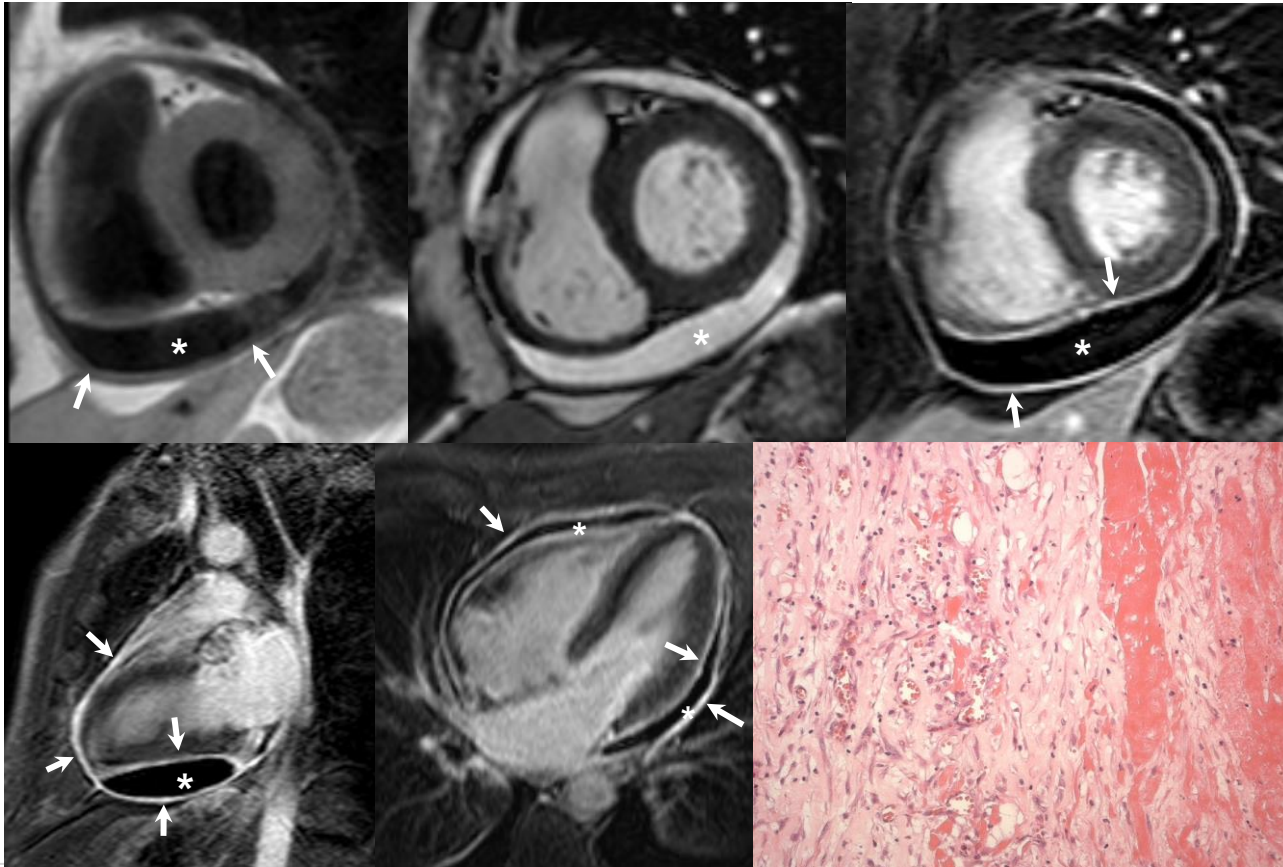
- Idiopathic
- Infections (viral, tubercular, fungal)
- Acute myocardial infarction (acute, delayed)
- Neoplasm
- Post-cardiac injury syndrome (trauma, surgery)
- Systemic autoimmune disease (SLE, rheumatoid arthritis, serum-negative spondylitis, panarterite nodosa)
- After mediastinal radiation




Acute Pericarditis



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Post-infarction pericarditis



Post-myocardial infarction syndrome (Dressler's Syndrome)

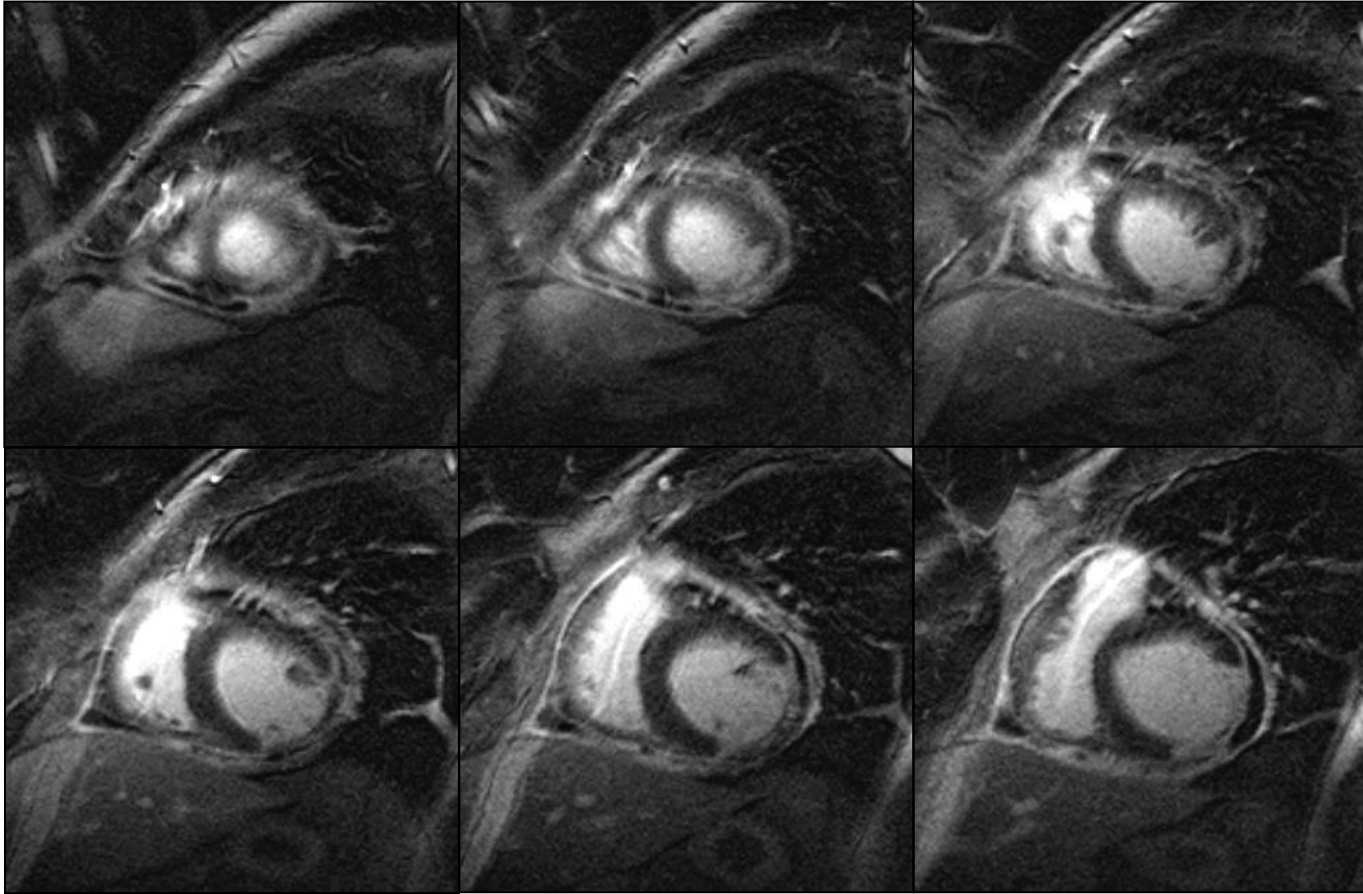
- does not require a transmural infarction
- appears after week-months
- High sedimentation rate
- Considerable “pericardial” pain,
- Frequent pericardial effusions, pleuritis,
- Often pneumonitis associated
- Autoimmune etiology
- Very rare



Epistenocardiac pericarditis

- Transmural infarction
- Coincident with AMI
- Few systemic signs
- Paucisymptomatic
- Direct injury to visceral pericardium
- Not unfrequent

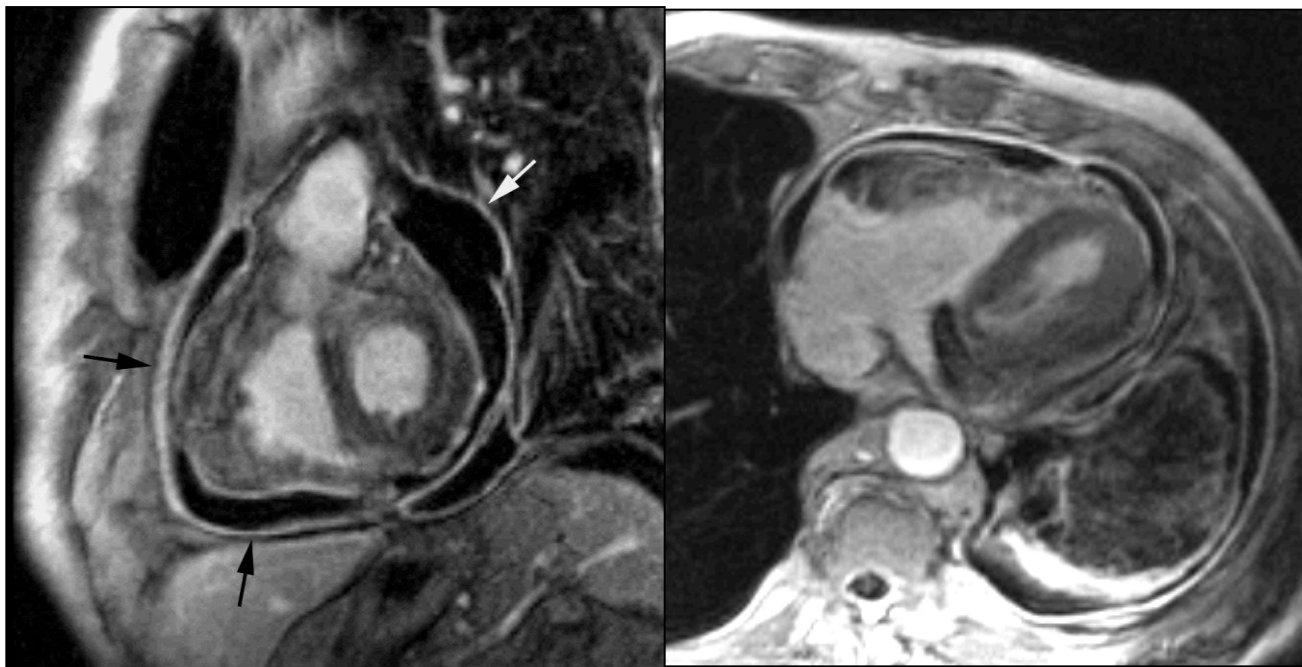
Post-infarction pericarditis



Mycotic Pericarditis in HIV patient

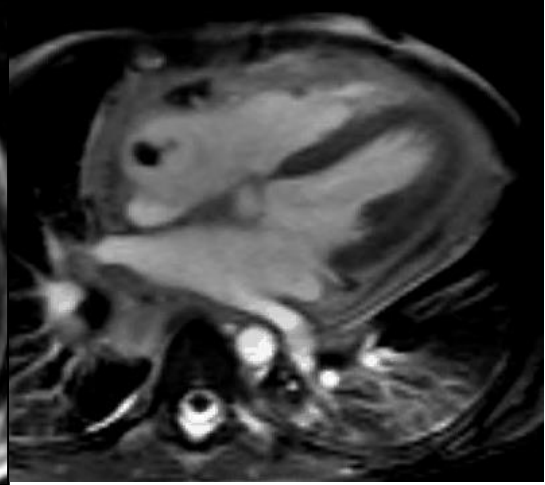
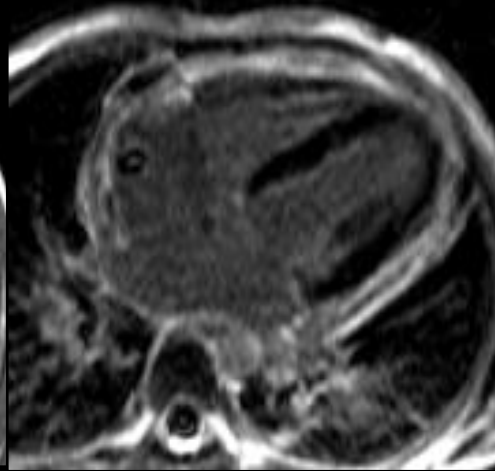


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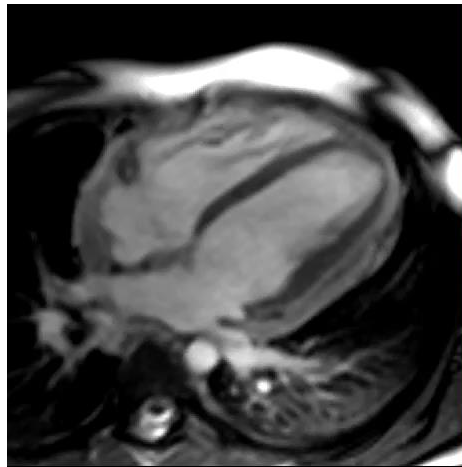


TBC pericarditis

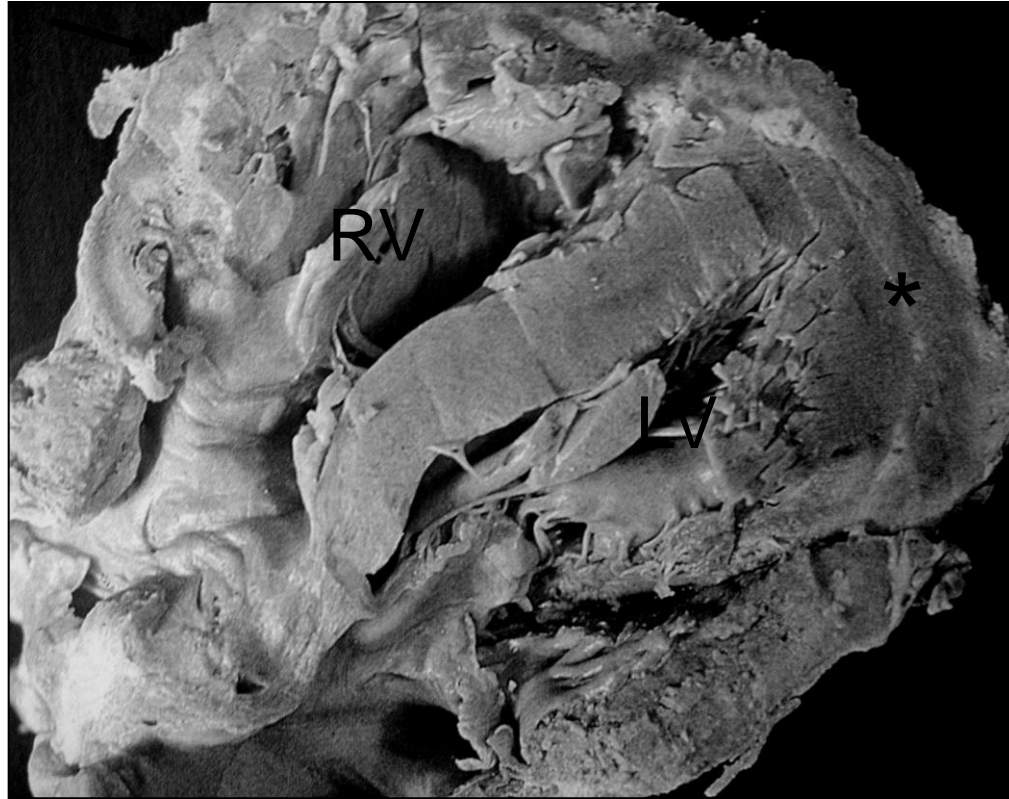
Jan 2006



May 2006



Constrictive Pericarditis

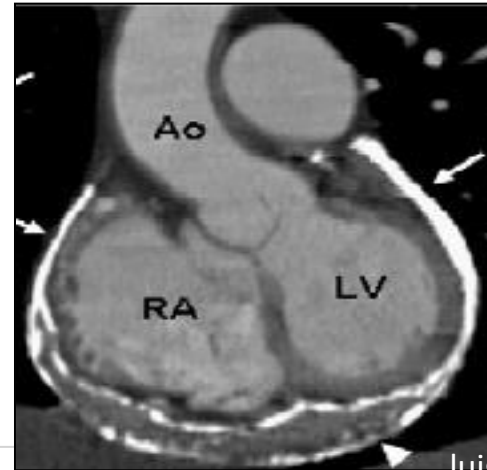
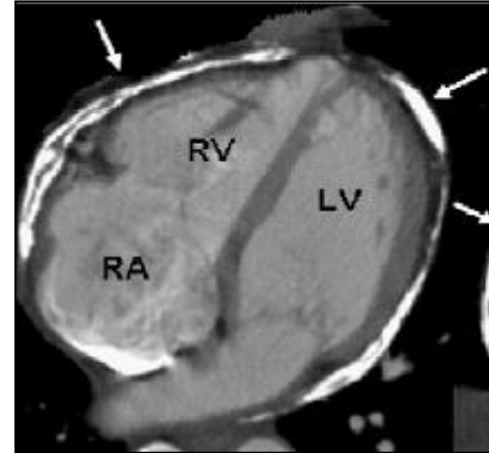
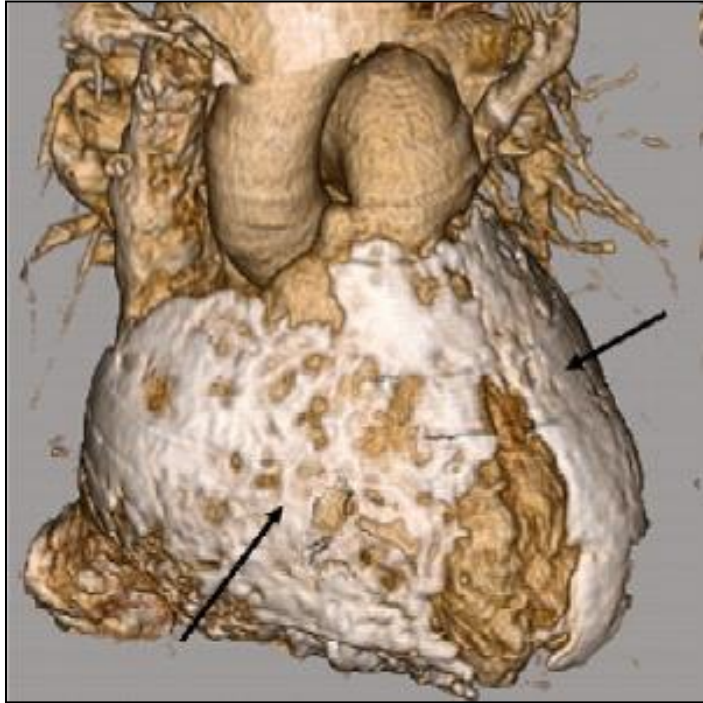


Morphology + diastolic dysfunction

Constrictive Pericarditis



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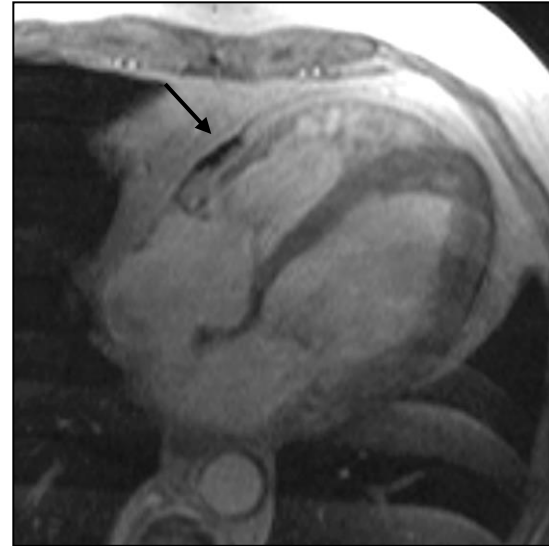


“egg-shell calcifications”

Constrictive Pericarditis



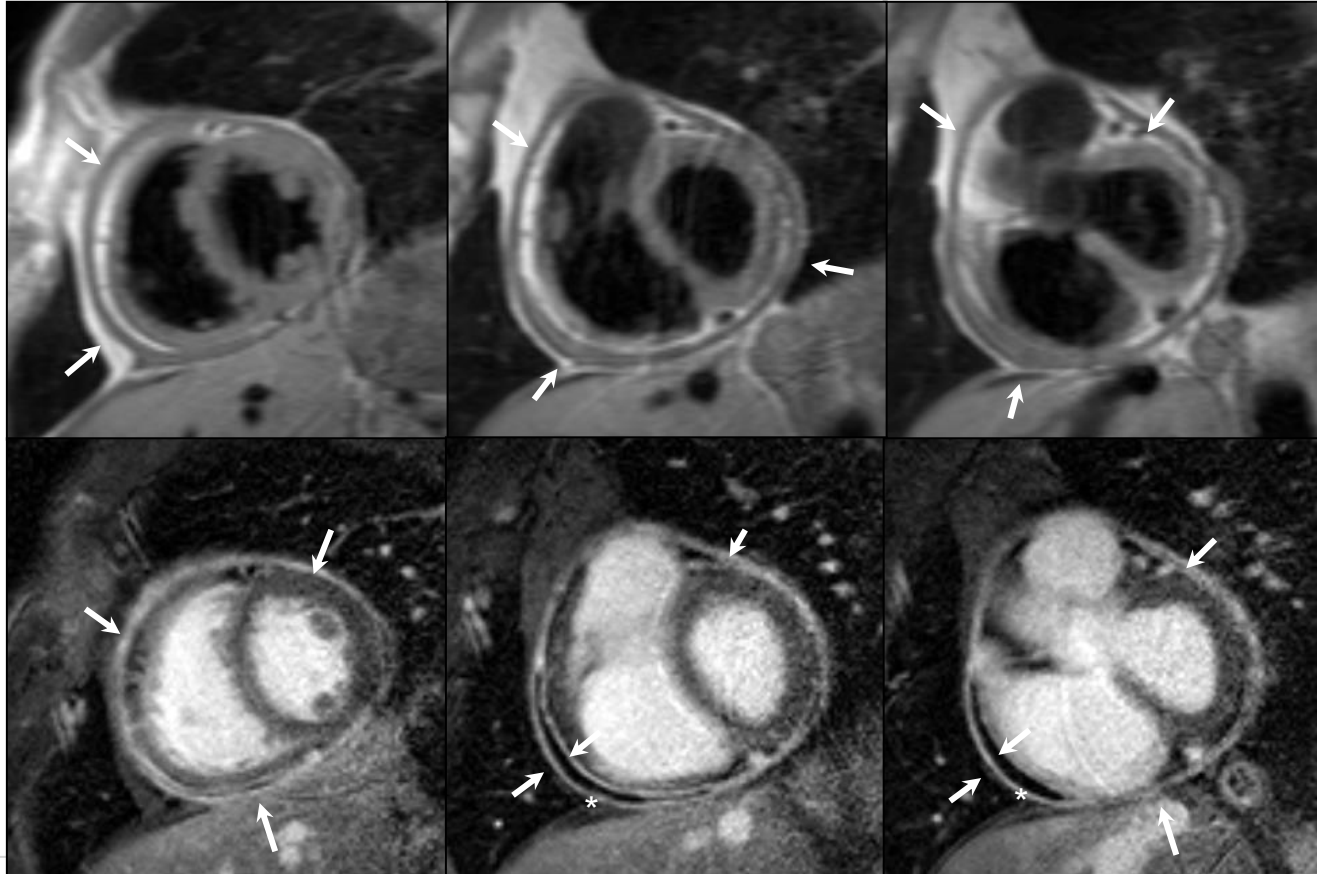
Constrictive pericarditis: focal thickening

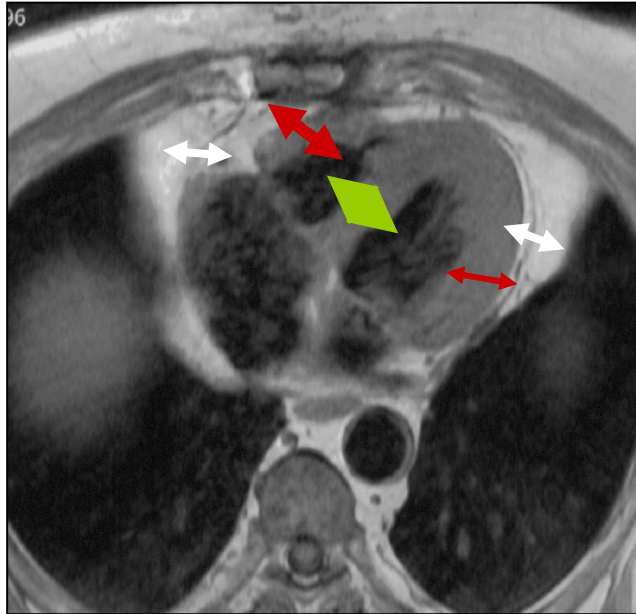


Constrictive pericarditis: pericardial layers enhancement



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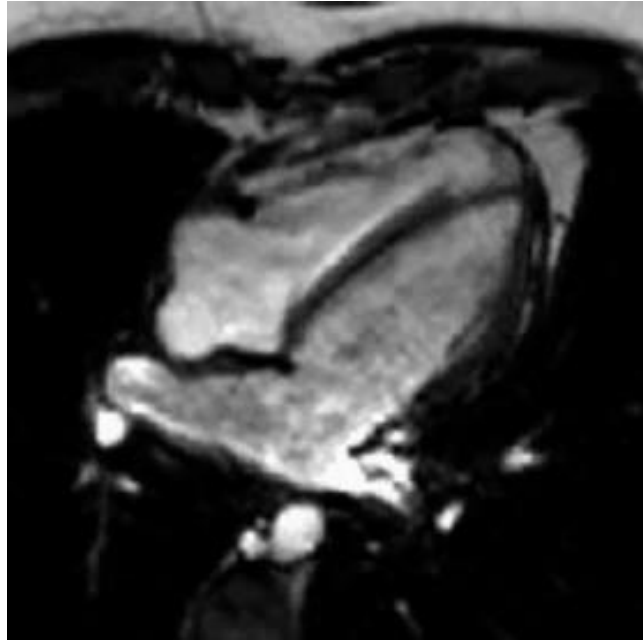


Interaction between:

- Pleura - Pericardium
- Pericardium – Ventricle
- LV \Leftrightarrow RV

- (1) Imbalance between intra-thoracic and intra-cardiac pressures
(pericardium acts as a “barrier”)
- (2) Reduced filling = increase trans-septal ΔP

Paradoxical septal motion



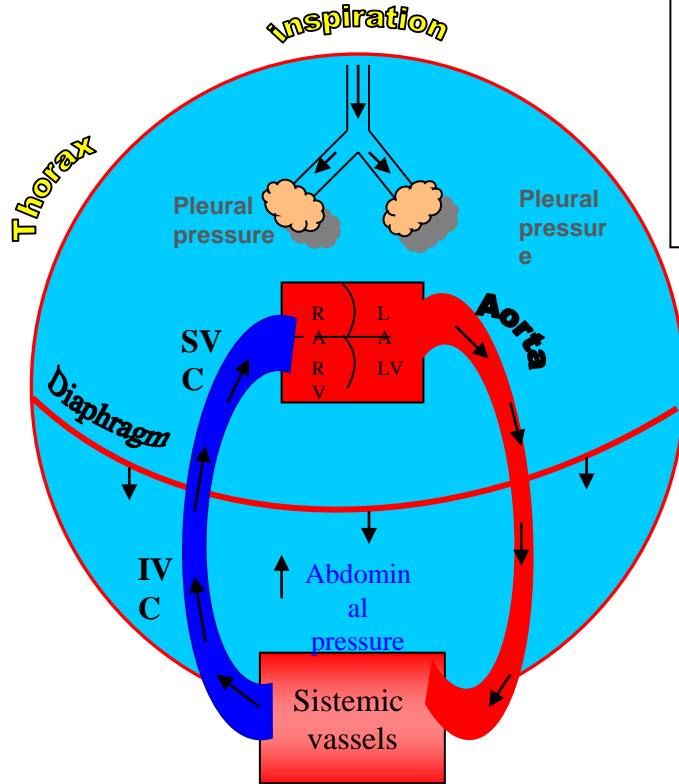
Real-Time MRI

JOURNAL OF MAGNETIC RESONANCE IMAGING 21:305-309 (2005)

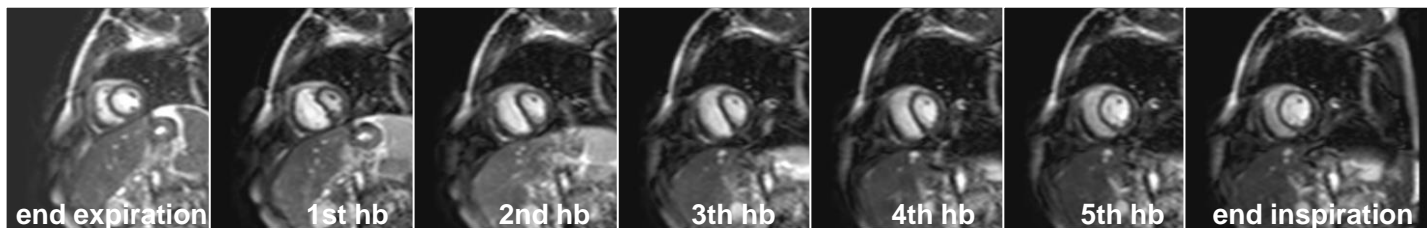
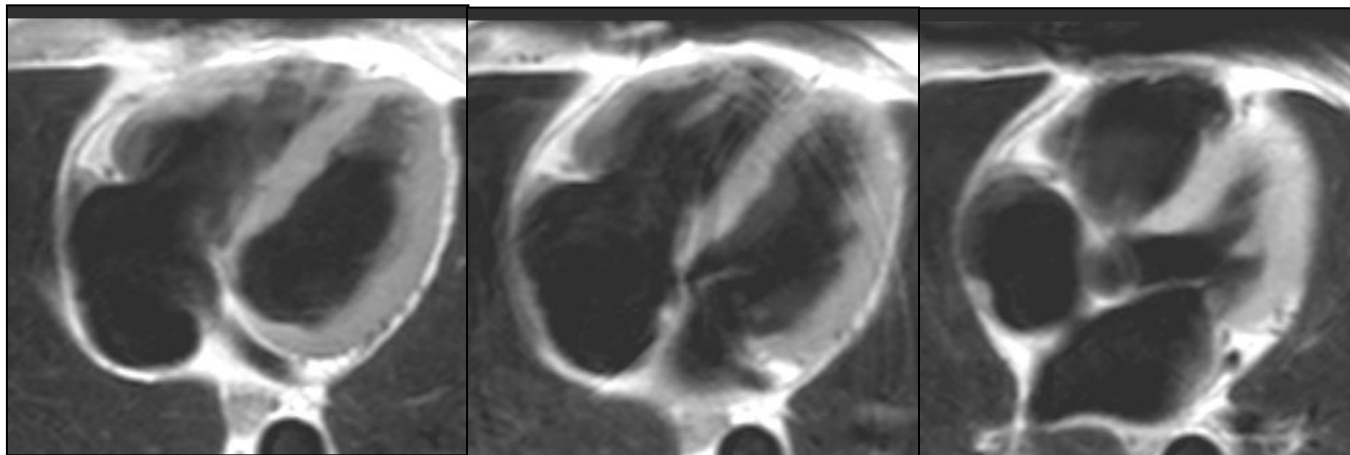
Clinical Note _____

Real-Time Cine MRI of Ventricular Septal Motion: A Novel Approach to Assess Ventricular Coupling

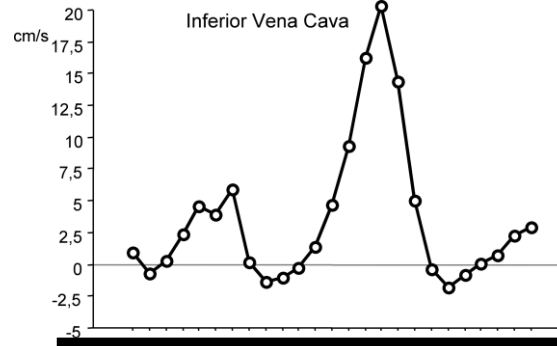
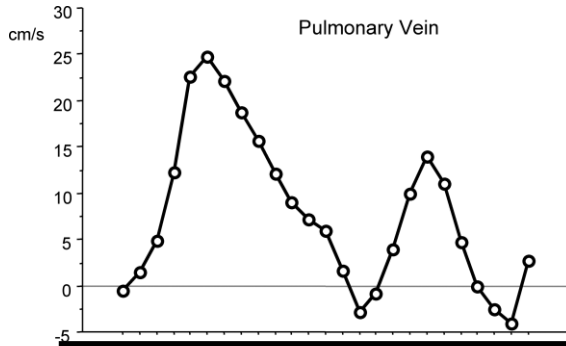
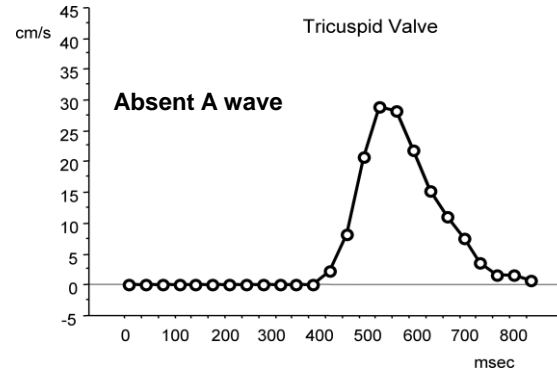
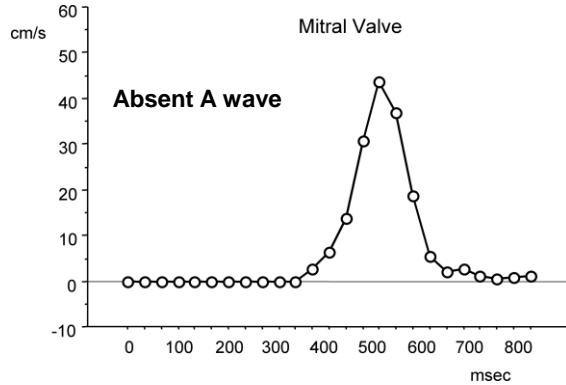
Marco Francone, MD, Steven Dymarkowski, MD, PhD, Maria Kalantzi, MD, and Jan Bogaert, MD, PhD*



Constrictive pericarditis without thickening



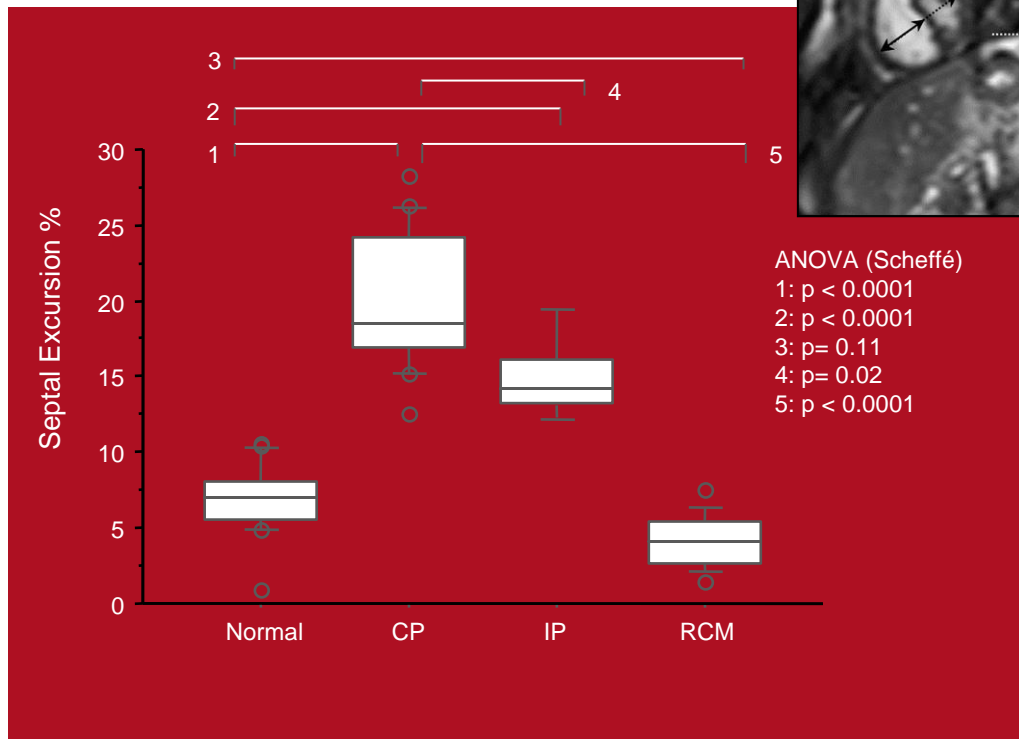
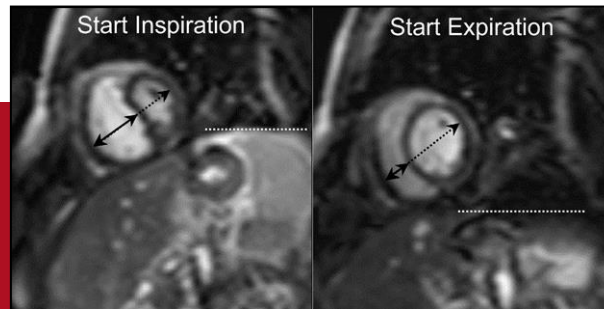
Constrictive pericarditis: velocity mapping



Reduced anterograde systolic flow

Reduced anterograde systolic flow

IVS motion analysis



(Francone et al. JMRI 2005 / Eur Radiol 2006)

Pericardial diseases: the essentials

Acute Pericarditis

T1w TSE: layers thickening

GRE-IR: delayed enhancement

Cine SSFP global an regional function

Constrictive pericarditis

T1w TSE: layers thickening > 4mm + atria and ventricles size and shape

VENC: E/A; ↓ anterograde systolic flow IVC

Cine SSFP + RT-MRI basal and insp/exp paradoxical septal motion

GRE-IR: pericardial layers delayed enhancement

Pericardium

➤ Congenital Absence

Fluid

This is

as!

EASY MARKS!!!!!!!

There are

the questions!!!!