

SUNG KYUN KWAN  
UNIVERSITY

## Case Discussion

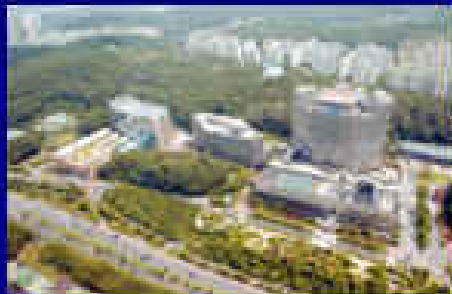
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Samsung Medical Center

Sungkyunkwan University

Seoul, Korea

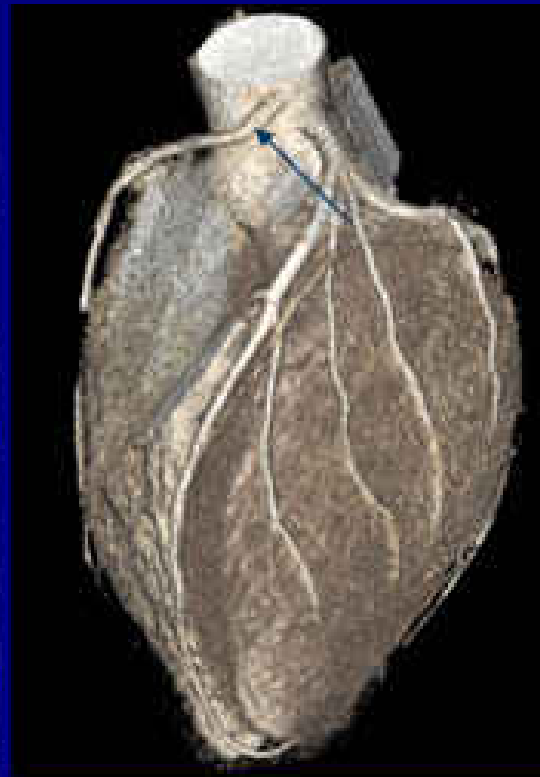


# Intermittent chest pain

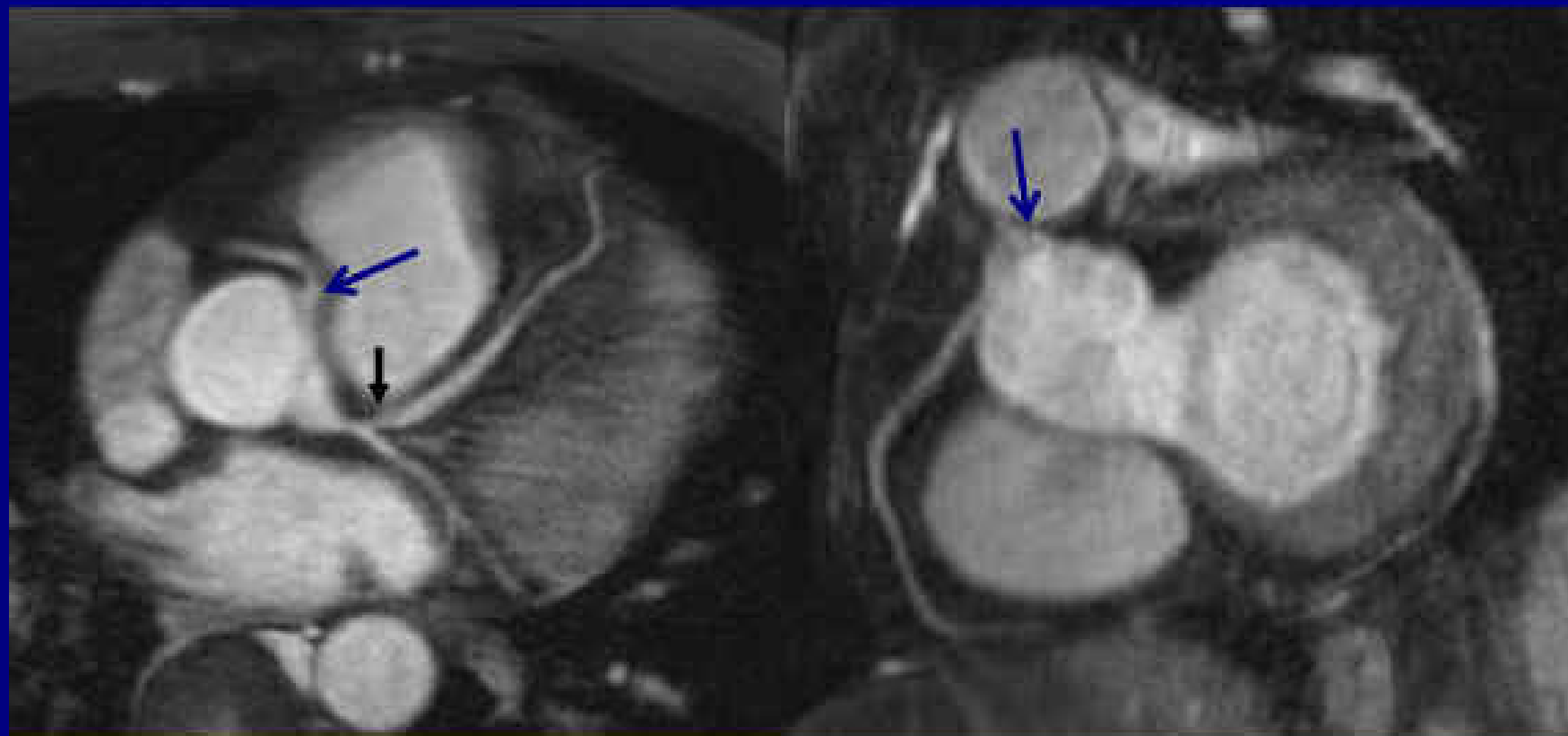
25/M

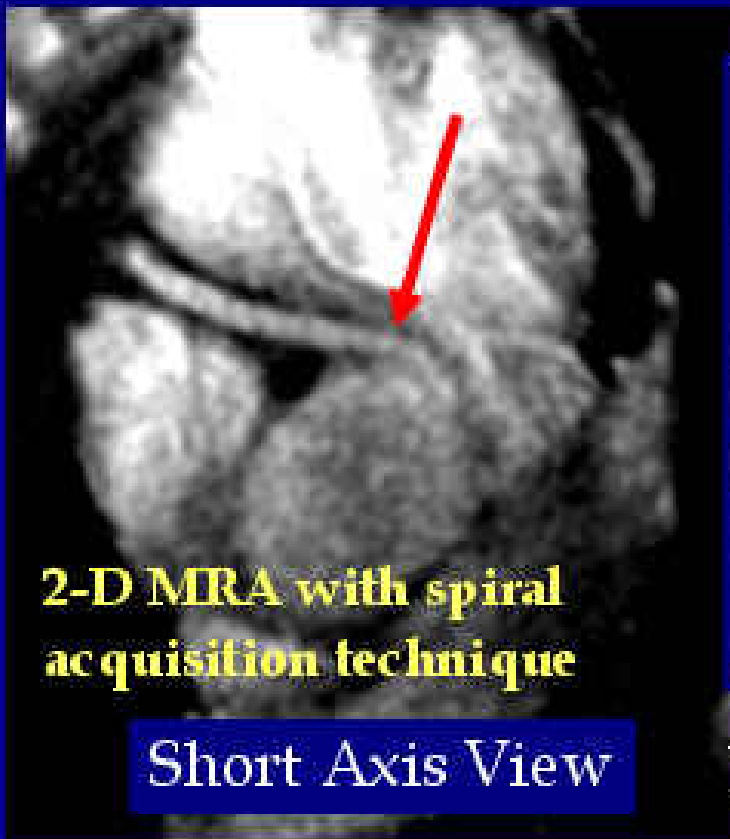


# Anomalous Right Coronary Artery from Left Coronary Sinus



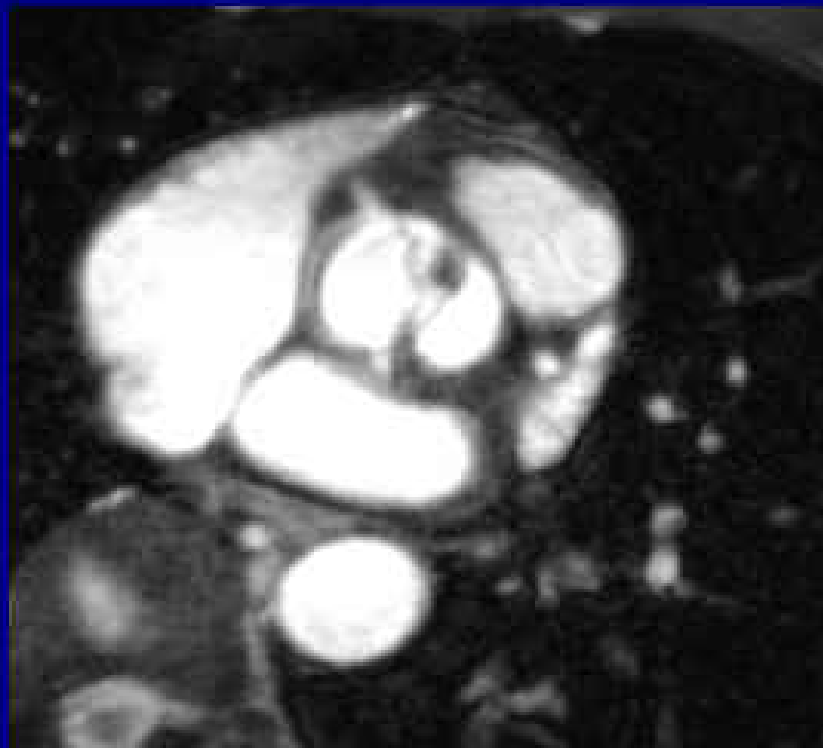
## LAD lesion, RCA from L Sinus



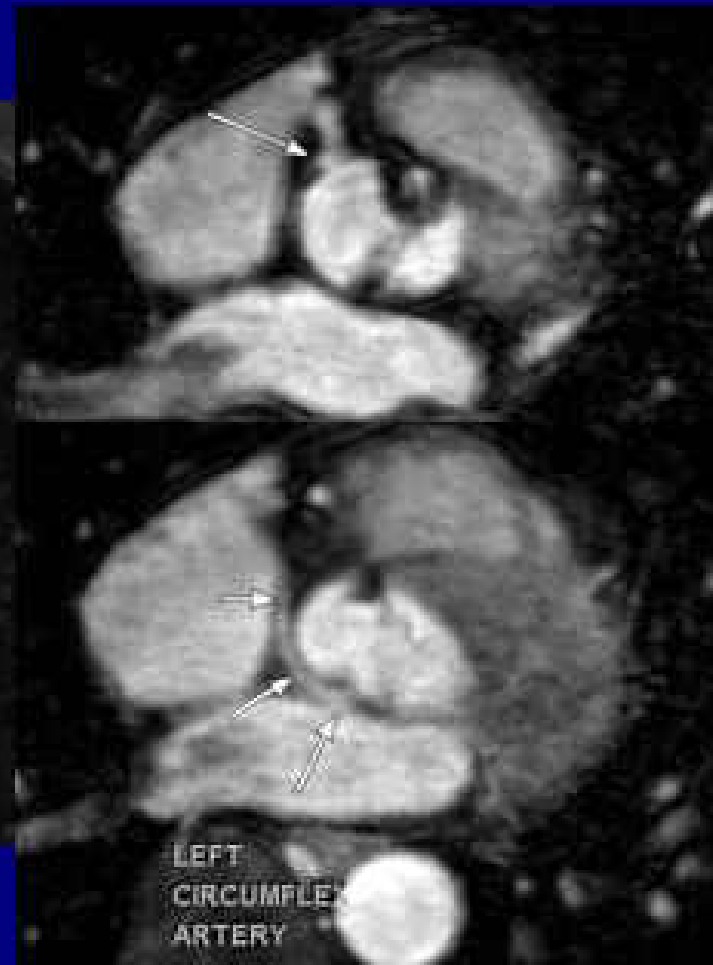


RCA from left coronary sinus associated with myocardial infarction due to RCA compression

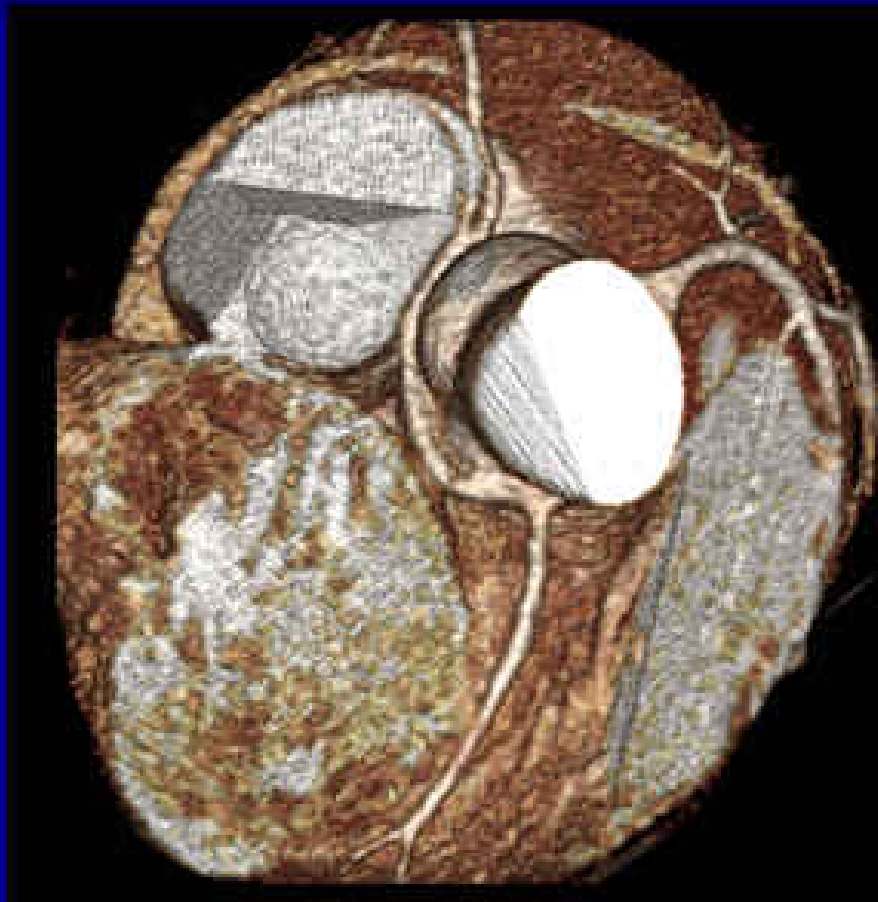
# Lt Circumflex from RCA

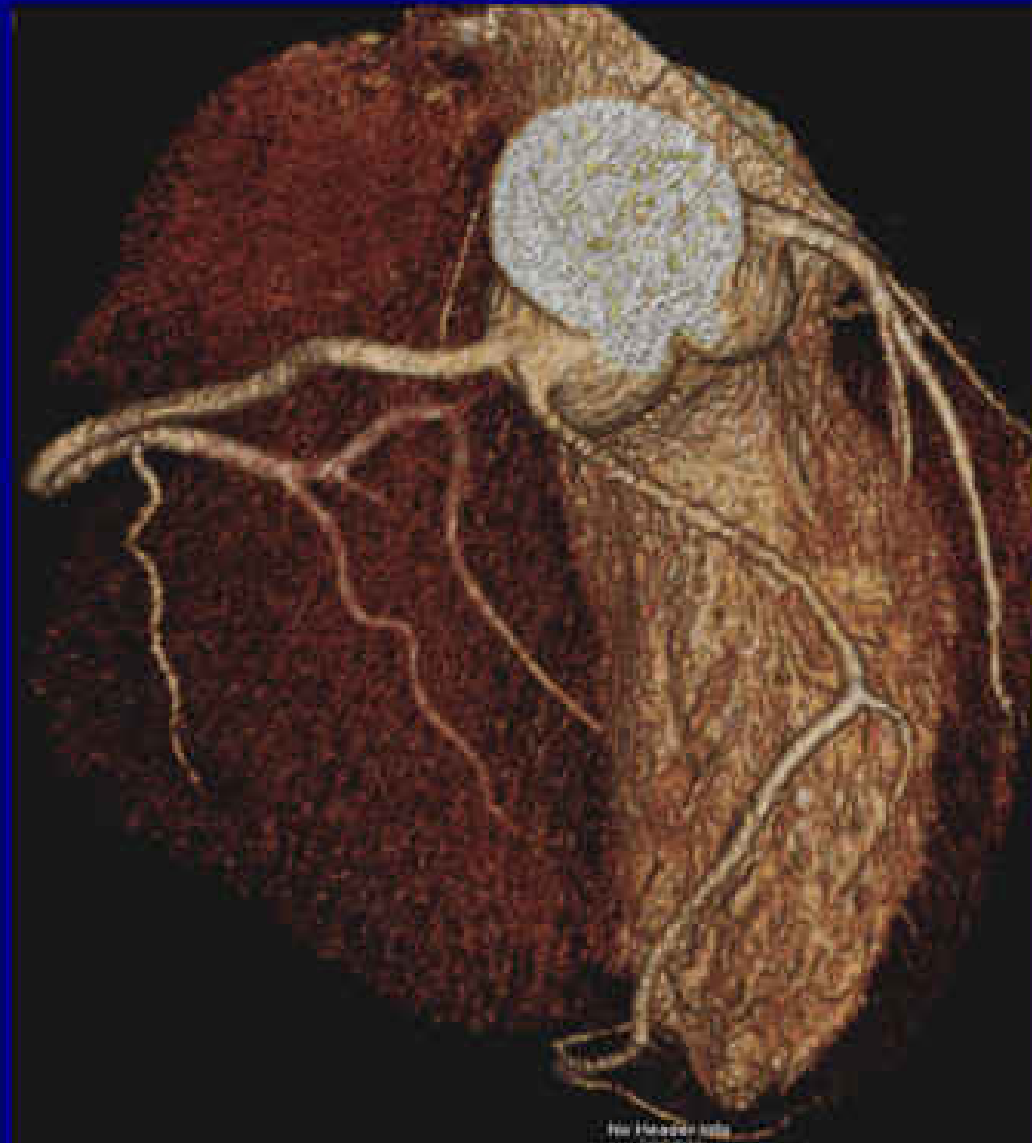


With Bicuspid AV



# LCX from R Sinus (CT Case)



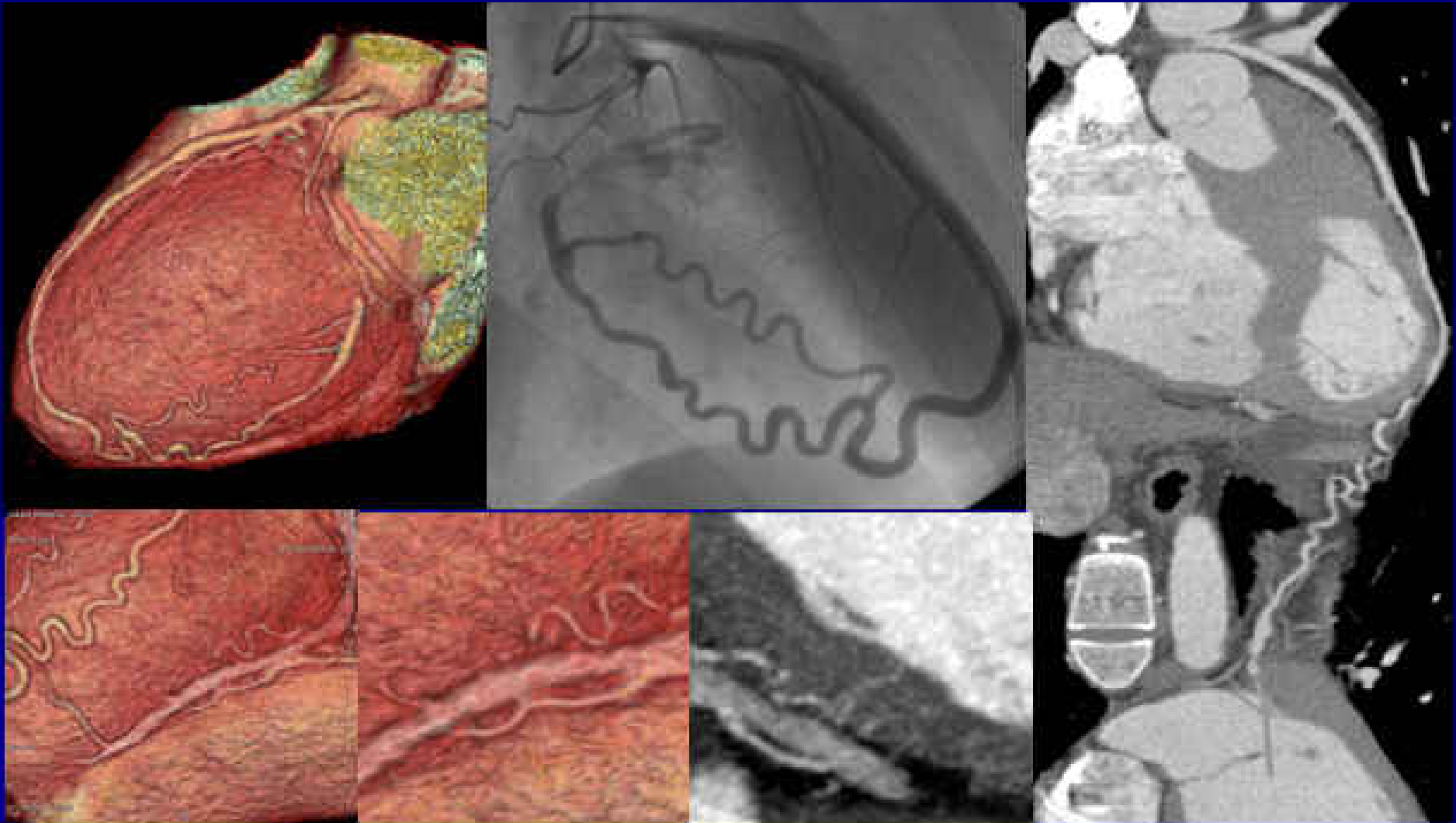




## LAD arising from right coronary sinus

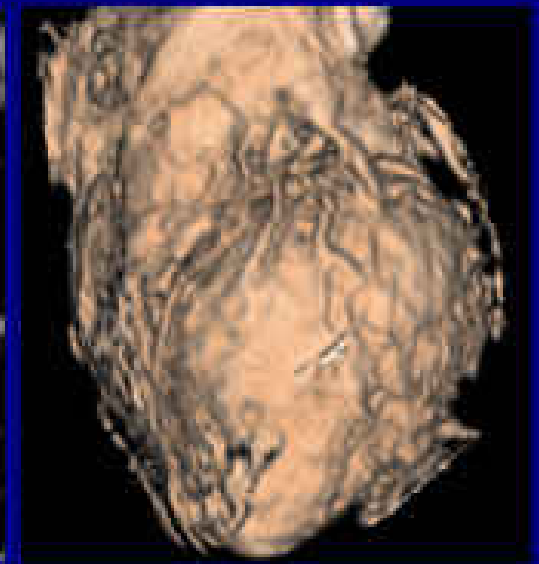
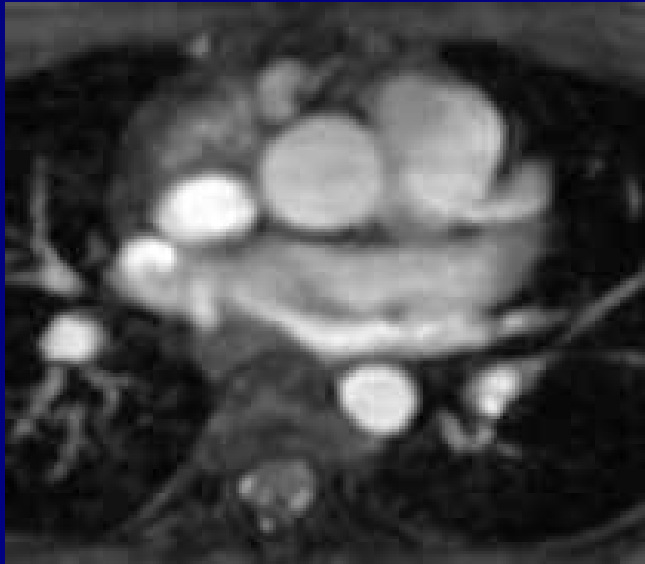
- LAD arising from right coronary sinus with retroaortic septal course
- 0.09%-0.11% of patients who undergo angiography
- Interarterial course may be seen up to 75% of patients with this anomaly, who are at high risk for sudden cardiac death.

# Coronary Arteriovenous Fistula to LV



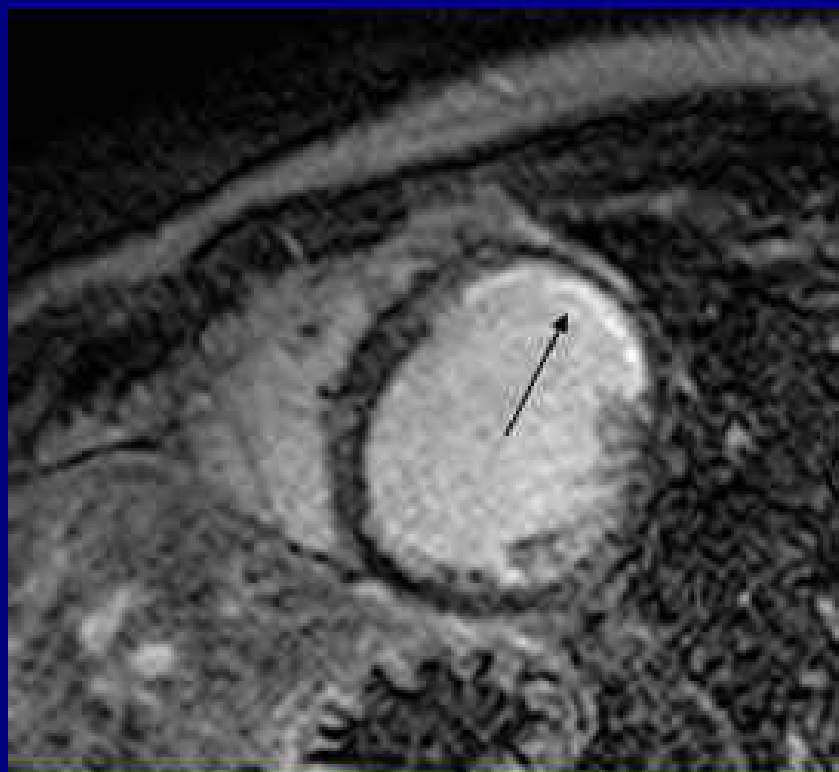
10y/F





MRA

Bland-White-Garland Syndrome:  
Anomalous LCA Connected to Pulm Art  
(ALCAPA)



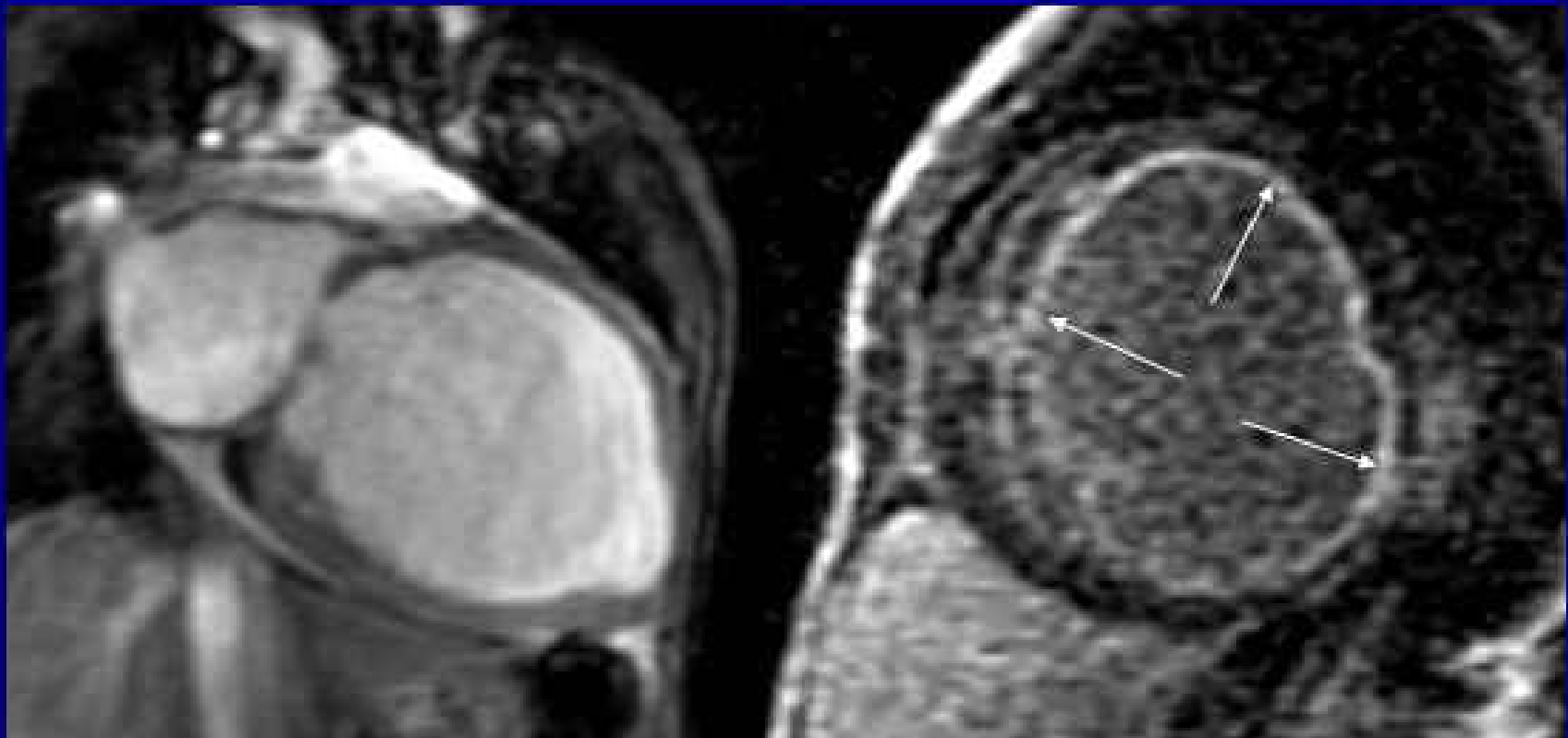
Delayed CE

M/7y

DCMP and Endocardial  
Fibroelastosis

S/p Volume Reduction Surgery

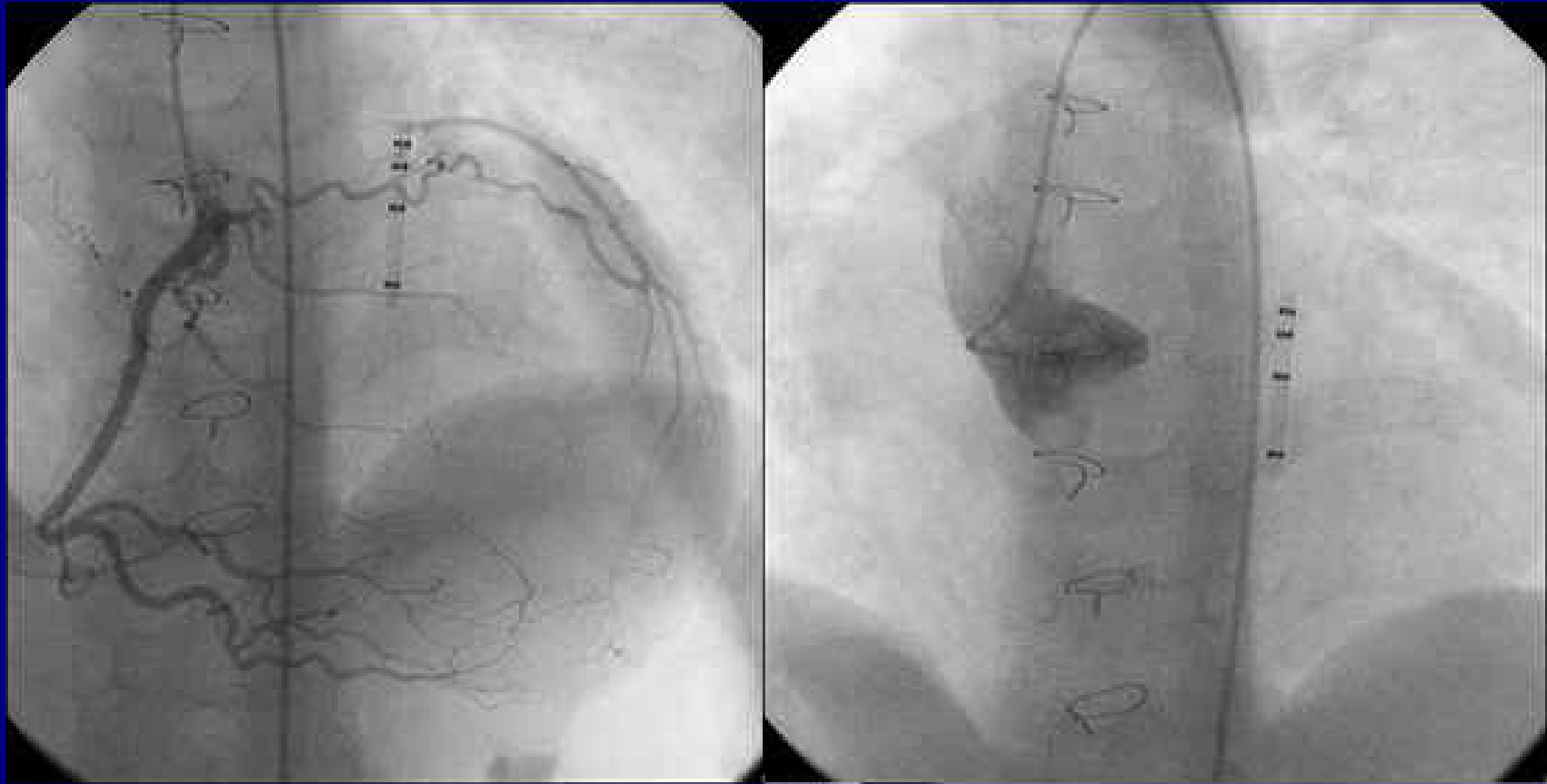
At age 2y



Systolic phase

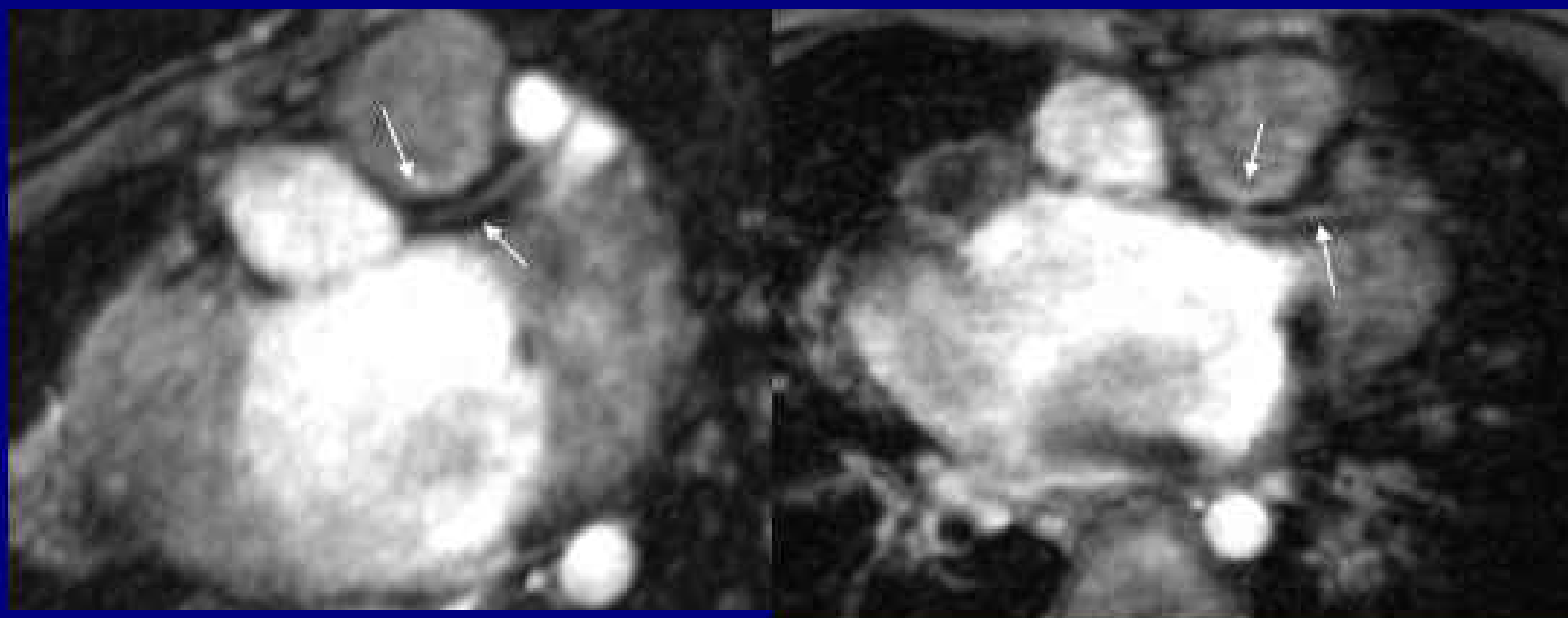
Delayed MRI

At age 7





7y/M



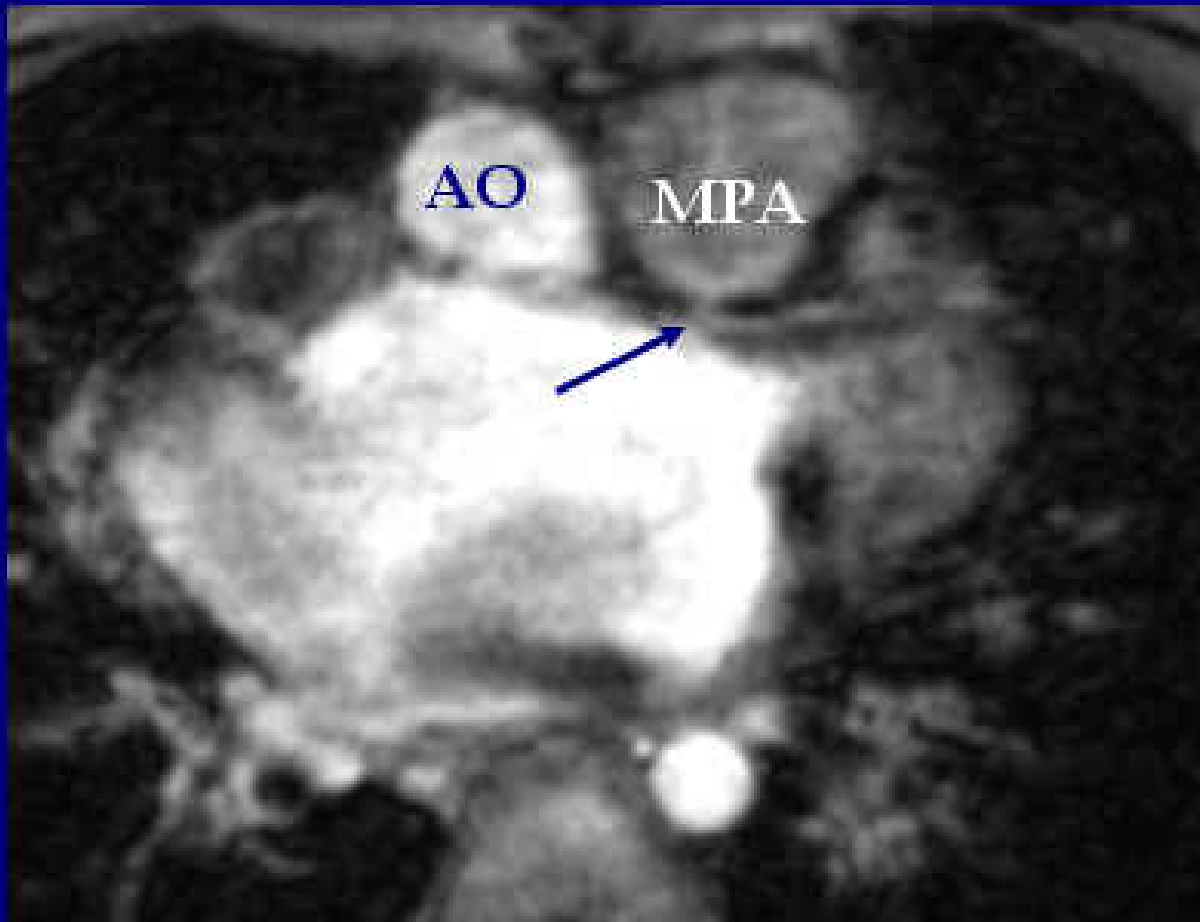
## L Main Occlusion or Stenosis?



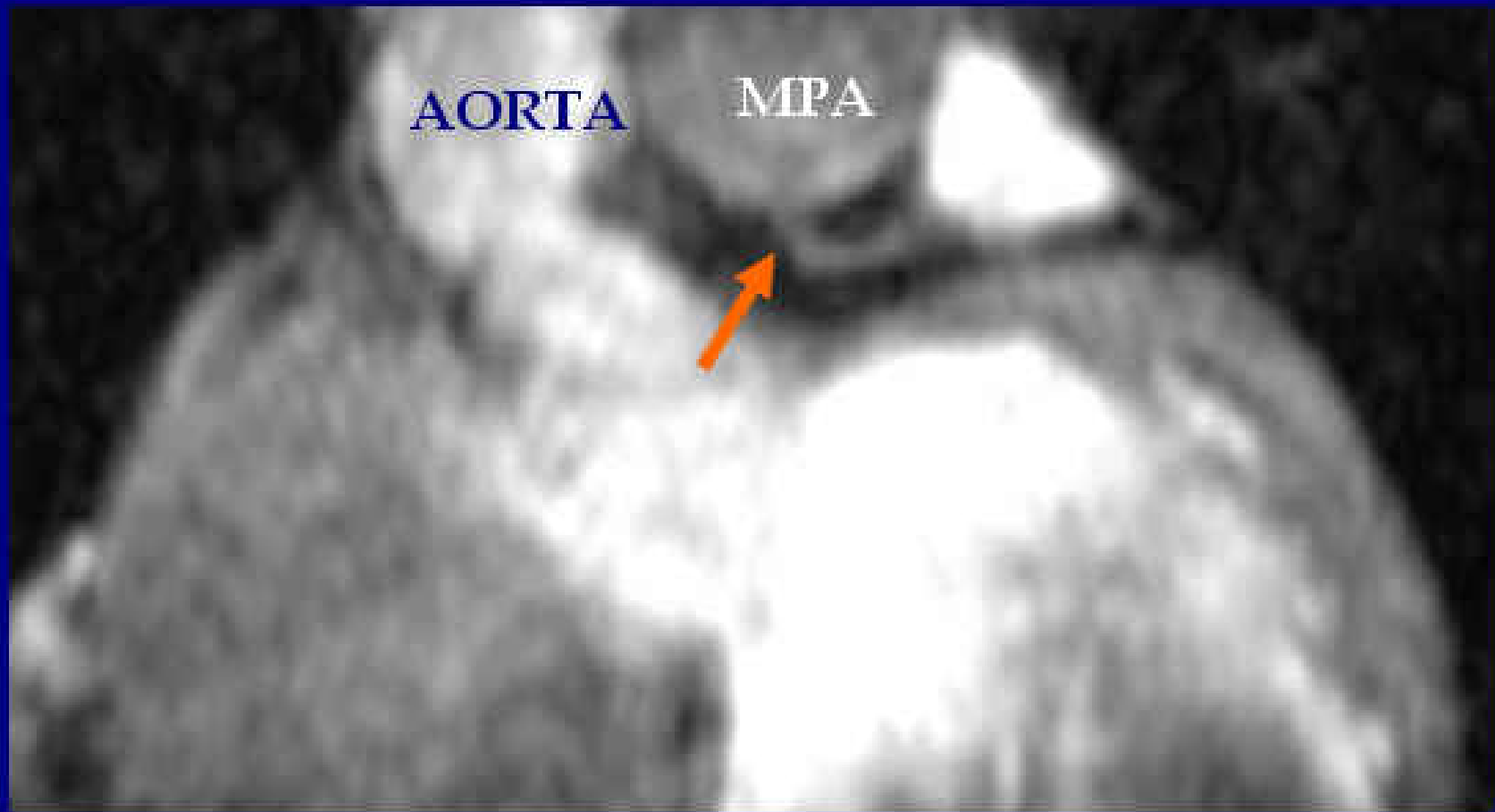
# Oblique Reformatted Image



# PA Origin of LAD



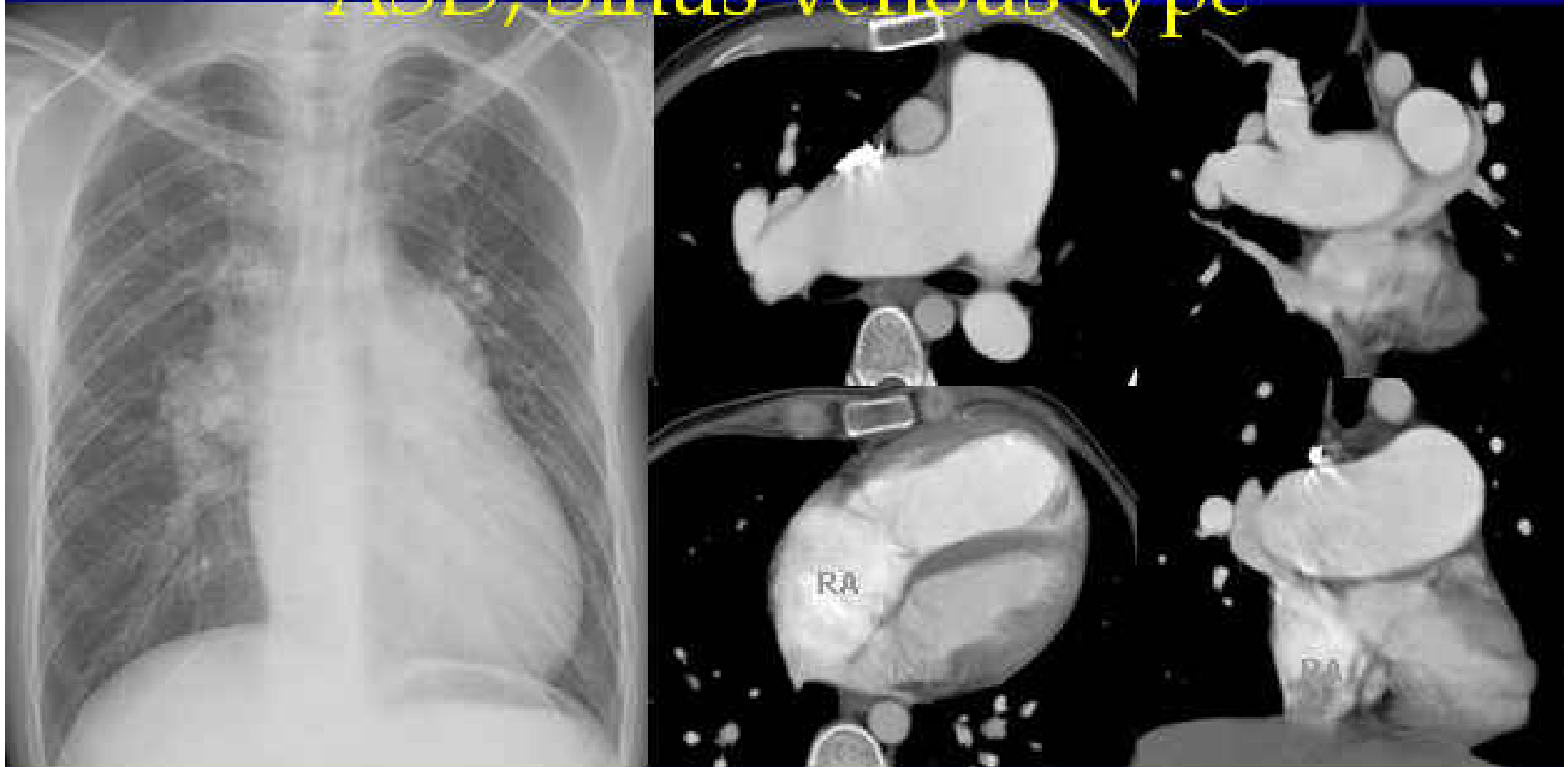
# Coronal



# MCCA Confirmed Final Diagnosis

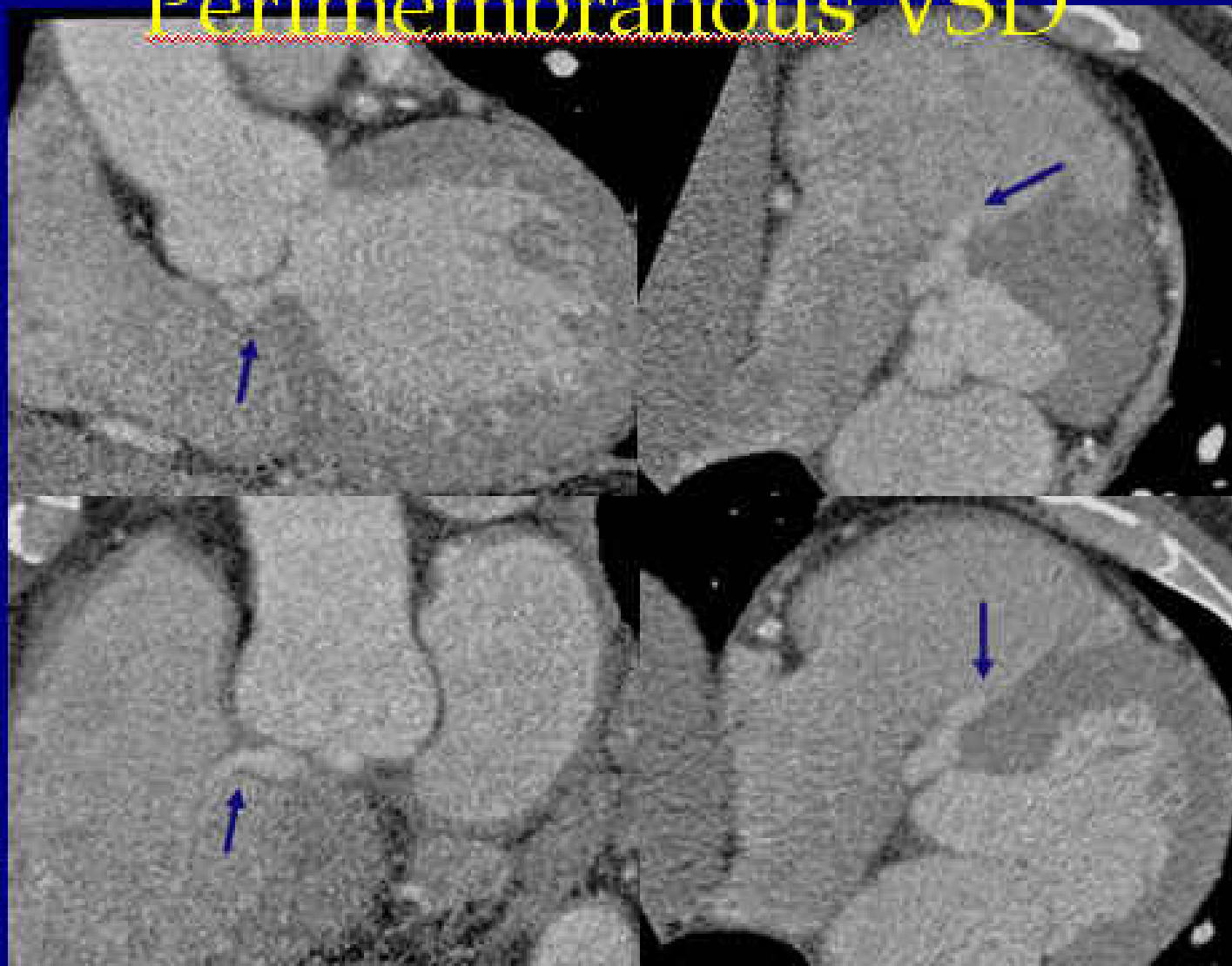
- “Dilated cardiomyopathy and endocardial fibroelastosis” was due to anomalous left coronary arising from pulmonary artery (ALCAPA).
- Bland-White-Garland syndrome

## ASD, Sinus venous type



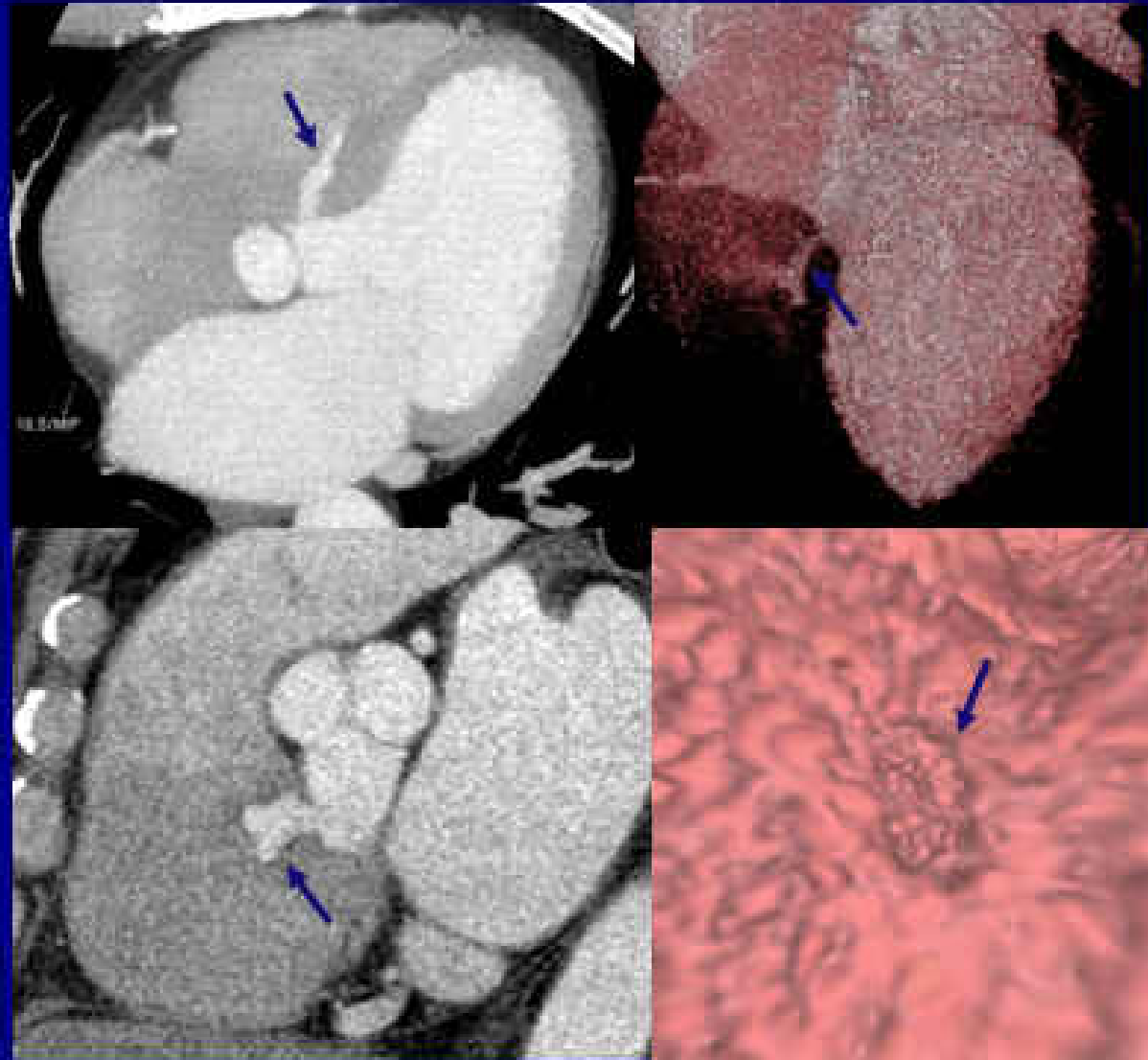
**A 35-year-old male with sinus venous type ASD, partial anomalous pulmonary venous return, and pulmonary artery hypertension**

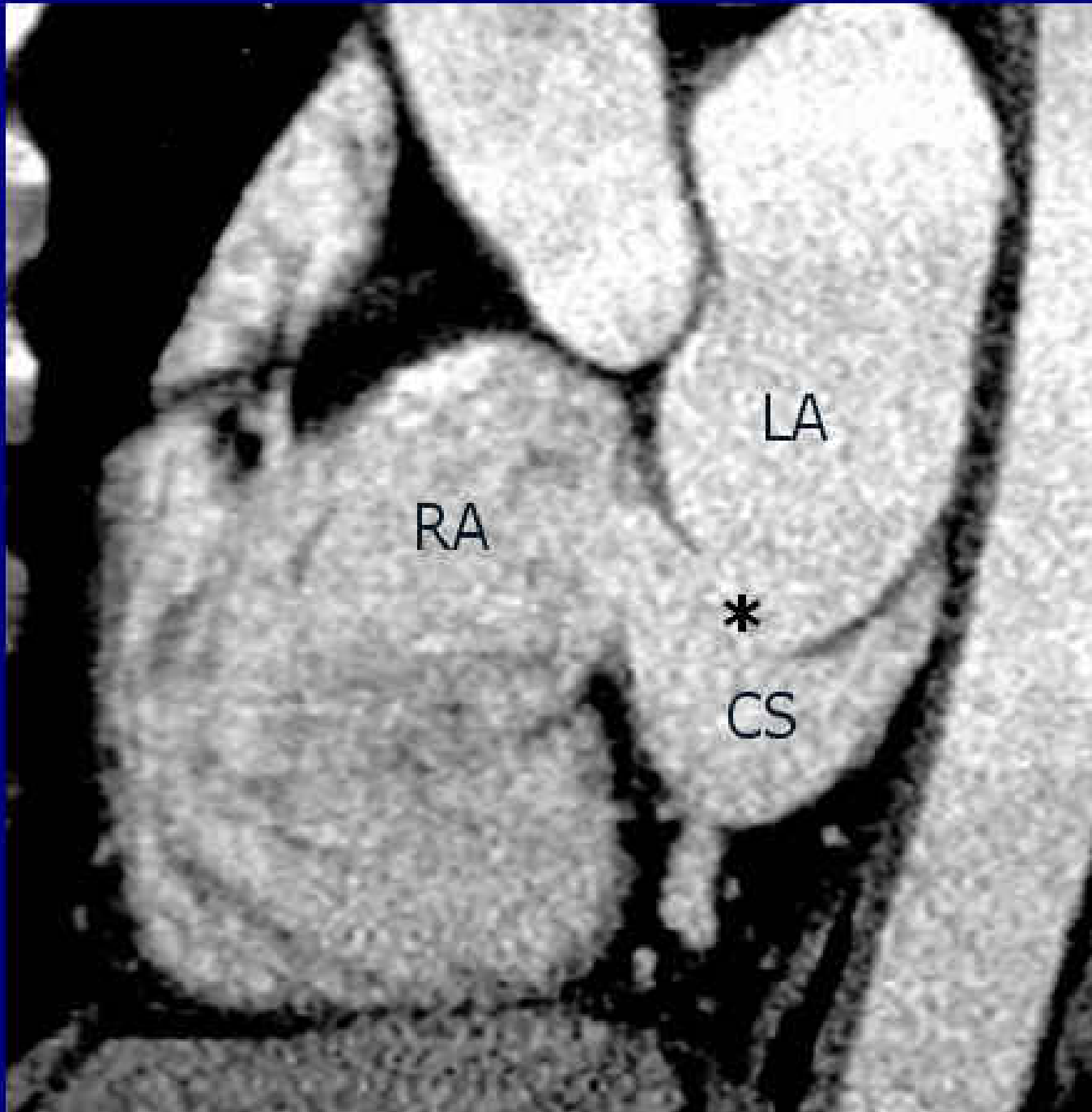
# Perimembranous VSD

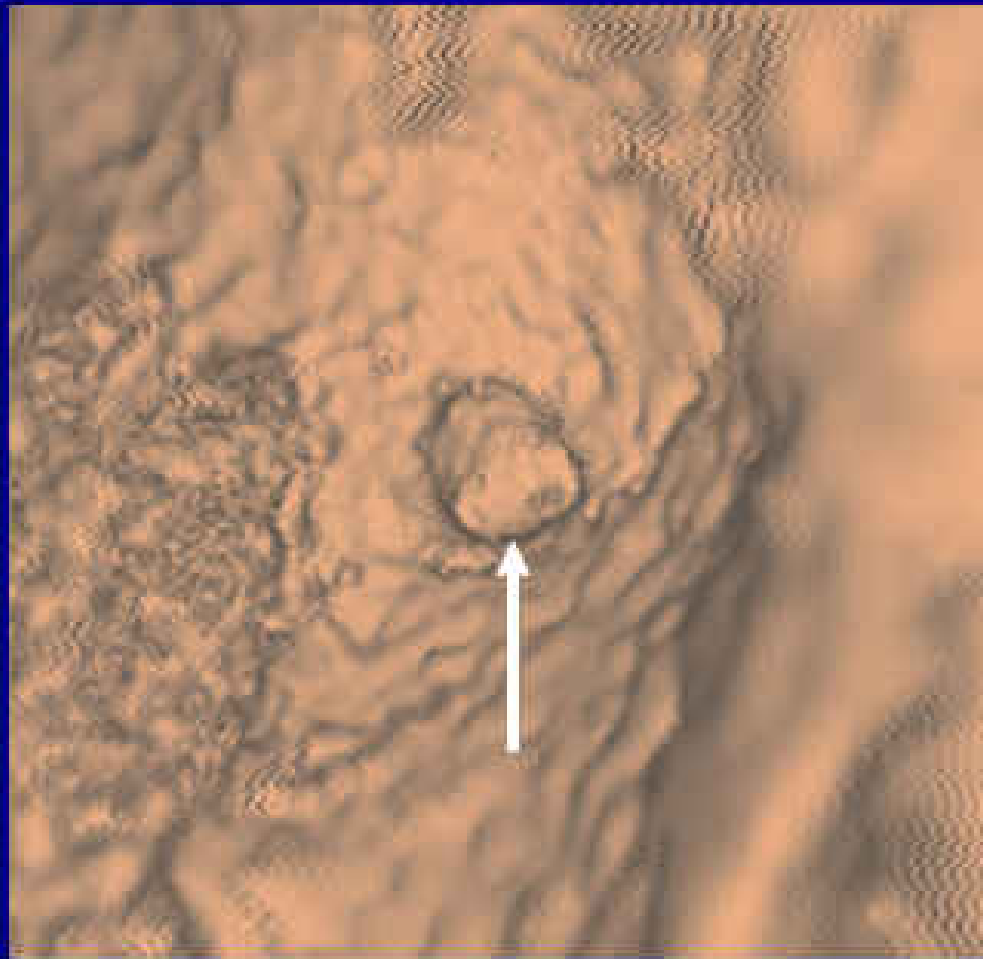


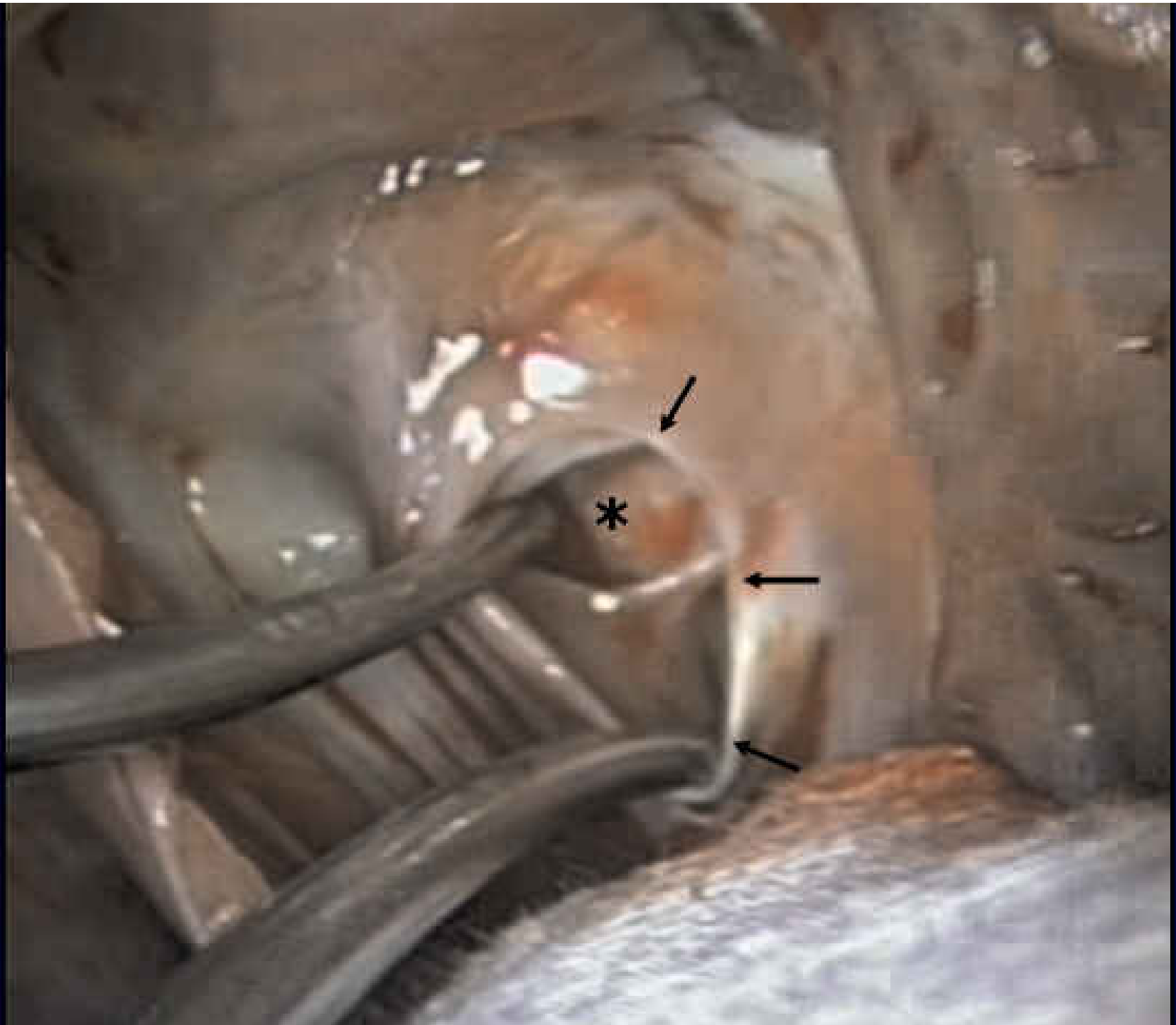


# Perimembranous VSD and septal aneurysm



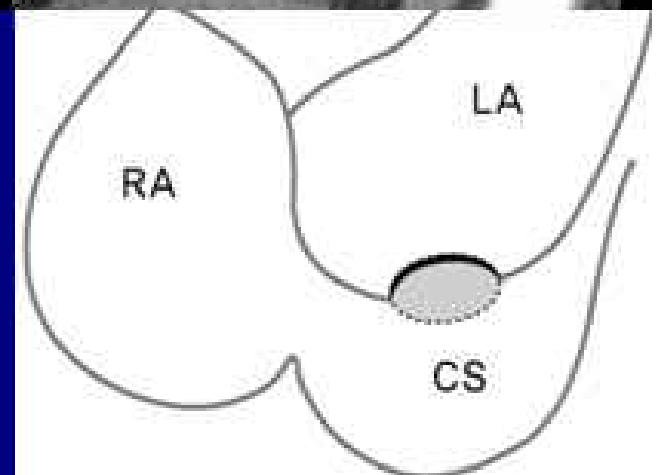


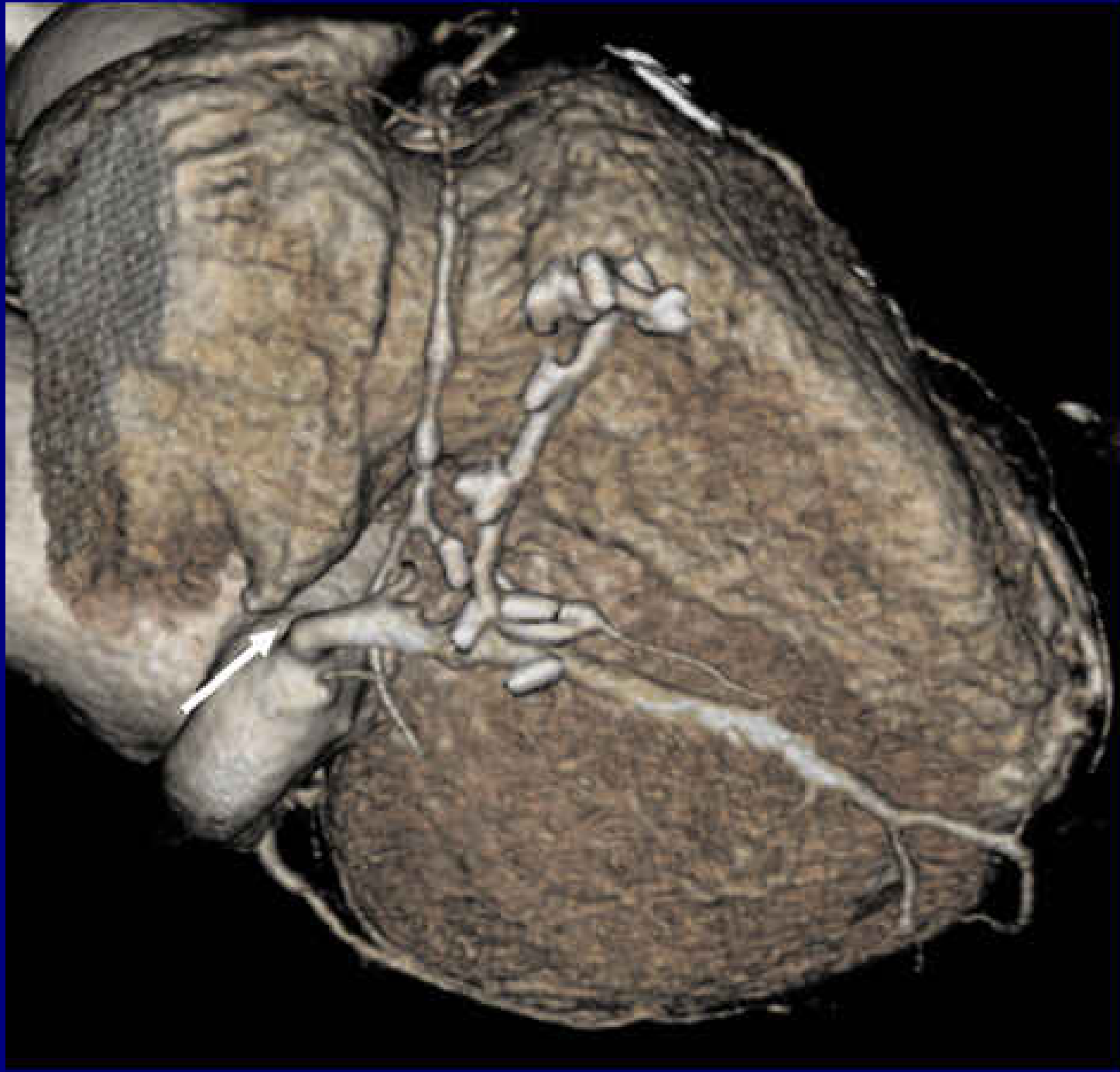


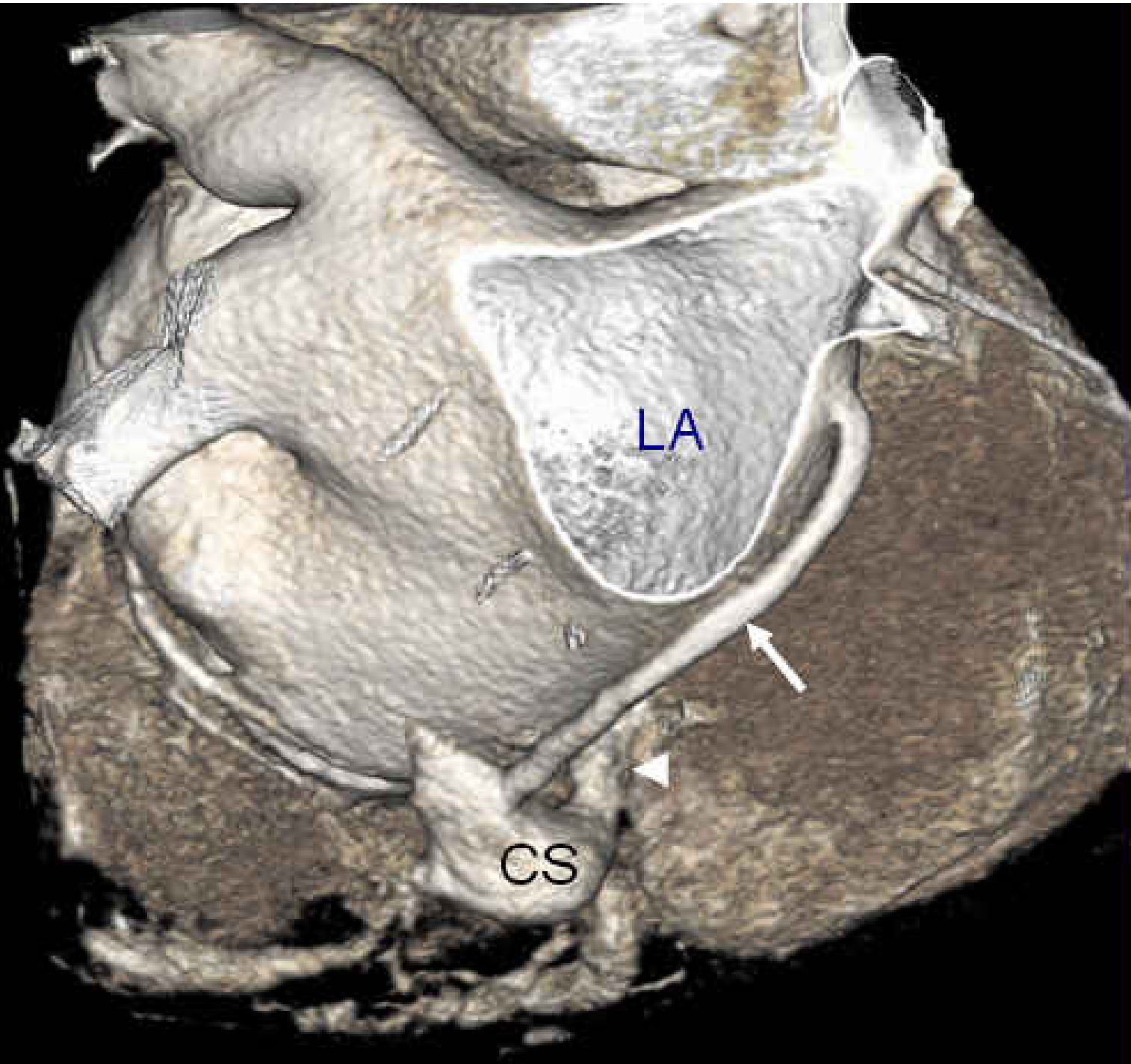




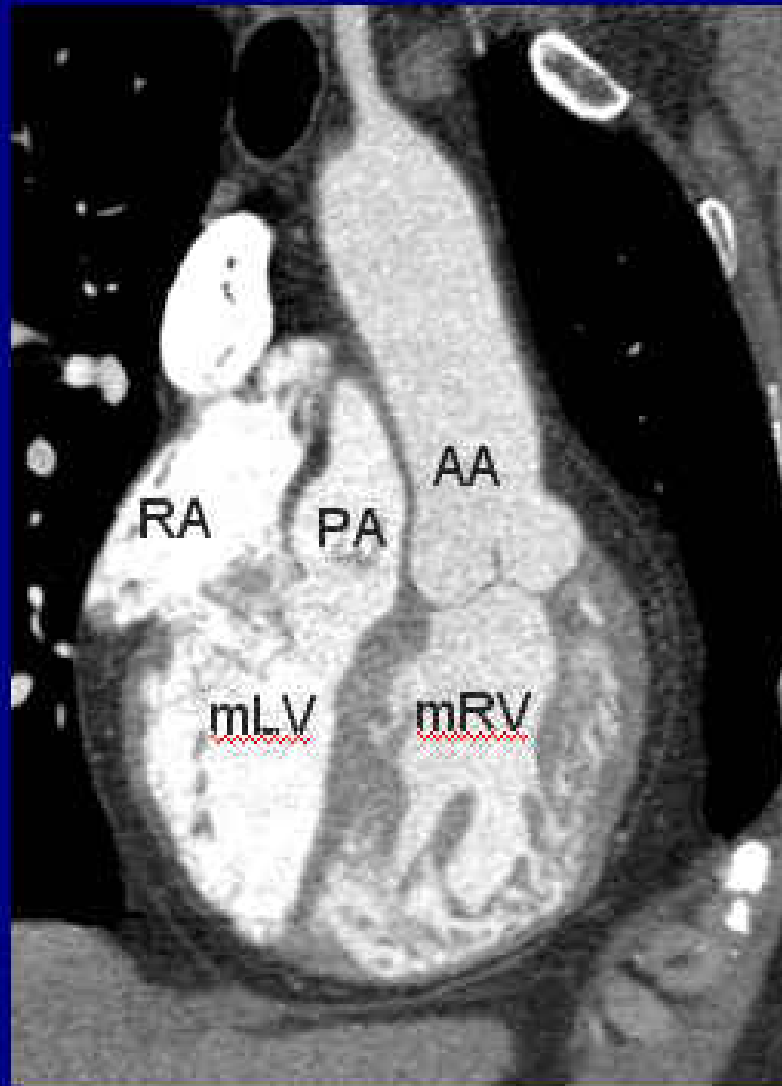
# ASD, unroofed coronary sinus



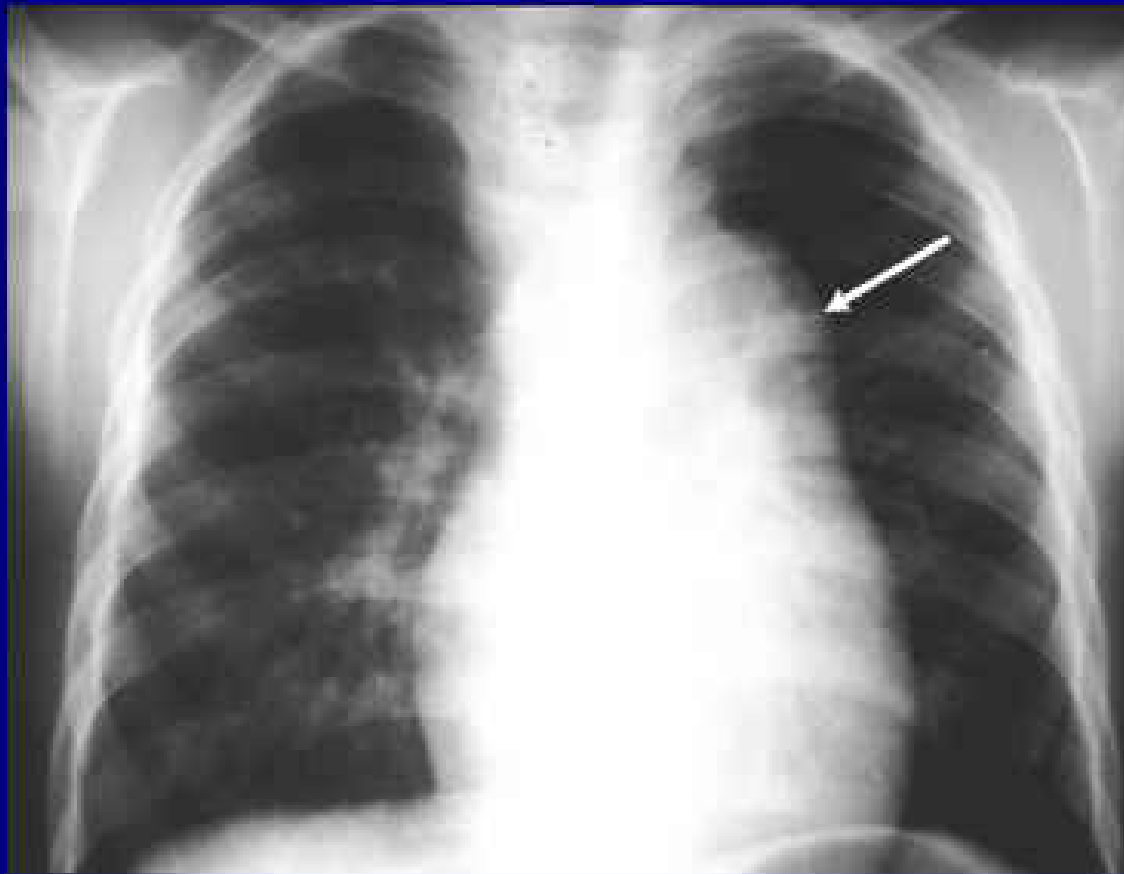


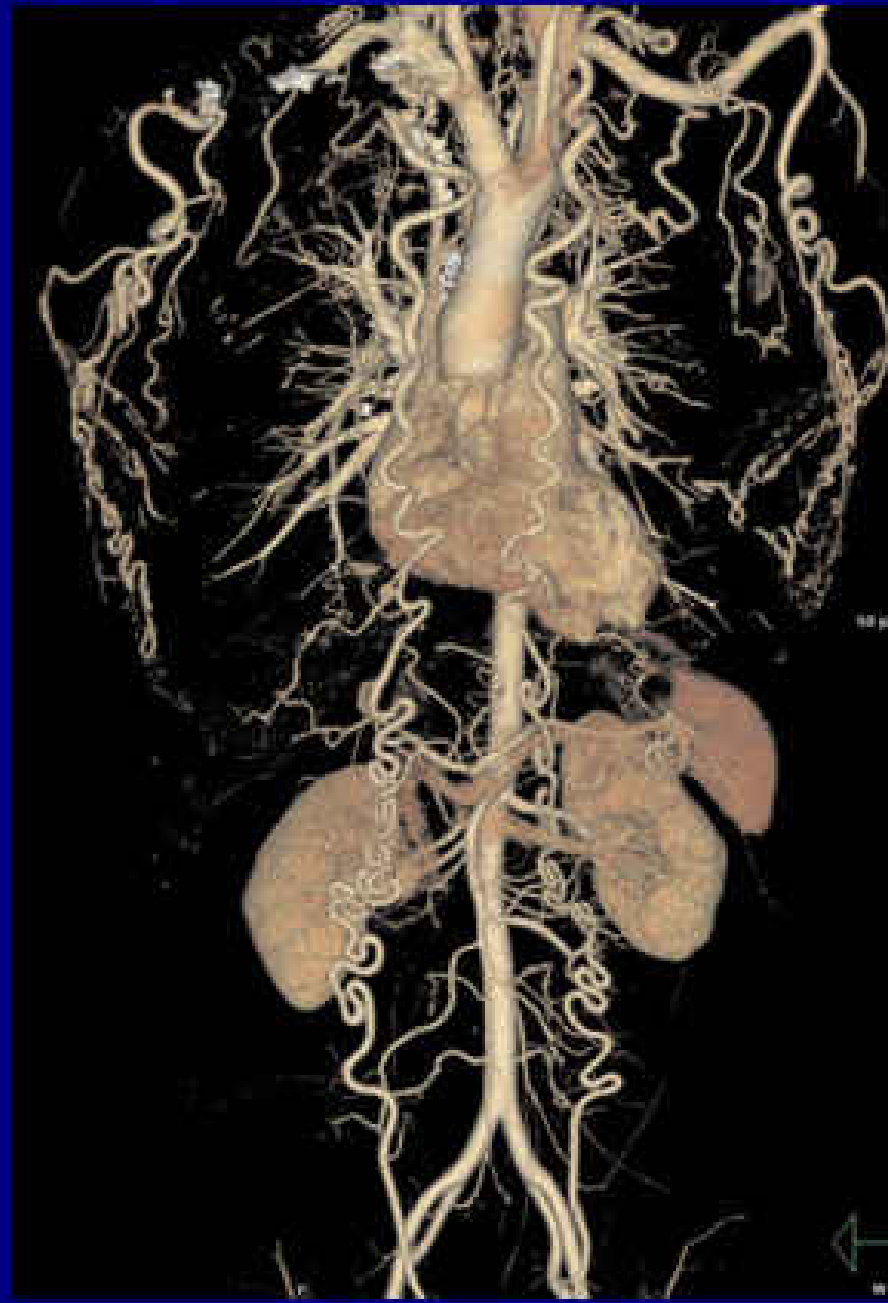






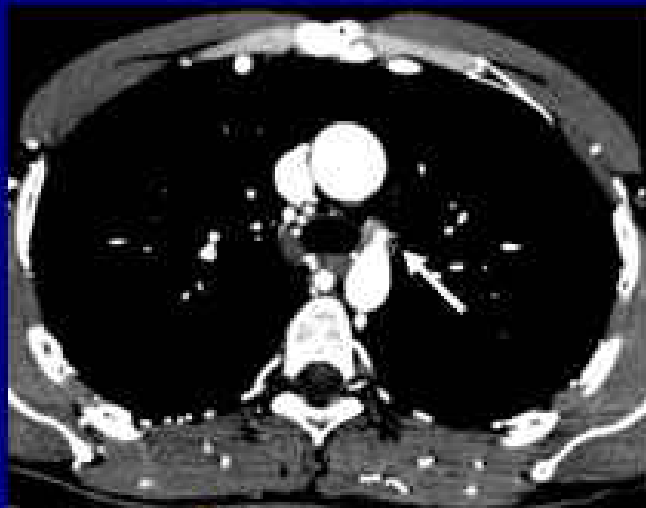
# Corrected Transposition of Great Arteries

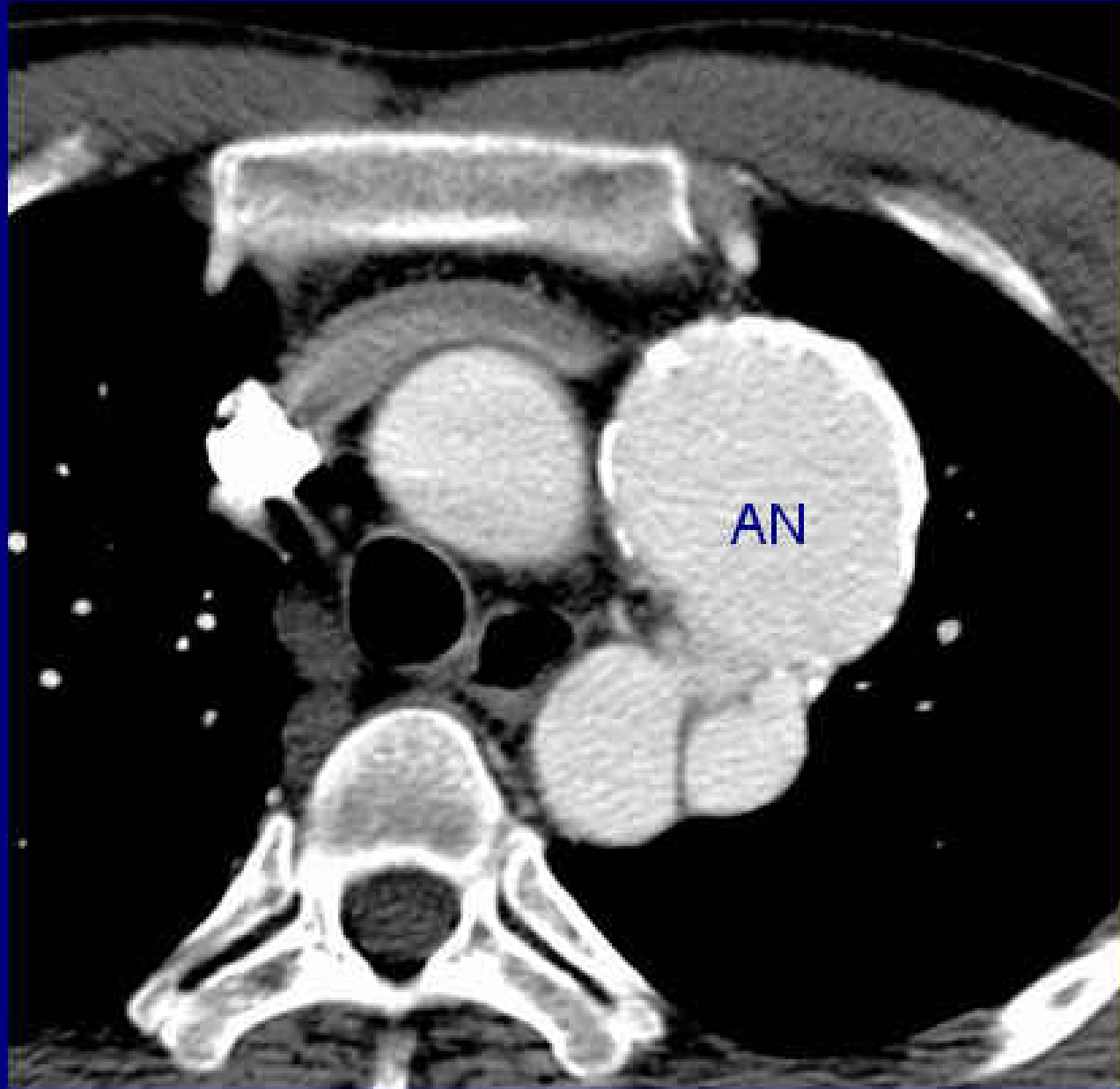






# Aortic coarctation





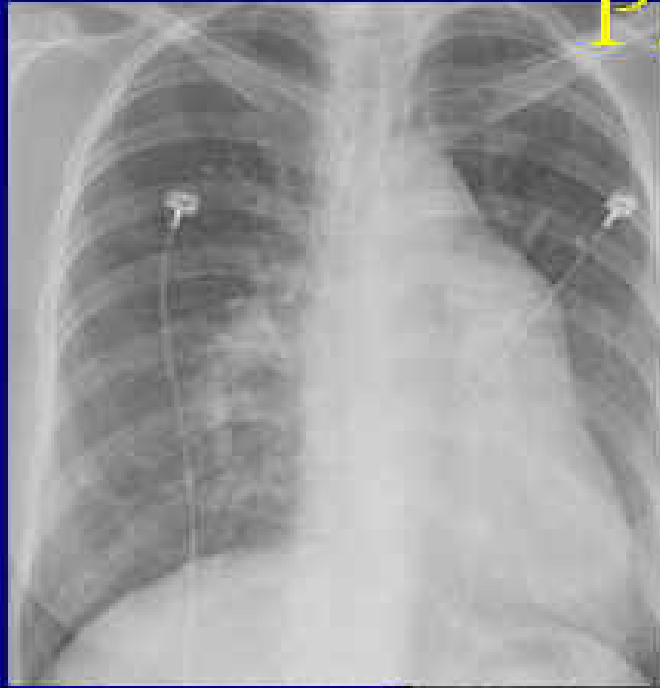


# Pseudocoarctation of Aorta

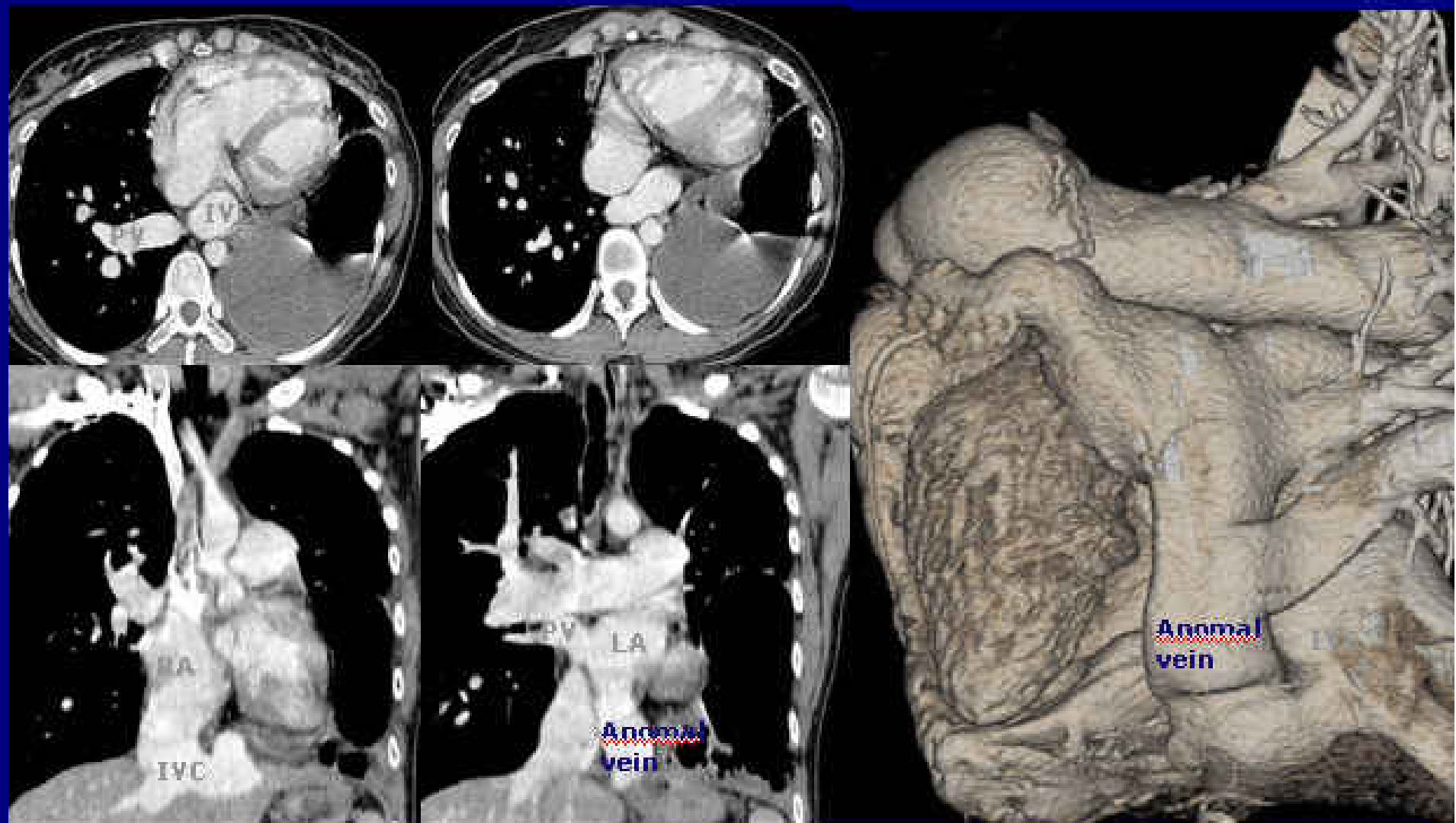




# PDA

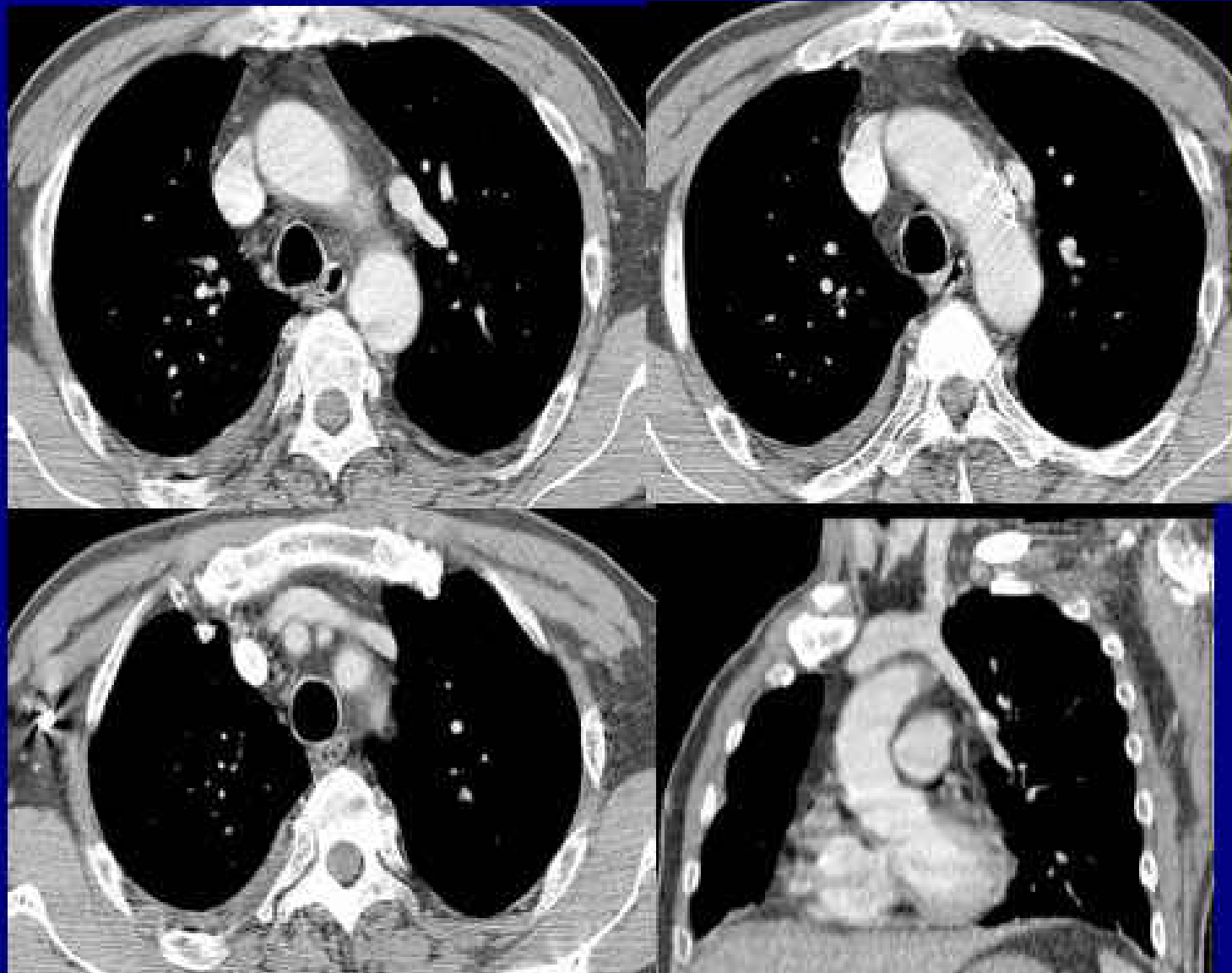


# PAPVR

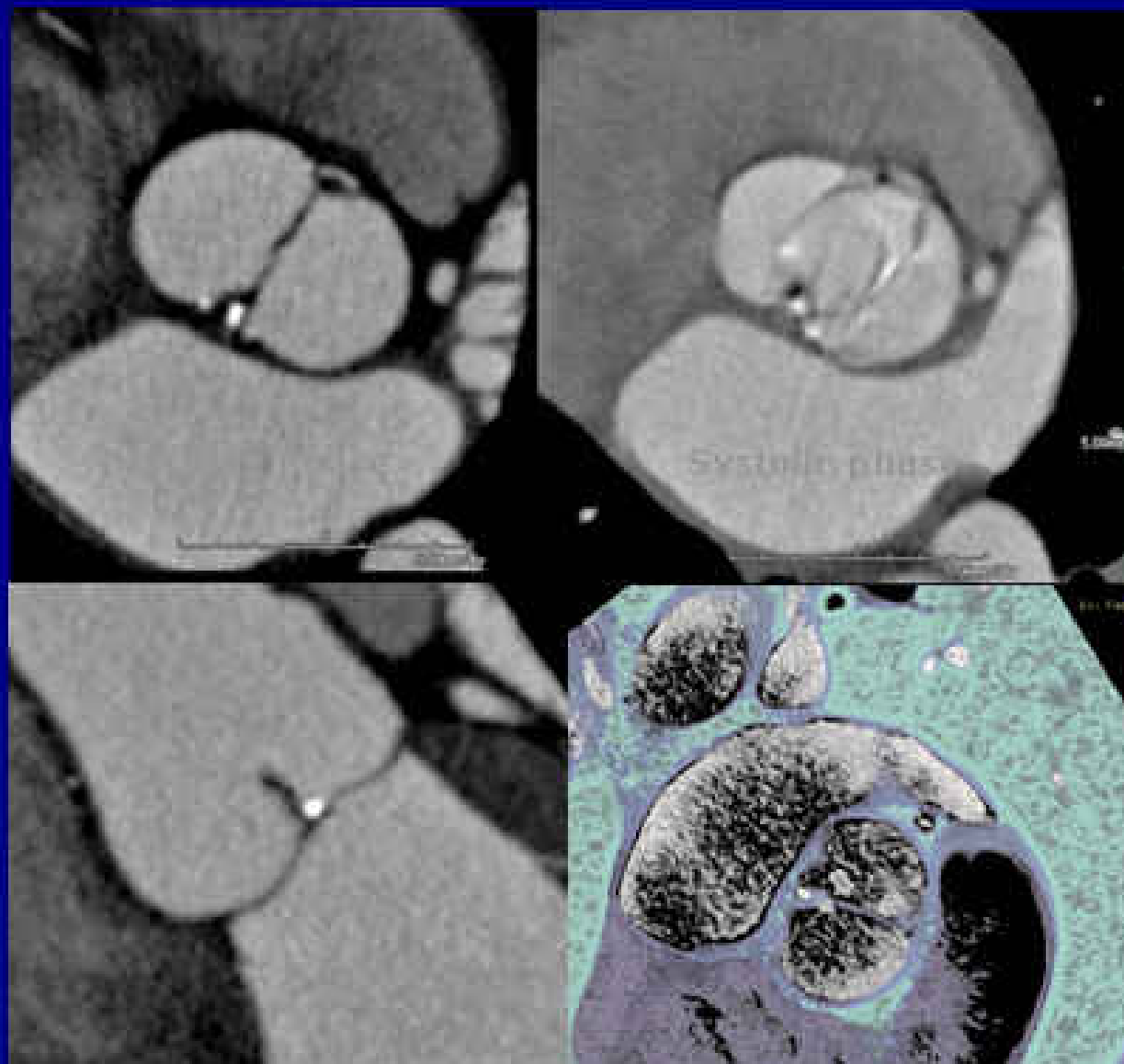


# PAPVR

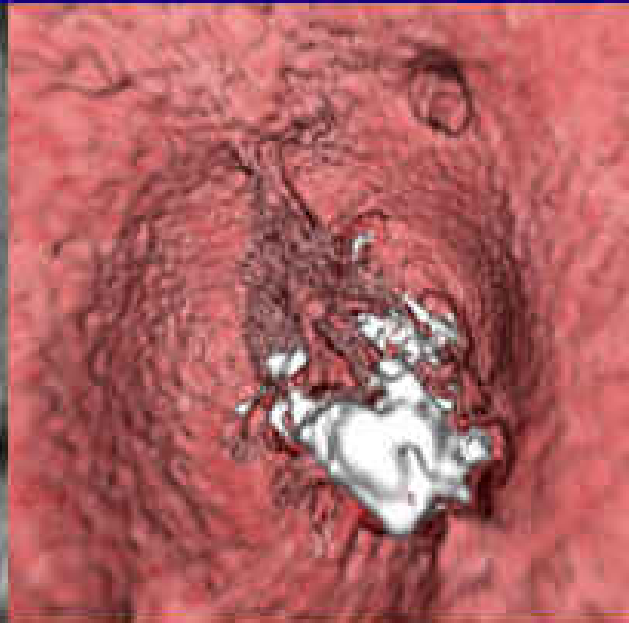
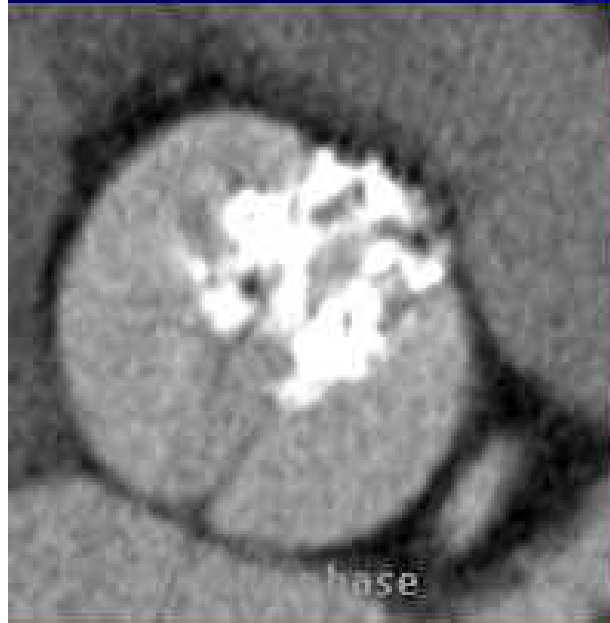
Lt. superior pul vein to ipsilateral  
brachiocephalic vein



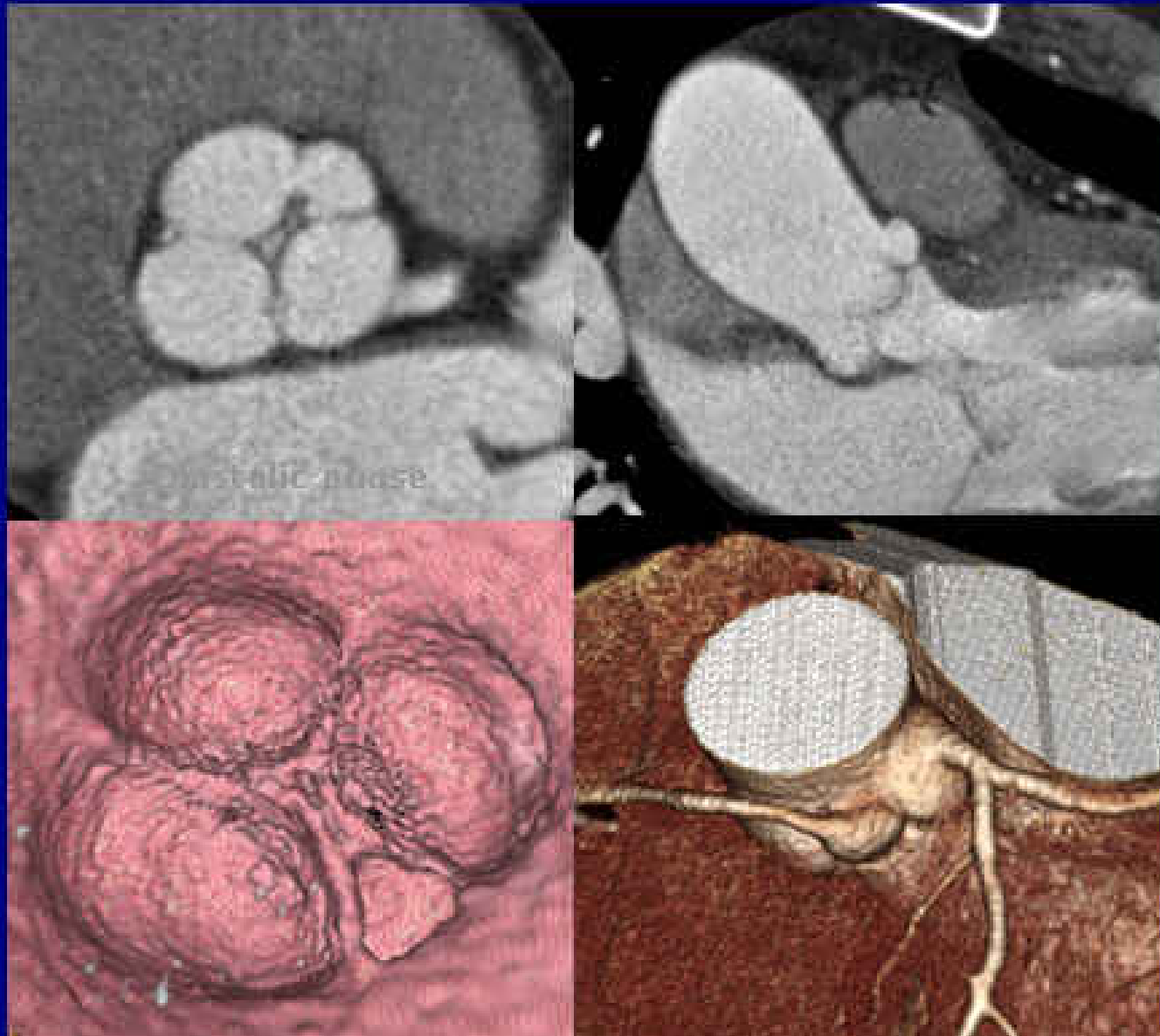
# Bicuspid aortic valve



# Bicuspid aortic valve, Severe AS



# Quadricuspid aortic valve

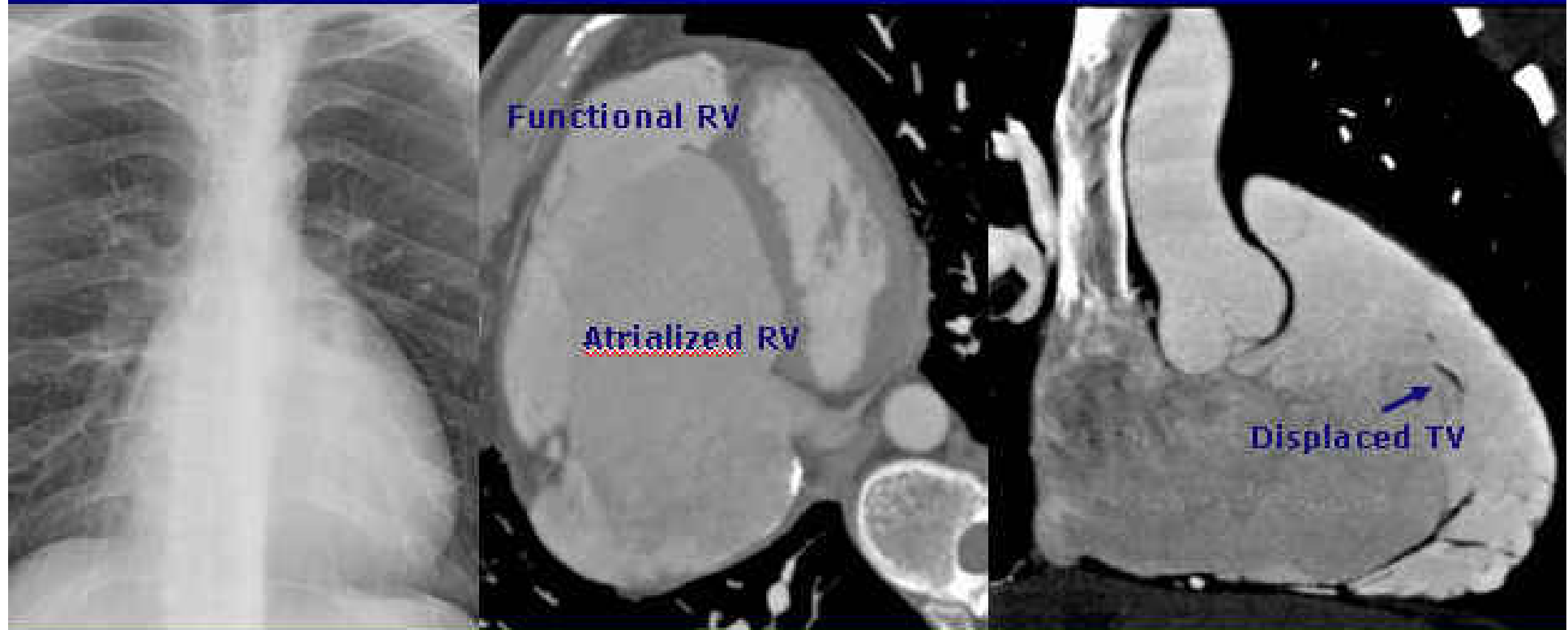


# Sinus of Valsalva Aneurysm,

48/M

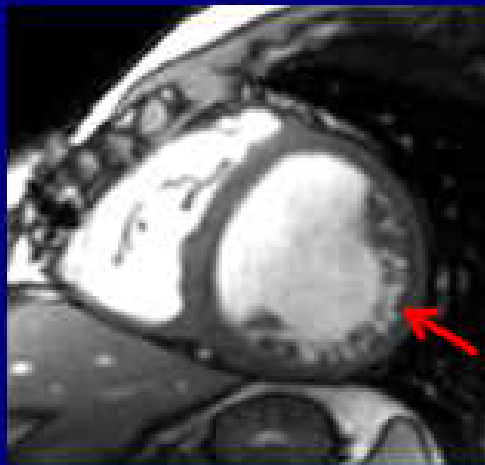


# Ebstein's anomaly

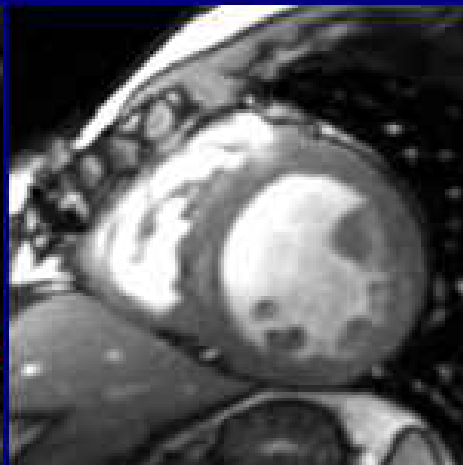




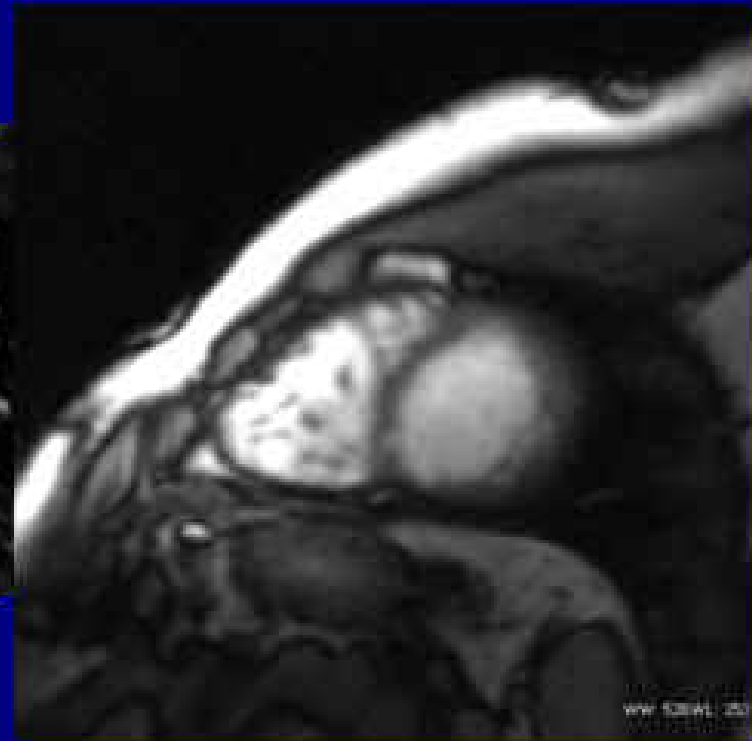
## Repaired TOF with Decreased Biventricular Function (M/25)



*Diastole*



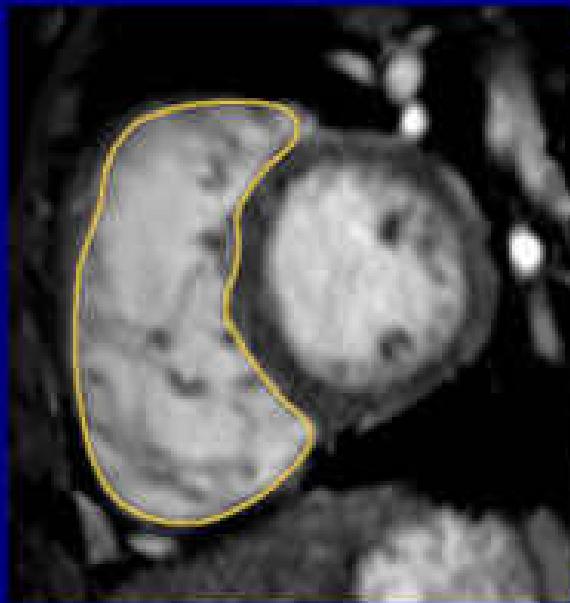
*Systole*



RV EF = 37%, LV EF = 31%

## RV Function Evaluation with Cine MRI

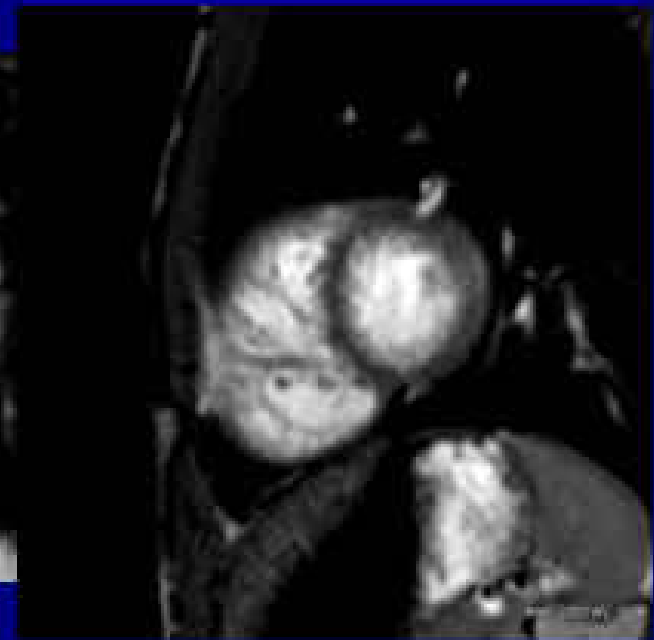
12y/M with Severe PR (62%)



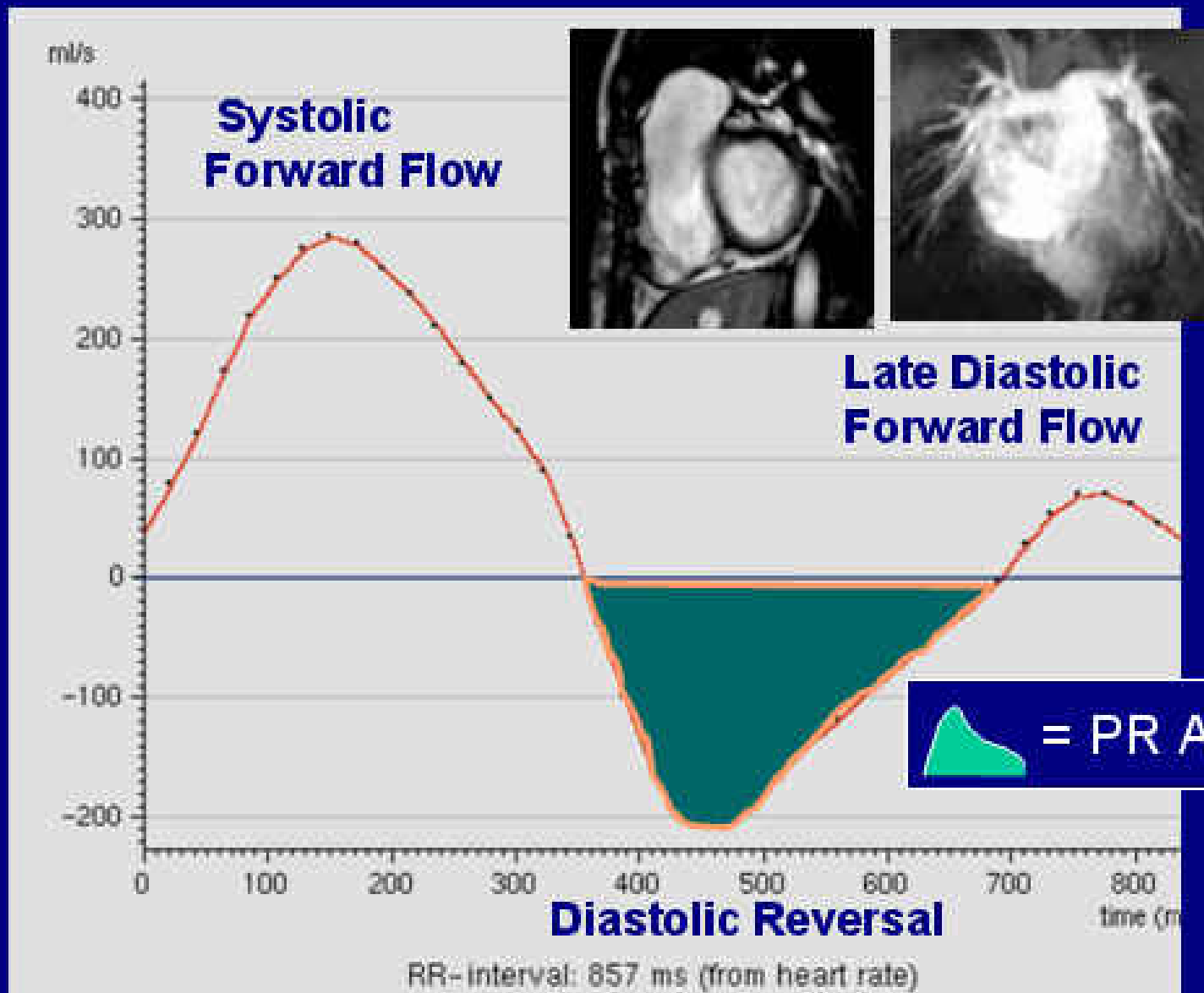
*Diastole*



*Systole*



RV EF 38%, LV EF 59%



14y/M with Severe PR, 54%

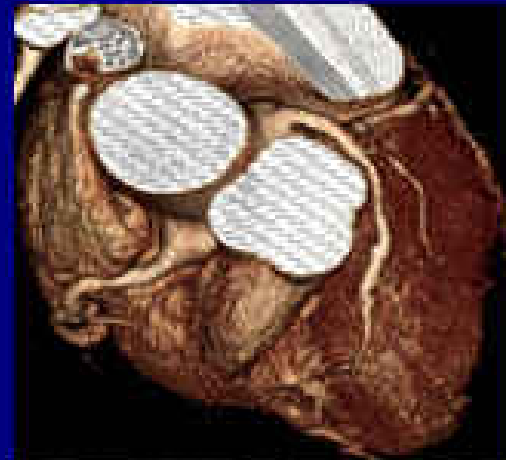
# Pulmonary Regurgitation: not a benign lesion

- Significant PR is usually well tolerated in childhood.
- However, in the long term, chronic PR has a detrimental effect on right ventricular (RV) function and exercise capacity and leads to an increased risk of arrhythmia and sudden cardiac death.
- Wider availability of MRI has facilitated decision making on the optimal timing for elective pulmonary valve replacement (PVR), which should be performed before irreversible RV dysfunction ensues.

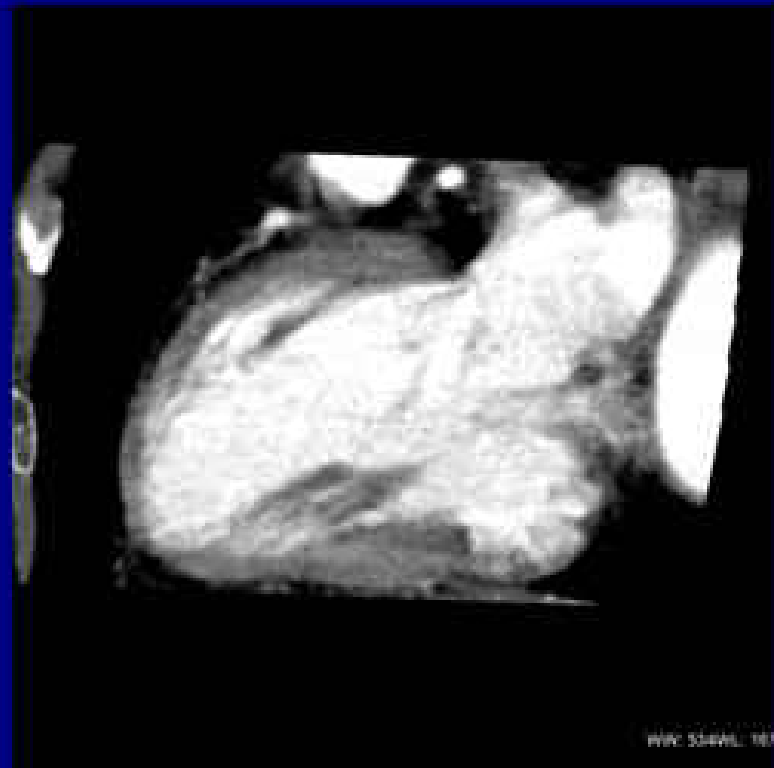
*Bouzas B et al. Eur Heart J. 2005;26:433-9.*

## Chest Pain for 5 y (69/F)

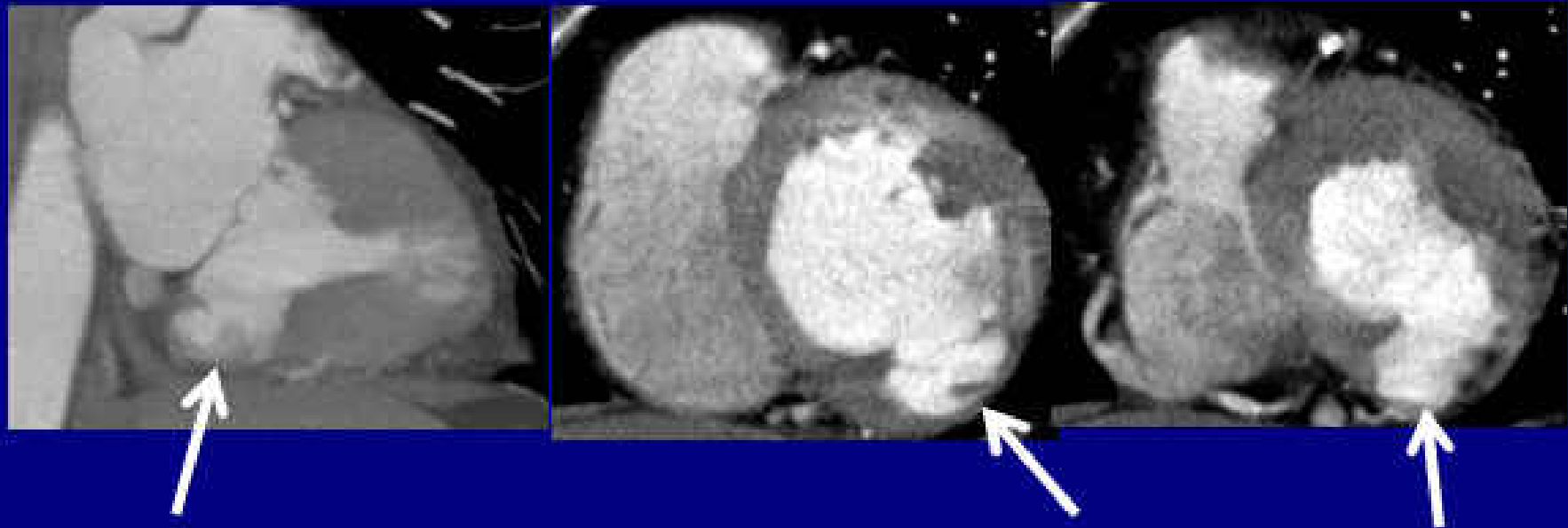
- Cardiac angiogram at outside: minimal LAD lesion
- Echo: inferobasal aneurysmal change, C/W ischemic heart disease
- CTA was done.



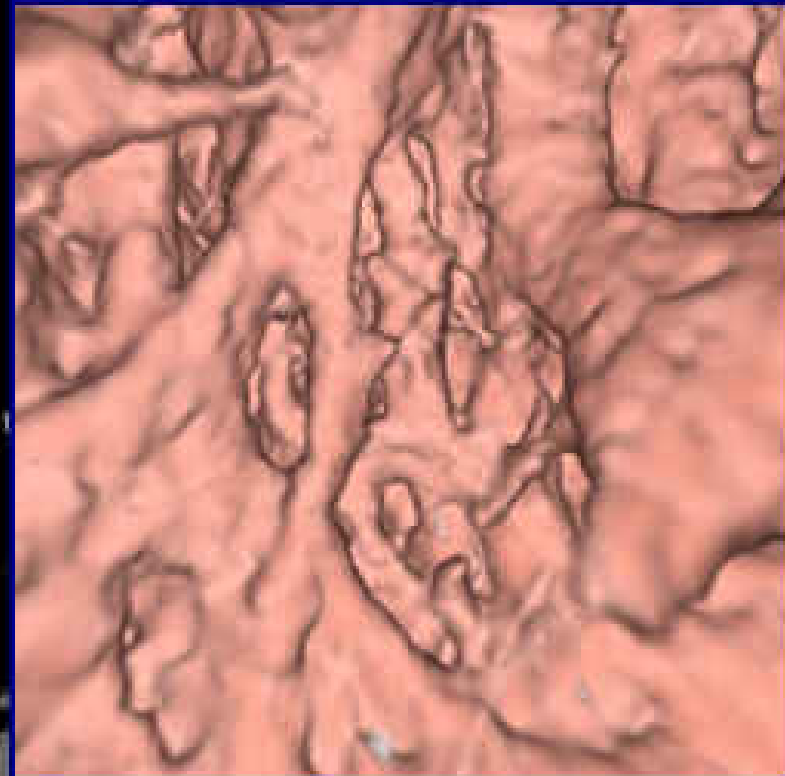
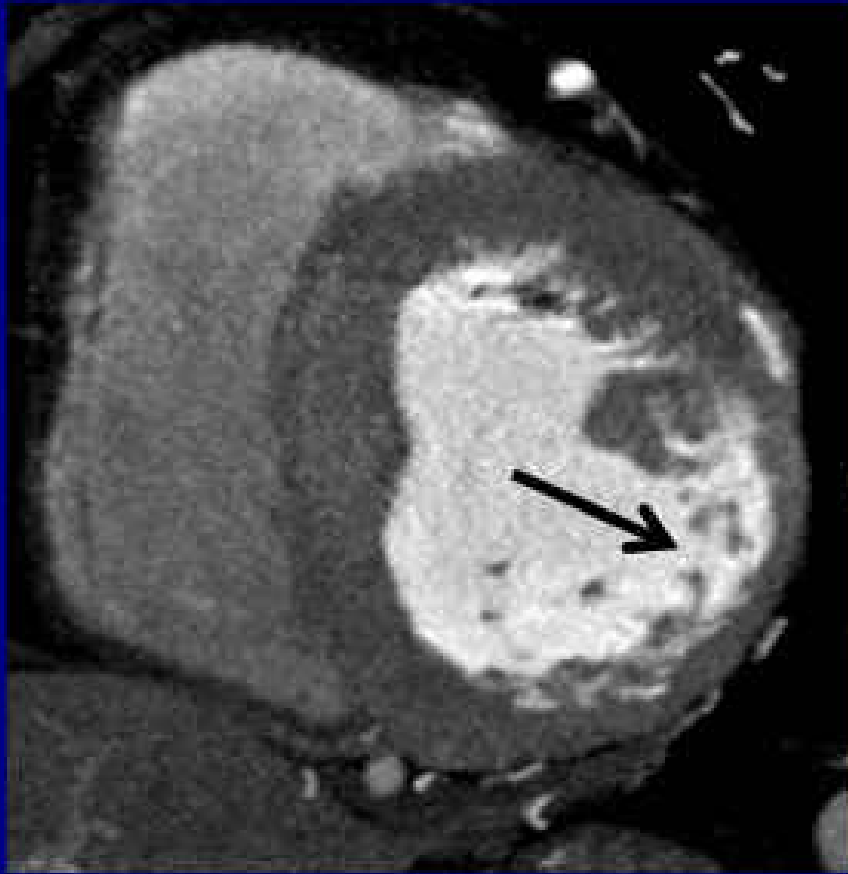
# LV Aneurysm?



# LV Diverticulum

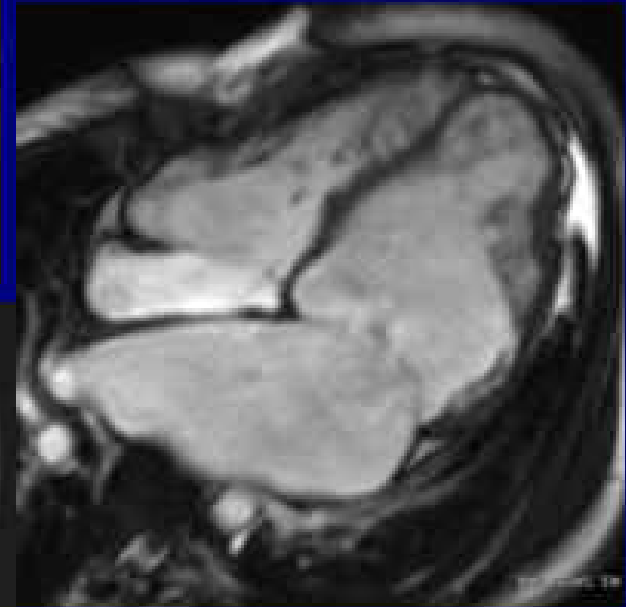
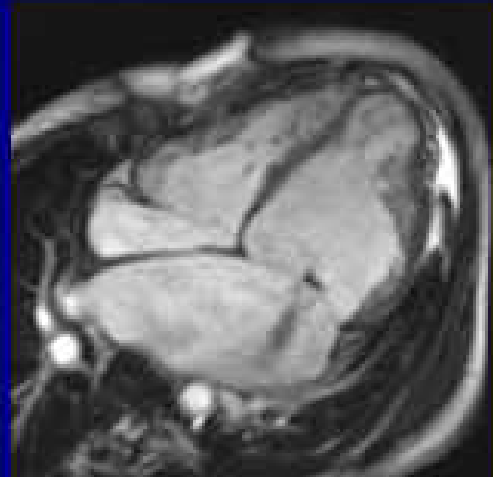
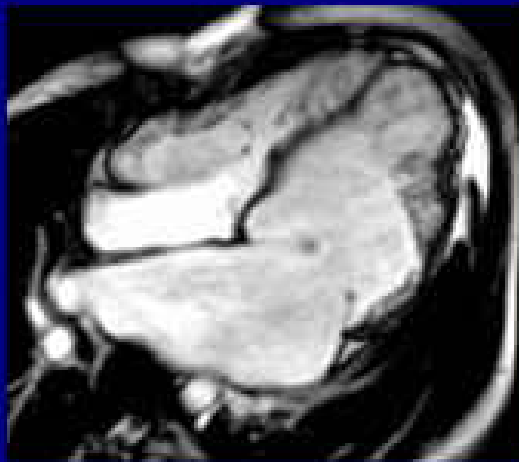


# LV Myocardial Noncompaction (70/F)





# Noncompaction of LV Myocardium, 19F



## Noncompaction of LV Myocardium

- Distinct congenital CMP due to arrest of compaction of loose myocardial meshwork during fetal ontogenesis
- Excessively prominent trabecular meshwork
- Deep intertrabecular recesses
- No connection with coronary circulation

# Pathology

- Recesses covered by endothelium
- Ischemic lesions, fibrosis, inflammation, abnormal vessels
- Predispose to local **thrombus** formation
- Oral anticoagulation after Dx

## CMR for Noncompaction

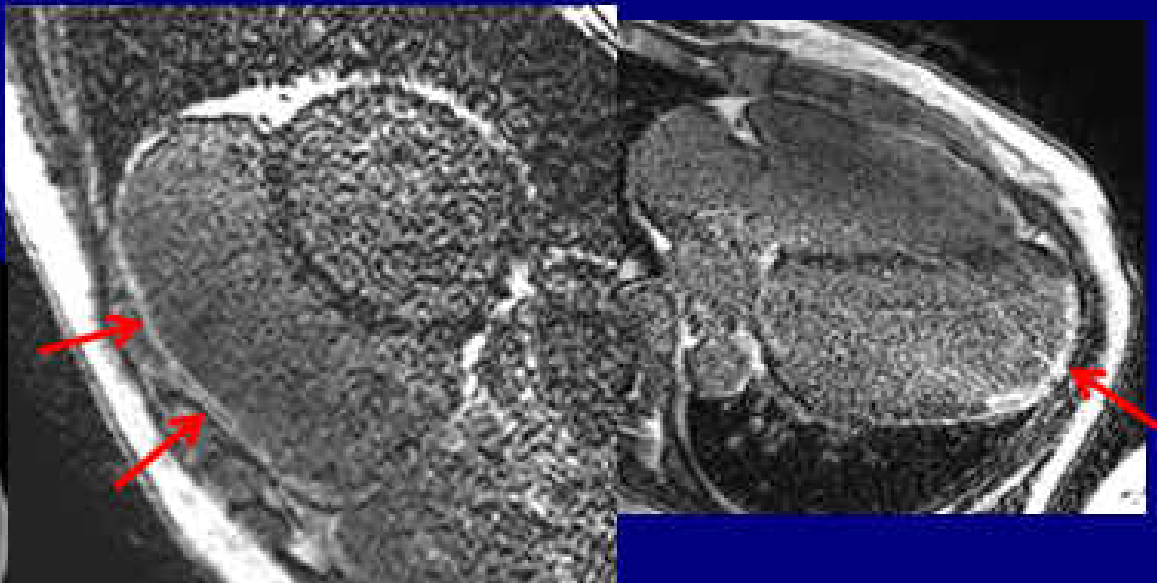
- A noncompacted to compacted ratio  $> 2.3$  in end diastole is considered diagnostic by MR imaging criteria
- Hypertrabeculation may be seen in normal variants and in patients who have hypertrophied hearts secondary to dilation, hypertension, or valvular disease.

# Sponge Plant





# Arrhythmogenic RV Dysplasia with LV Fibrosis (E/33)



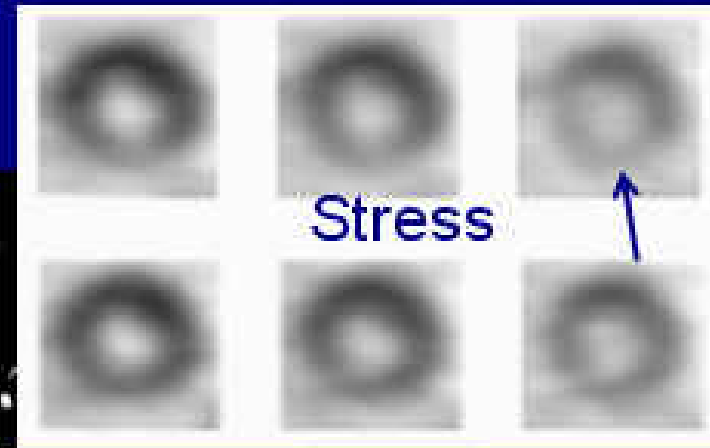
Late Hyperenhancement

# ARVC

- Fibrofatty infiltration of myocardium
- Ventricular tachyarrhythmia
- Sudden death or syncope
- Heart failure
  
- Wall thinning with fat infiltration/ fibrosis (delayed hyperenhancement)
- Deformity of RV wall
- Local and global wall motion abnormality of RV(LV)

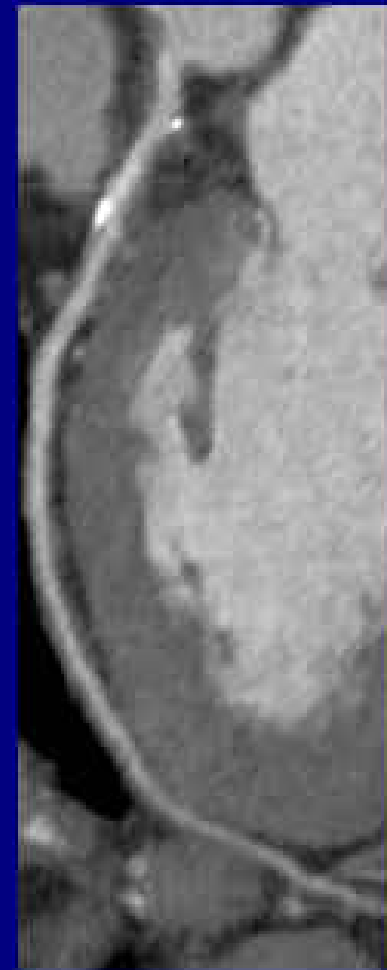


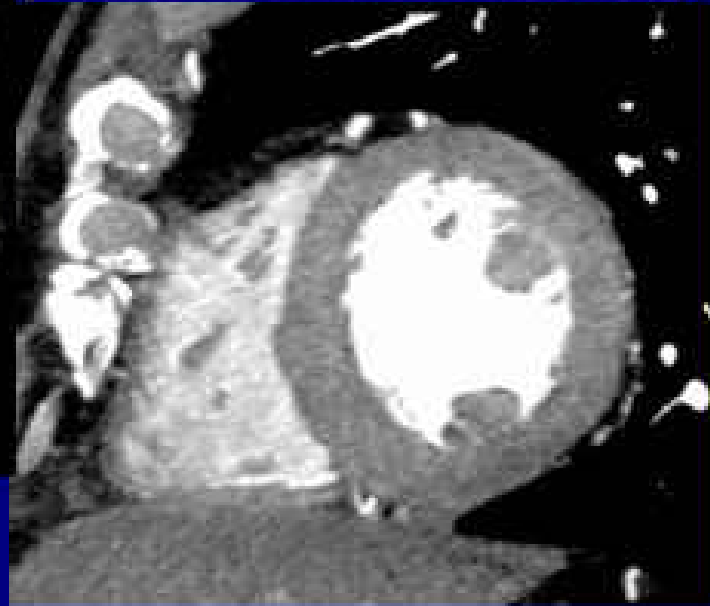
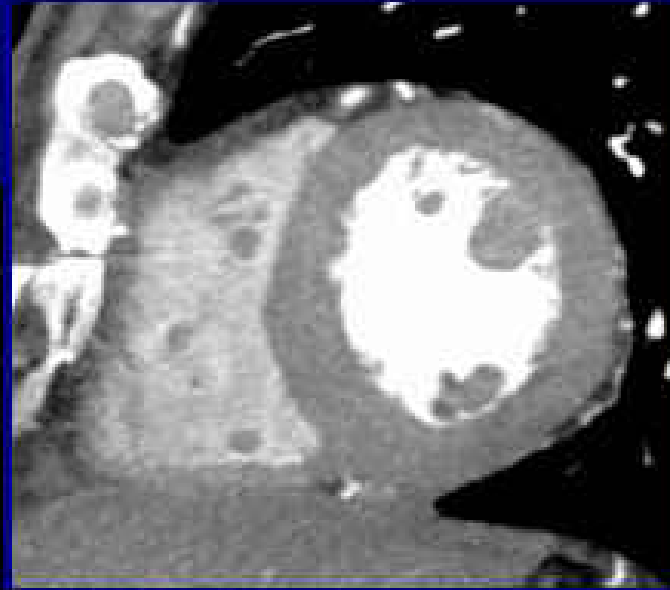
## RCA Lesion: CCTA-SPECT Correlation



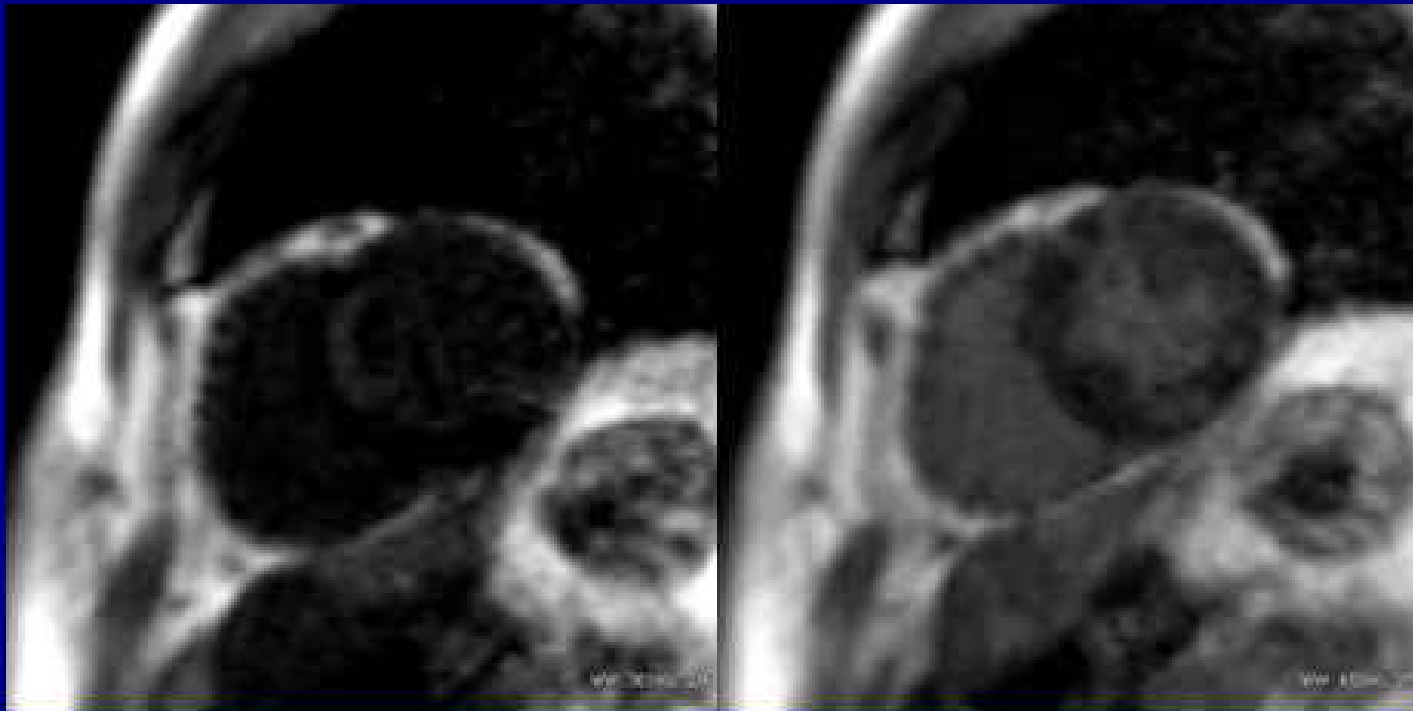
Rest

For CAD Work-up, 66y/M with  
Chest Pain on Exertion



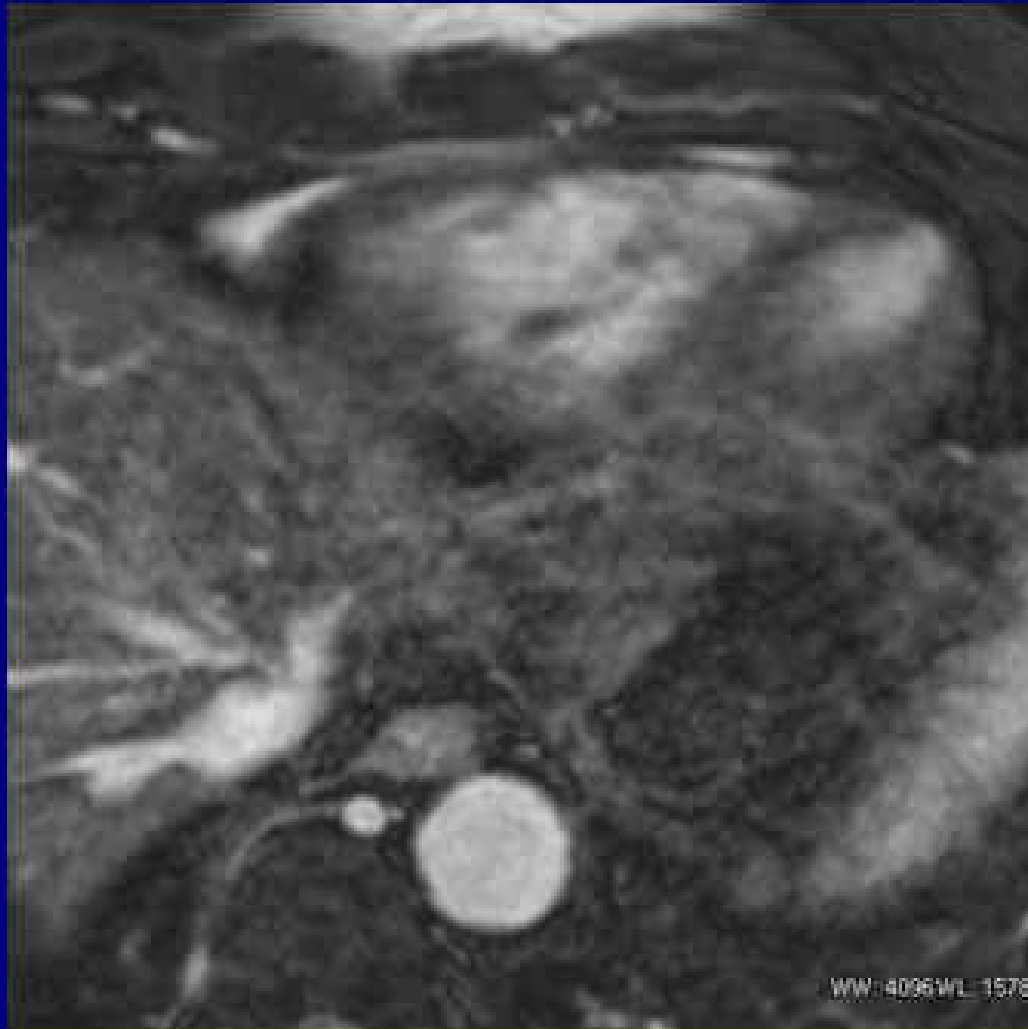


# Perfusion MRI

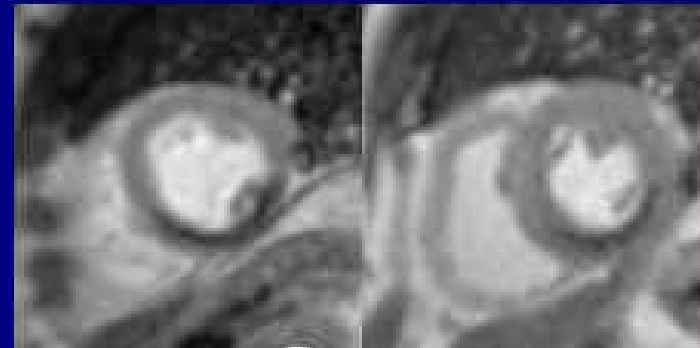
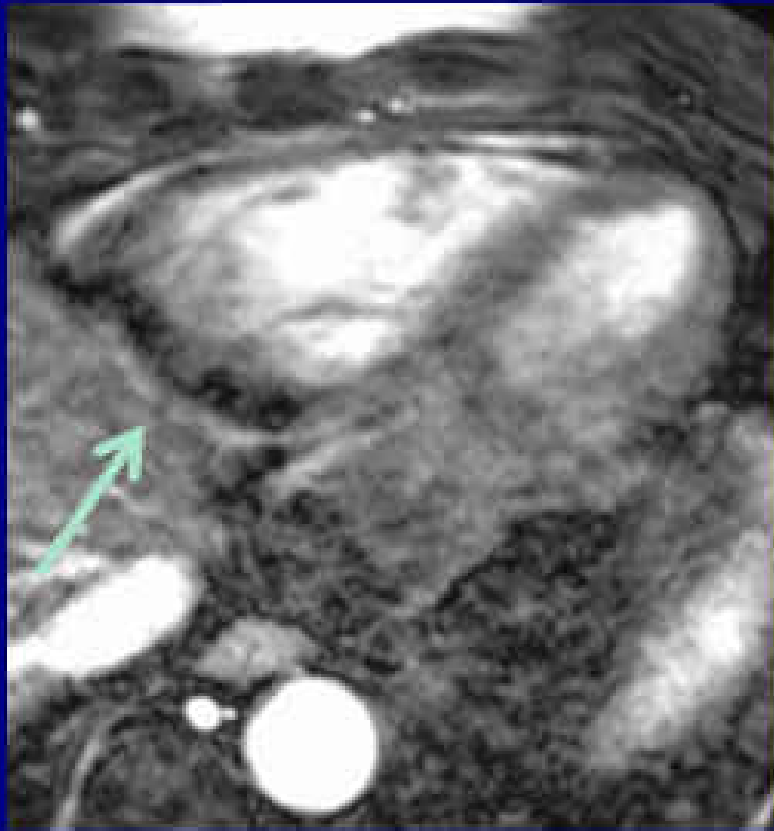


Adenosine-Stress

Rest



Whole-heart MR Angiography



**Stress**



**Rest**

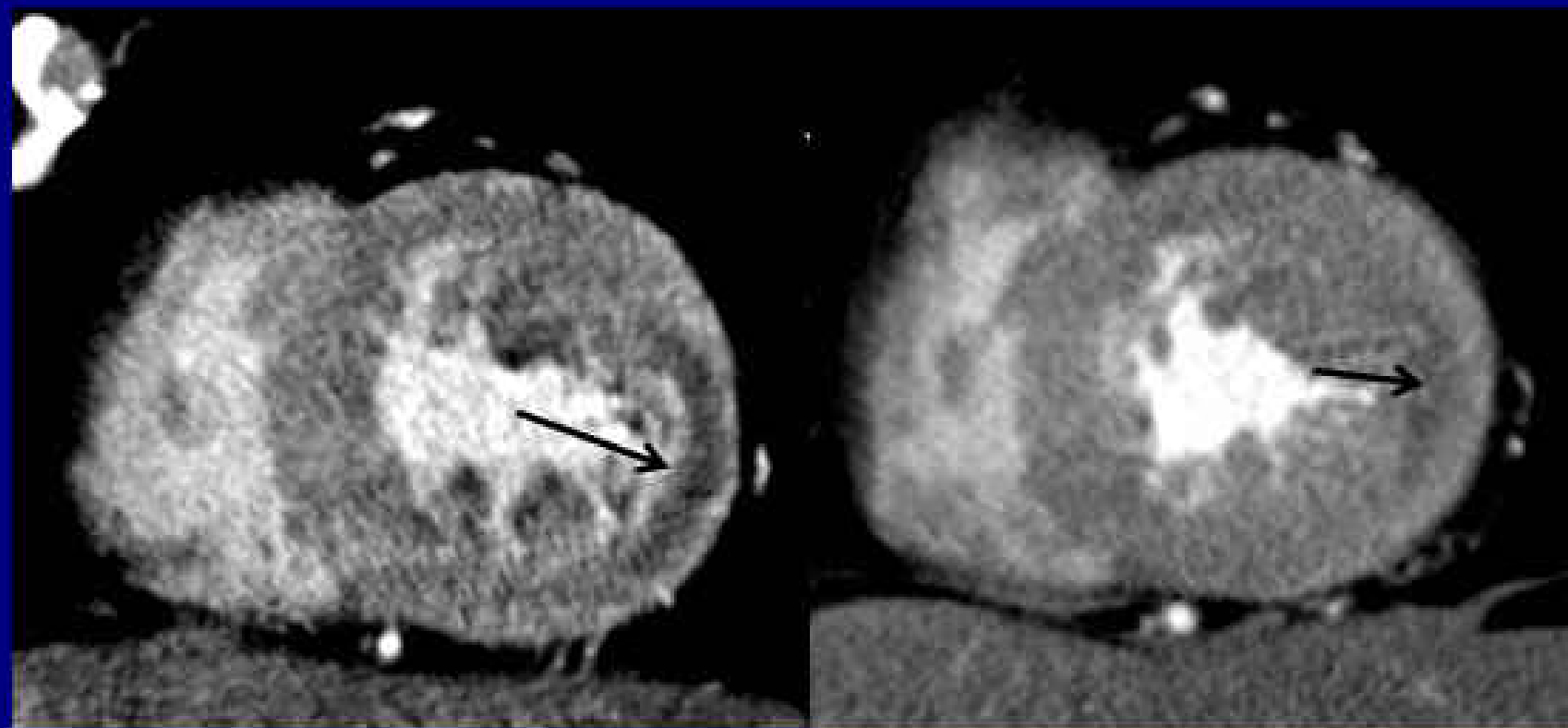


**Delayed CE**

# Myocardial Perfusion

- The physiologic significance of CT-detected lesion may not be clearly understood.
- Recent literature shows the potential advantage of MDCT for CCTA during adenosine stress.
- Dynamic CCTA during adenosine infusion may be possible with the use of area-detector CT (256- or 320-slice CT).
- Dual-energy CT recently showed the potential of depicting ischemic segments in resting state.

## Stable Angina (72/M)

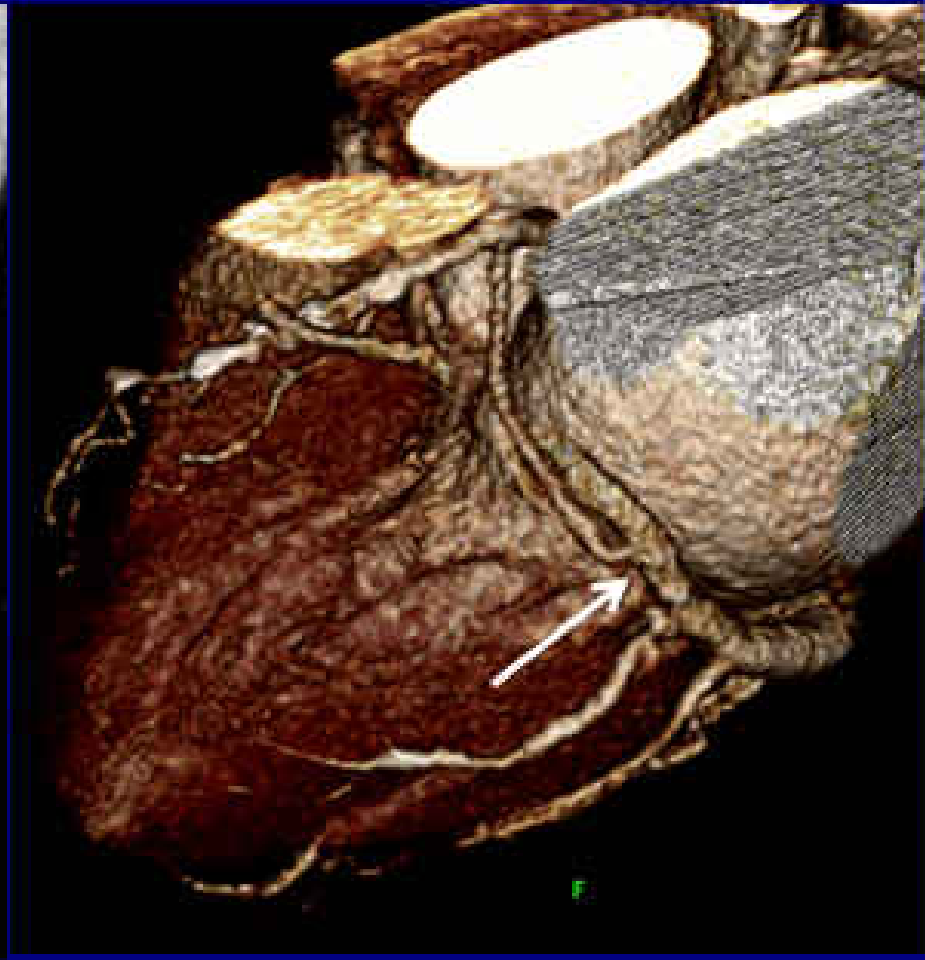


Adenosine stress

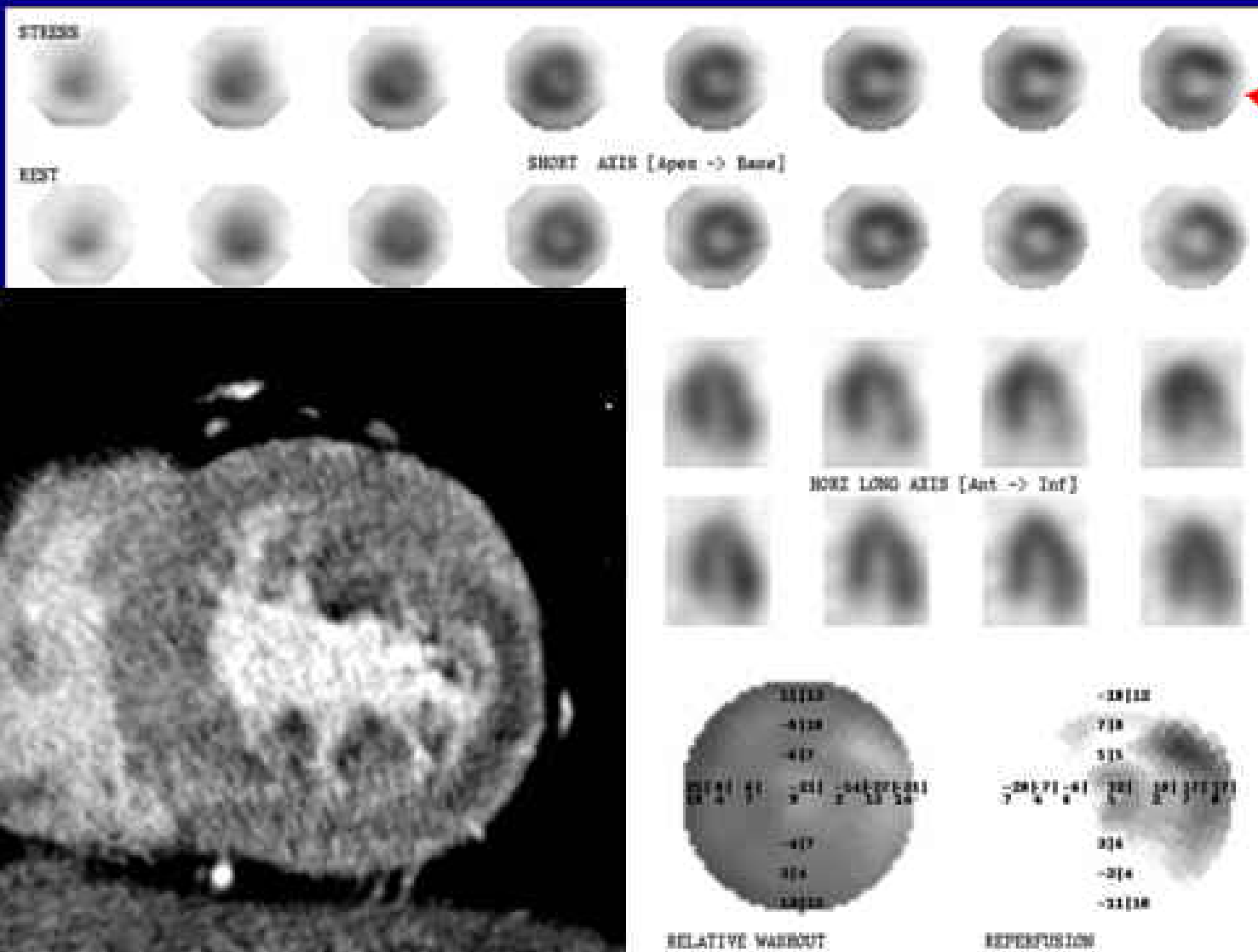
Rest



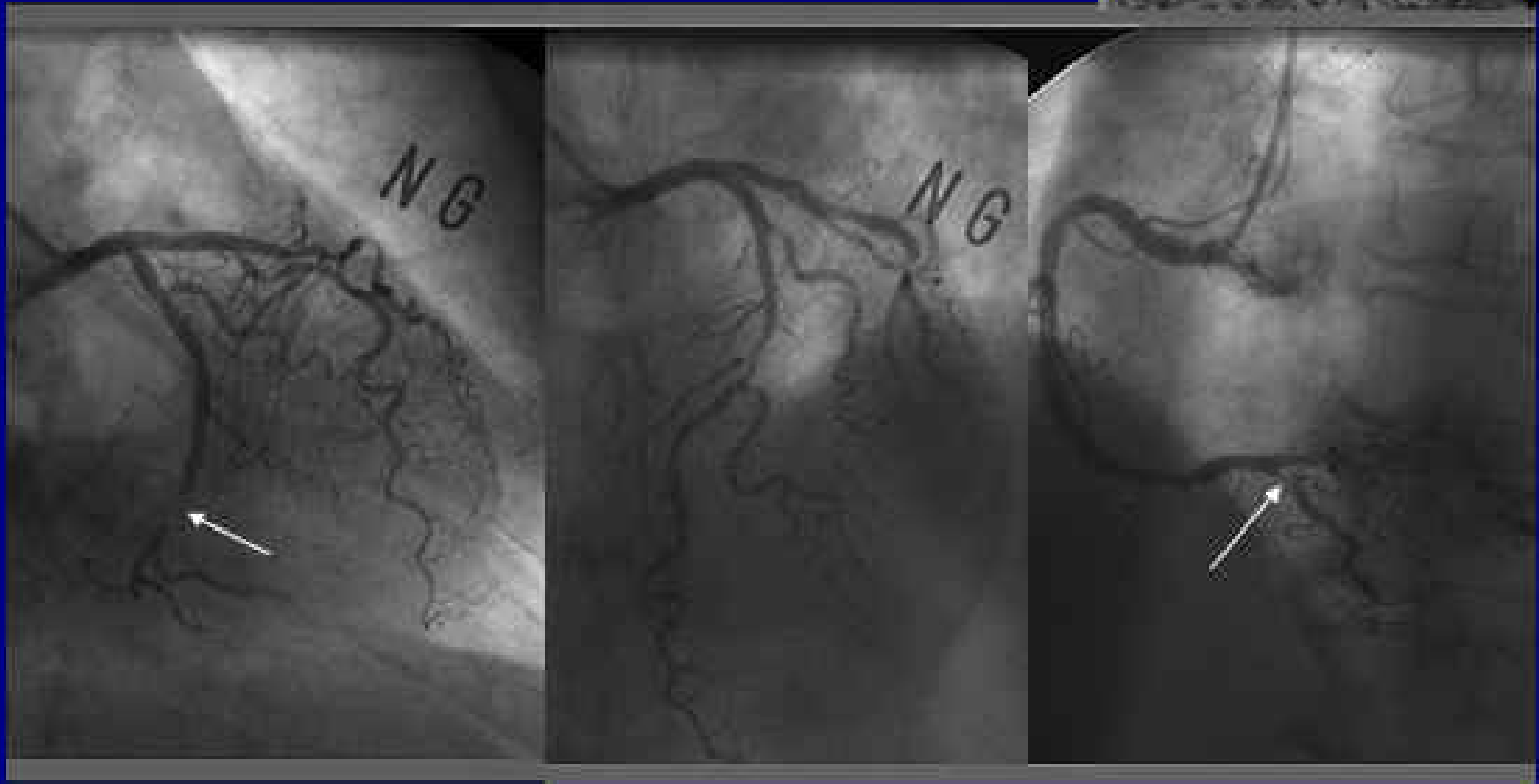
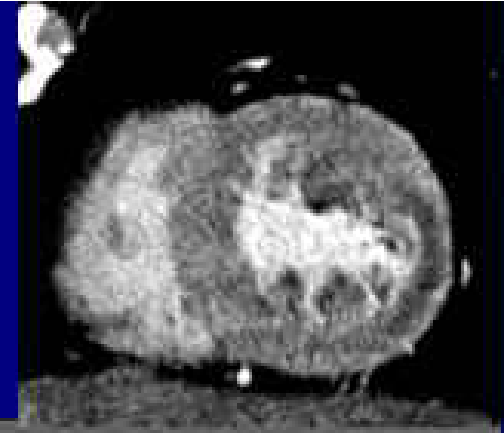
## LAD Stenosis and LCX Occlusion



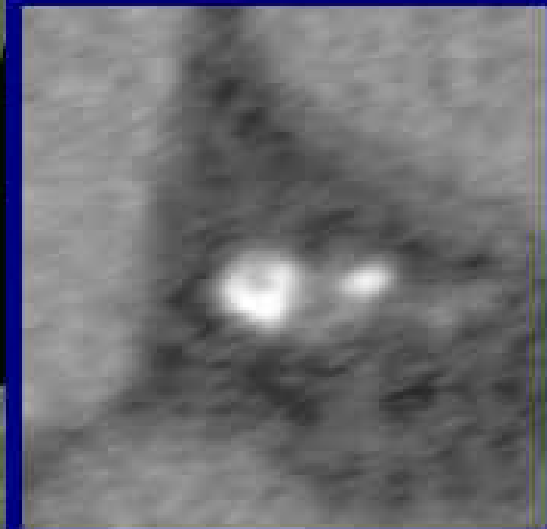
# Adenosine-stress SPECT vs MDCT

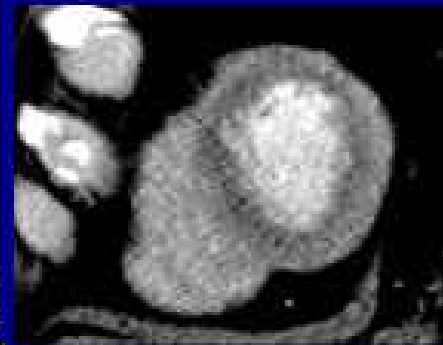
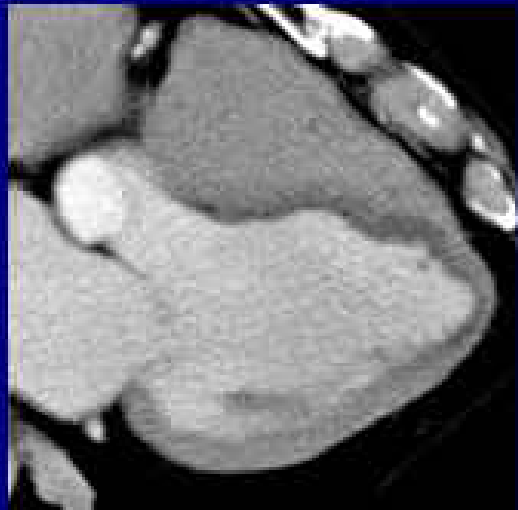


# CAG



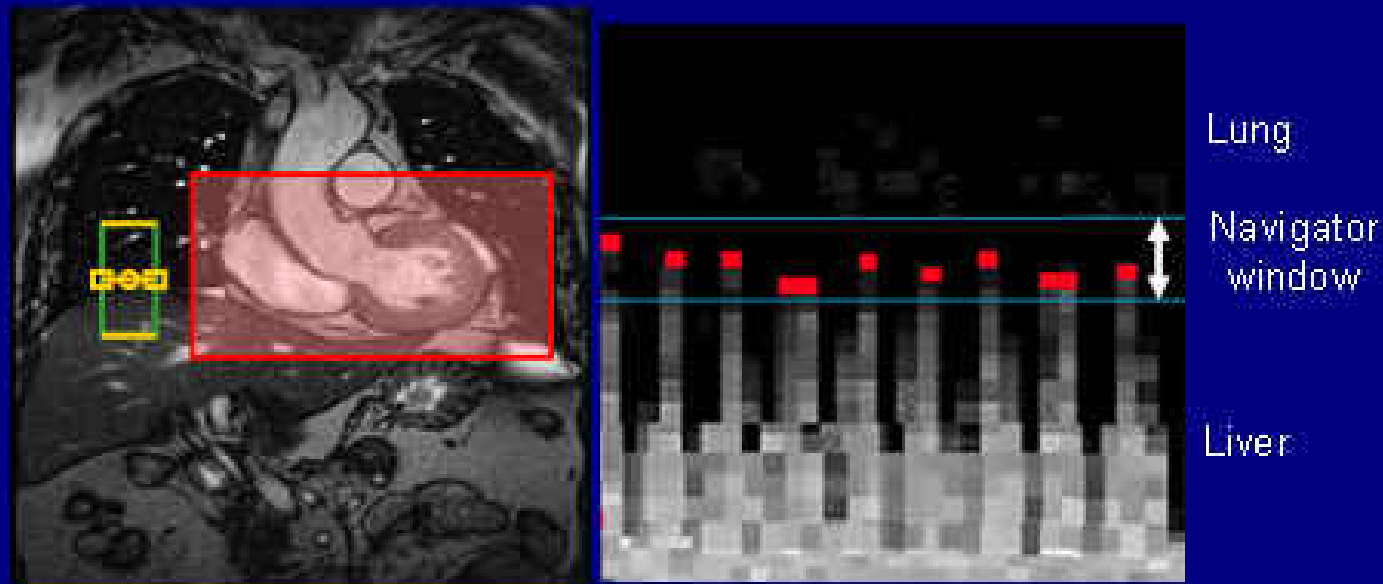
## 70/M with Exertional Chest Pain



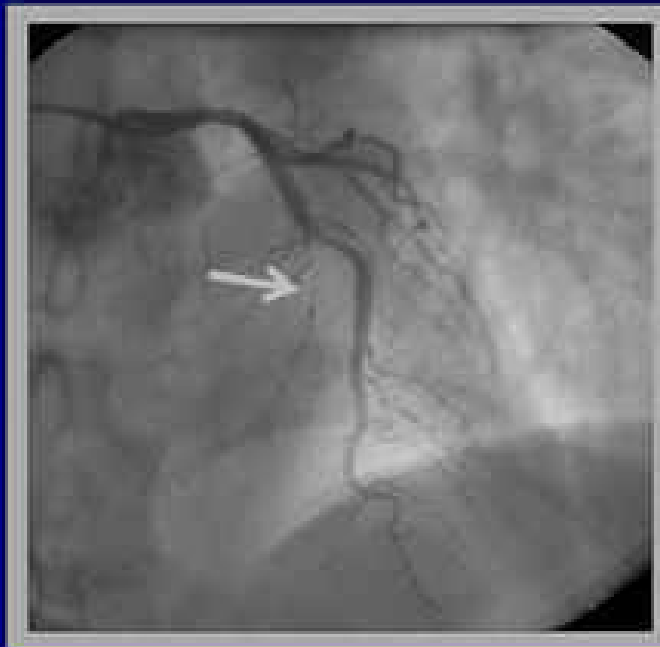


Adenosine-Stress Dual-Energy CT (Definition FLASH)

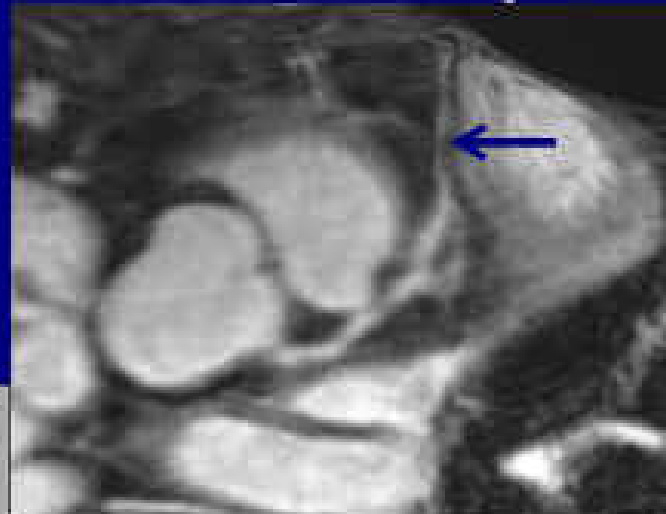
# Free-breathing Coronary MRA using Navigator Echo Tech.



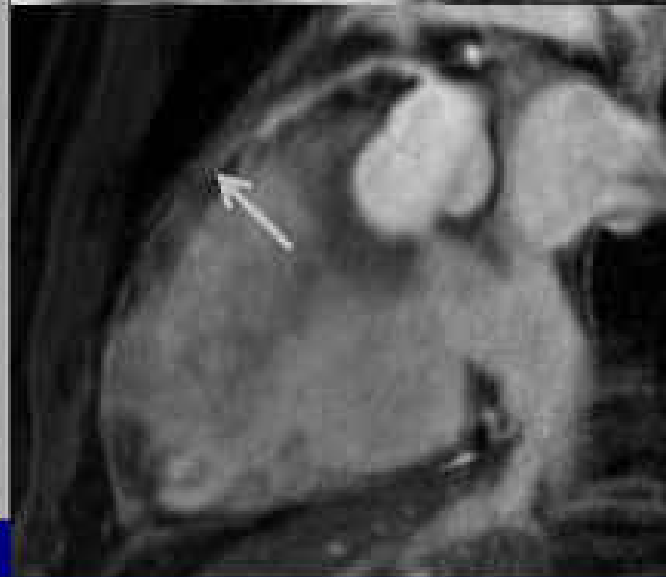
Contrast-enhanced  
MRCA after PCI,  
Residual stenosis  
40% at CAG



Initial CAG

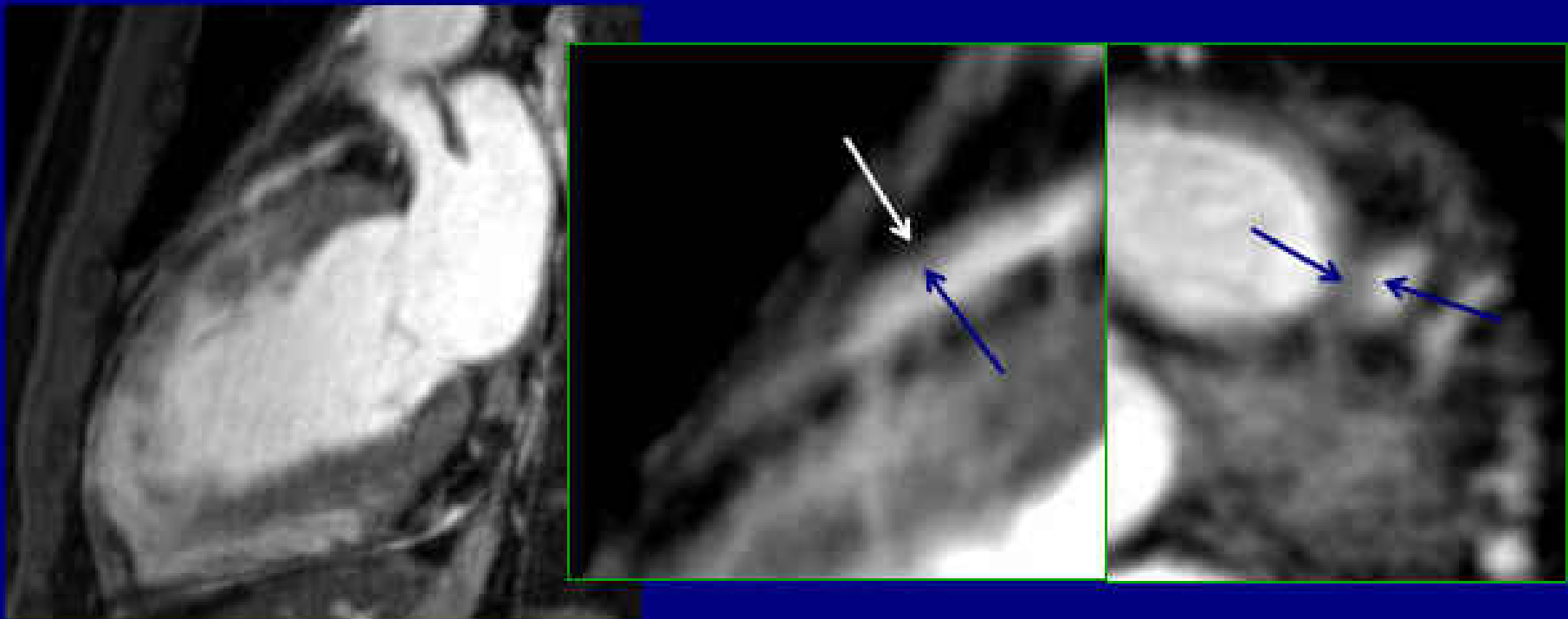


WH MRA



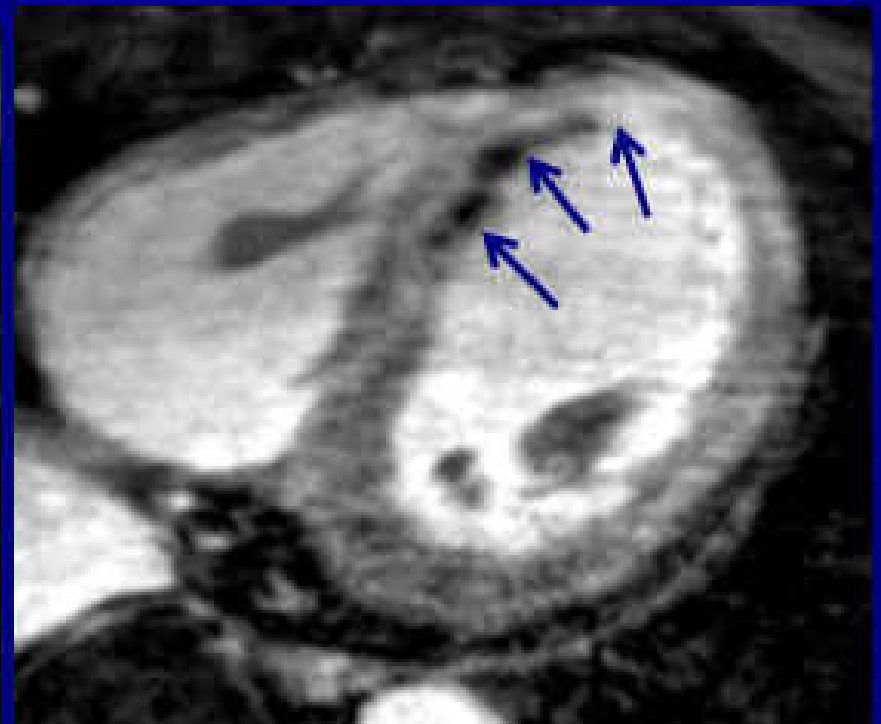
VT MRA

# Contrast-enhanced MRCA: Plaque Visualization



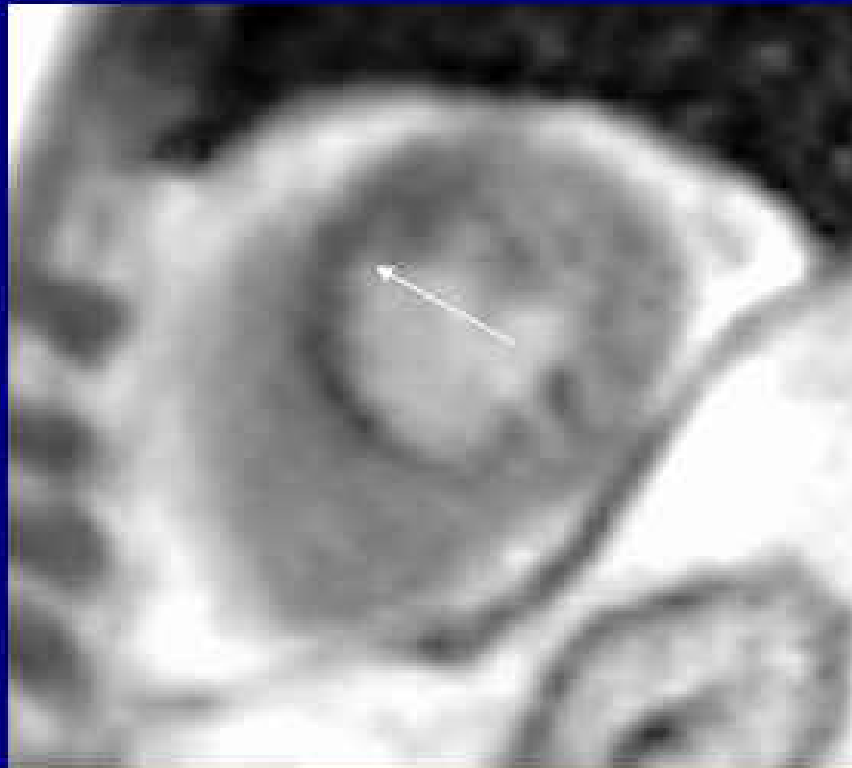


Contrast-enhanced MRCA:  
Visualization of Myocardial Infarction after  
Angioplasty of m-LAD

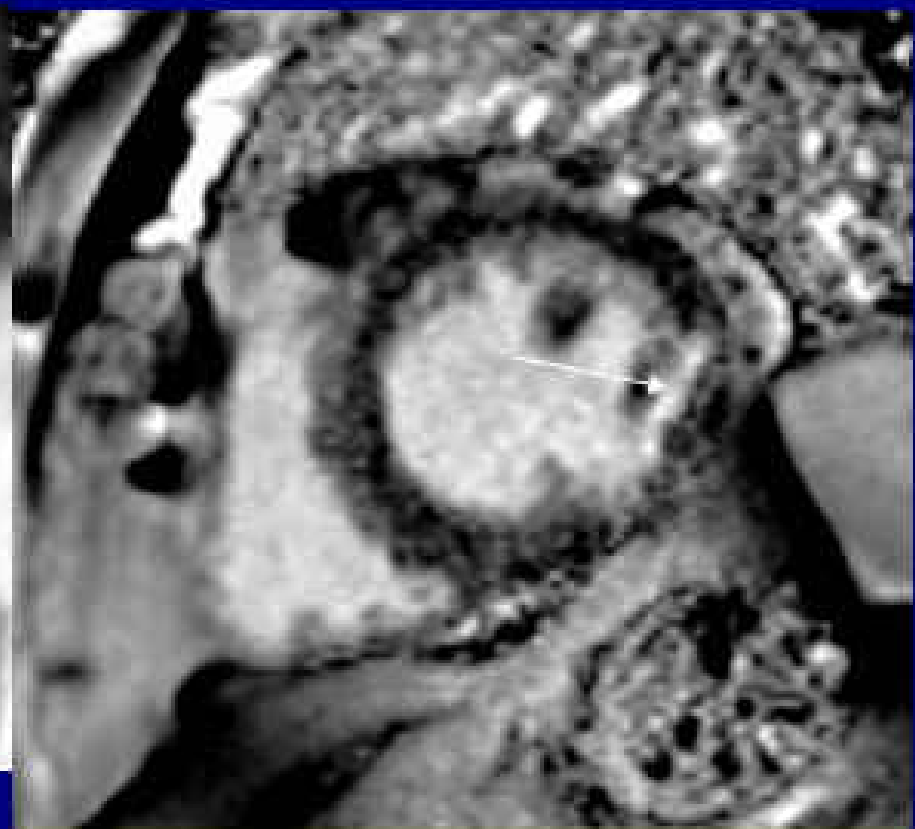


Hyperenhancement, residual perfusion defect, patent m-LAD

# Old MI

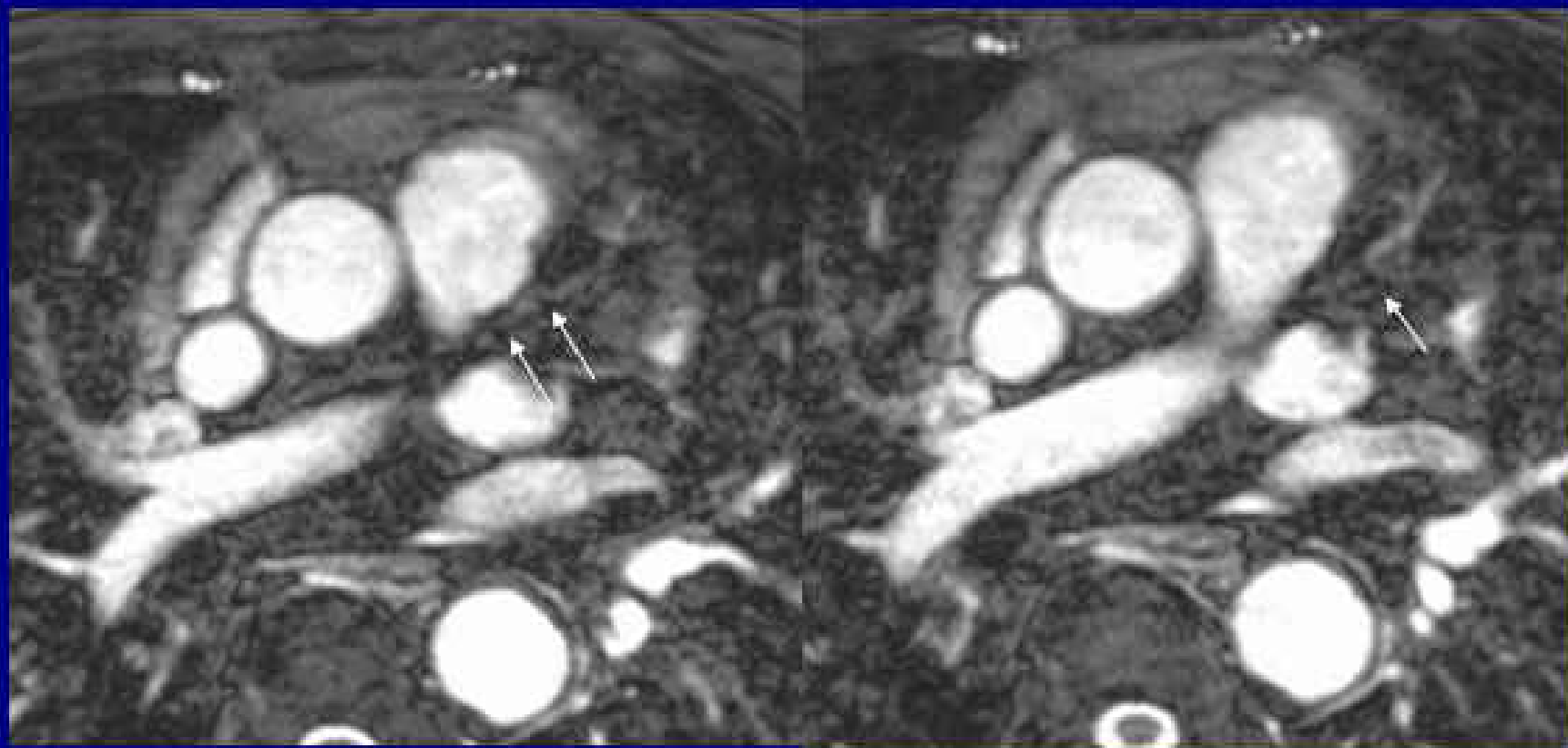


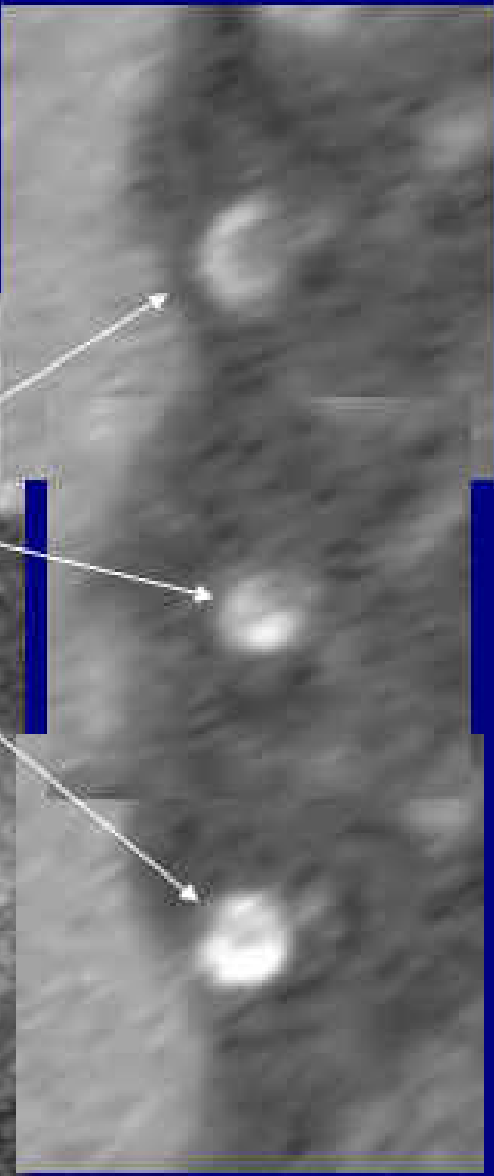
Adenosine-stress

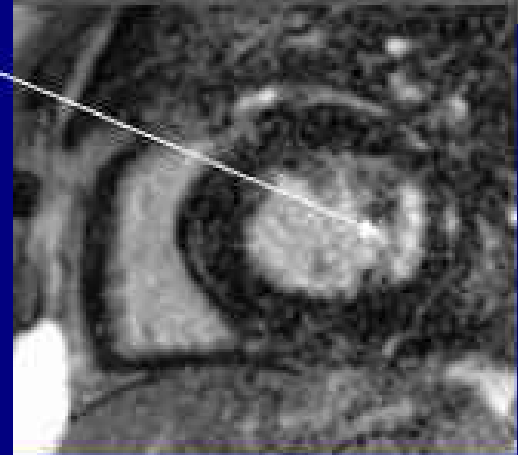
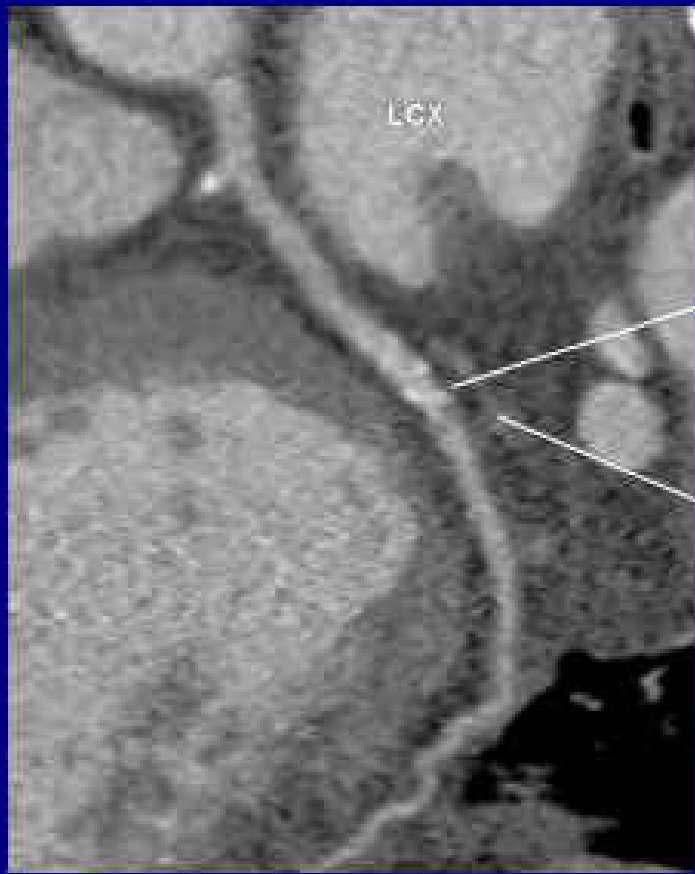


Delayed Contrast-enhanced

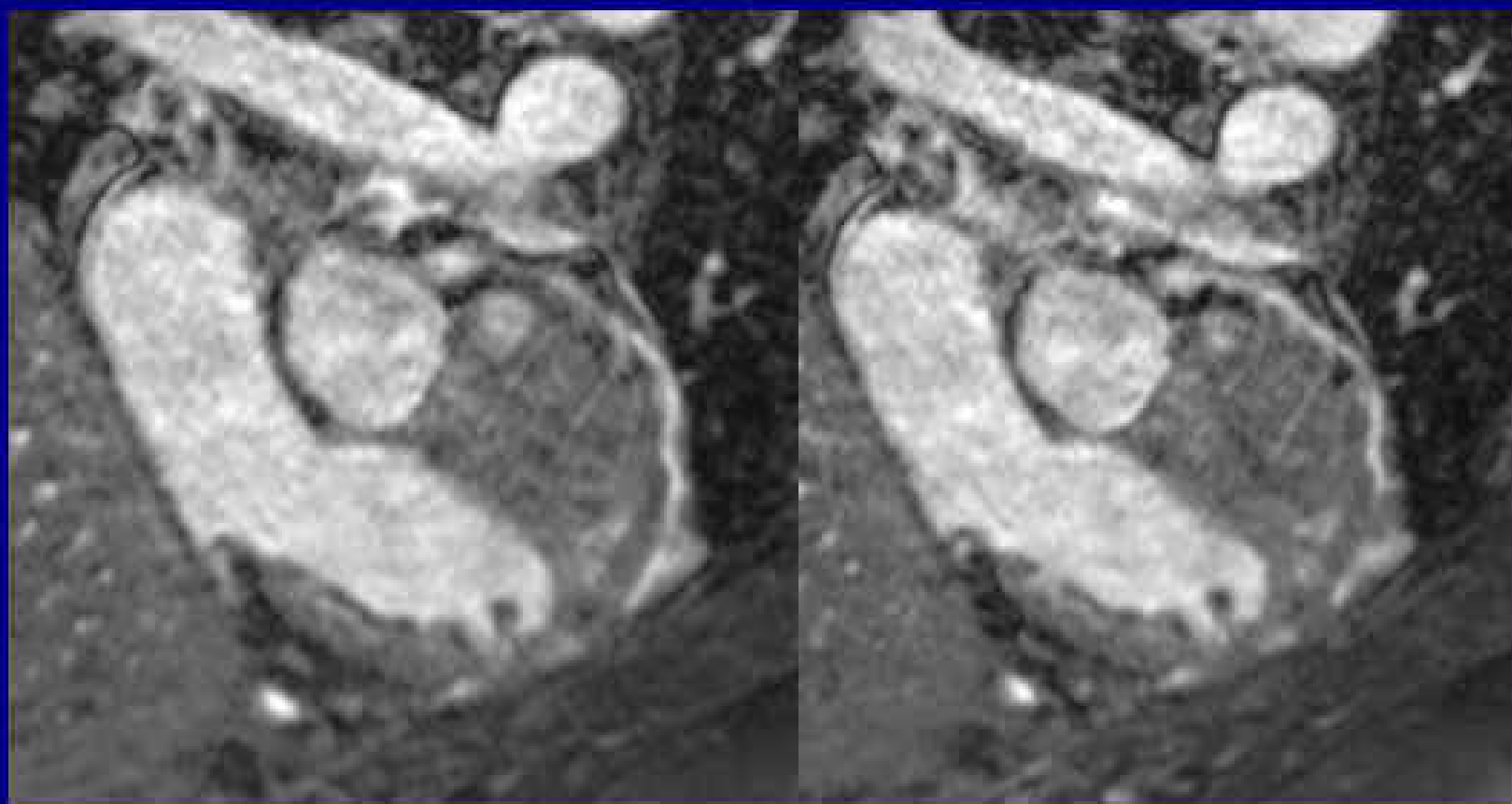
# Whole-heart Coronary MRA

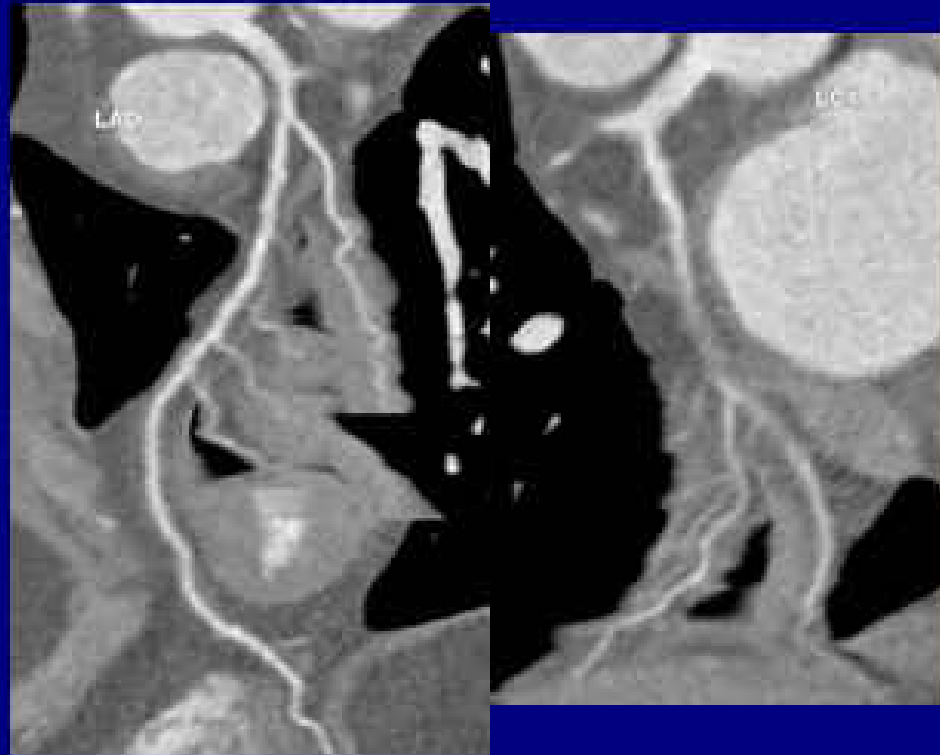




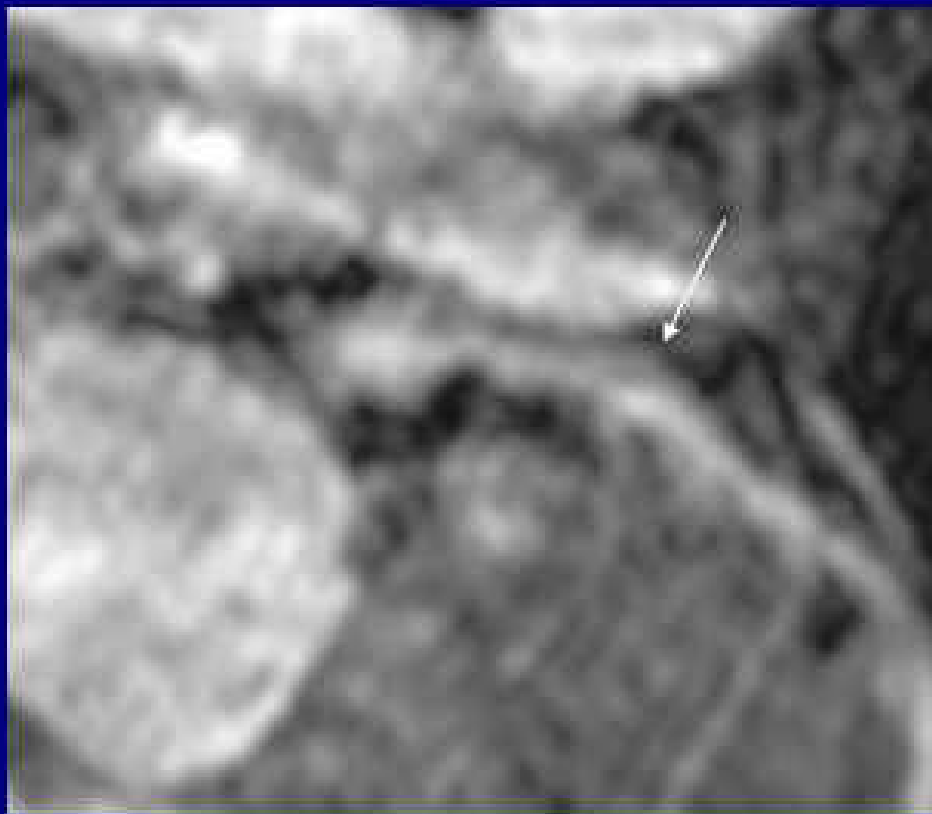


# Chest Pain, M/45



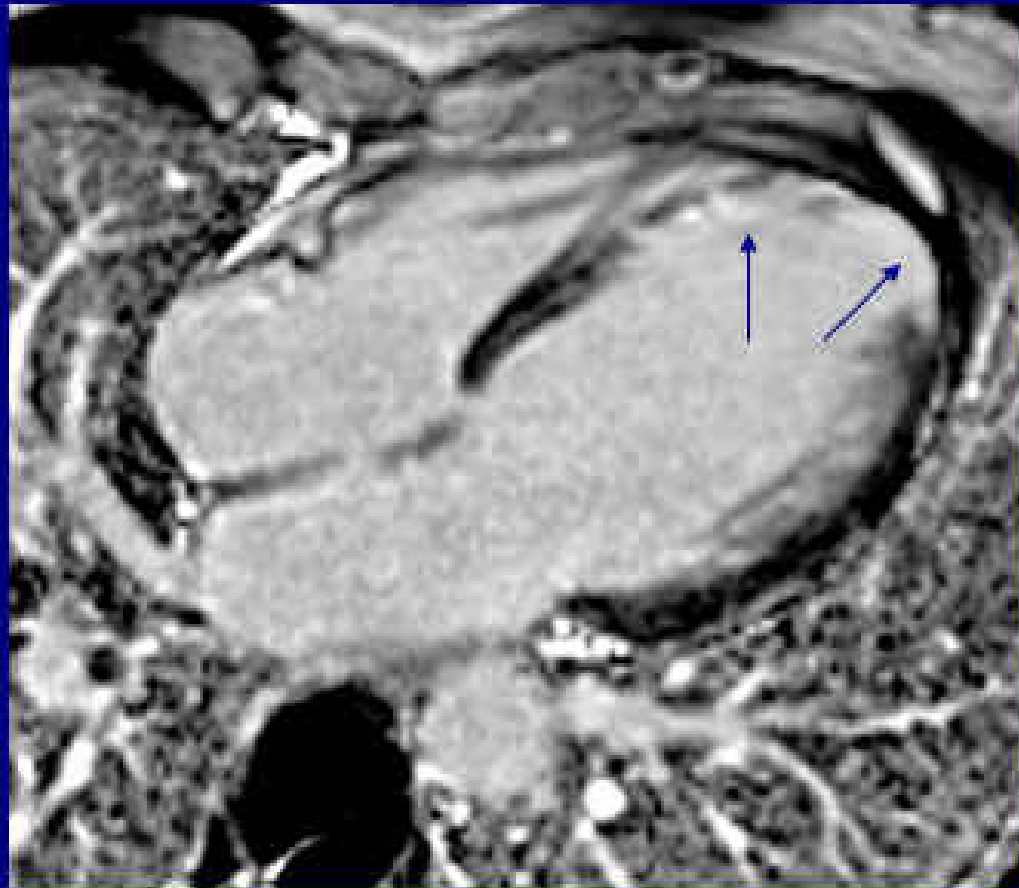


# LAD Plaque Visualization



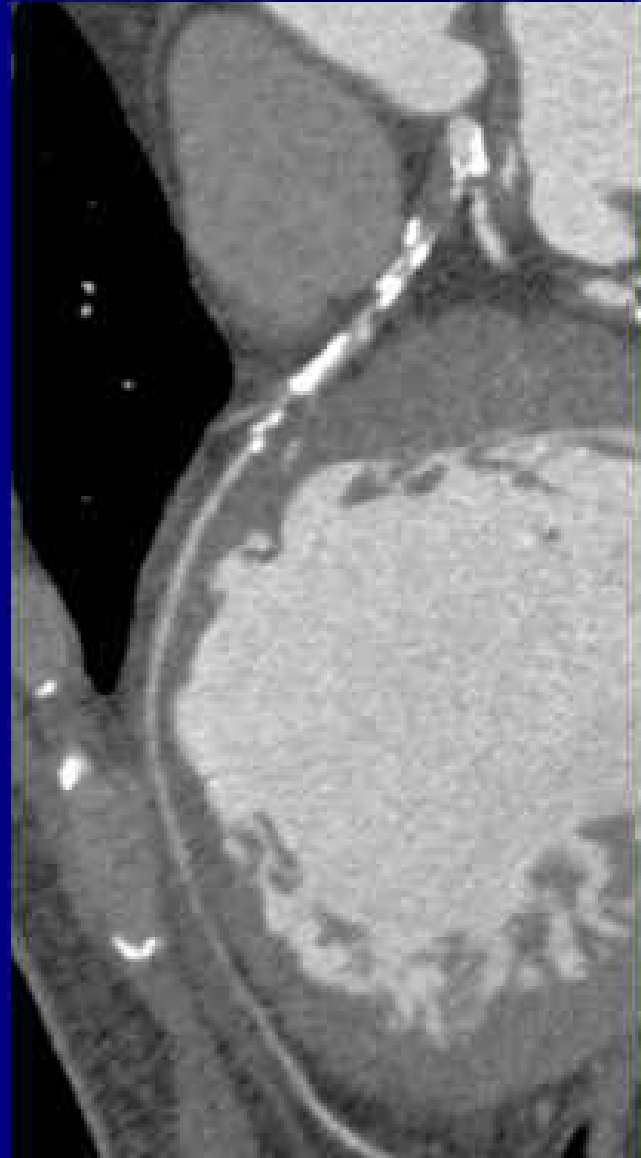
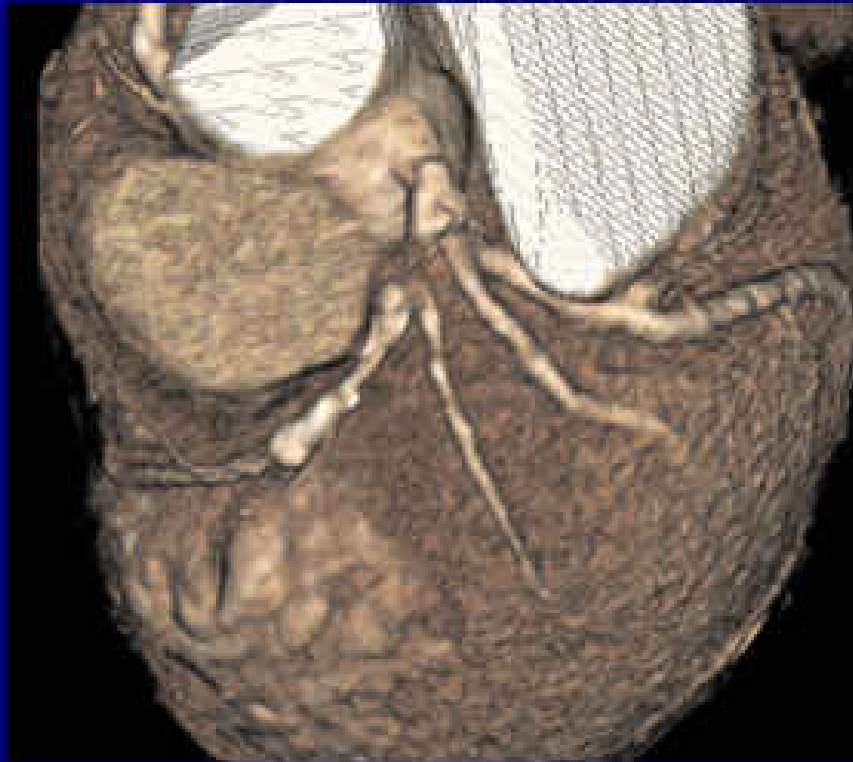


# Old MI, 67/M



# MRA

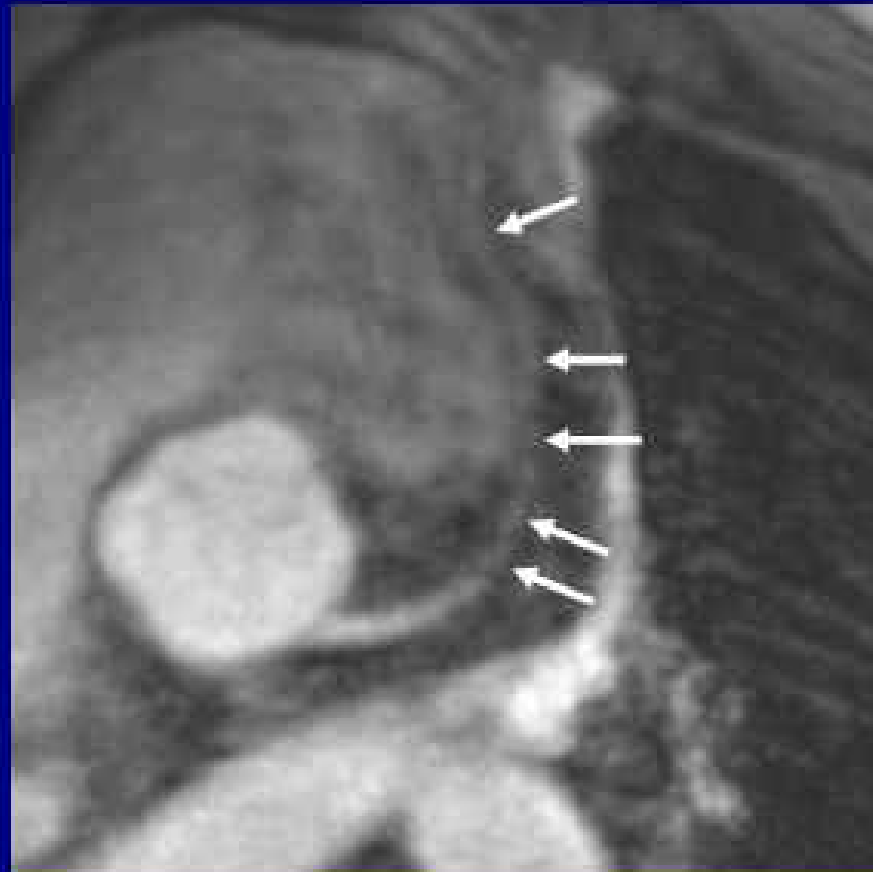




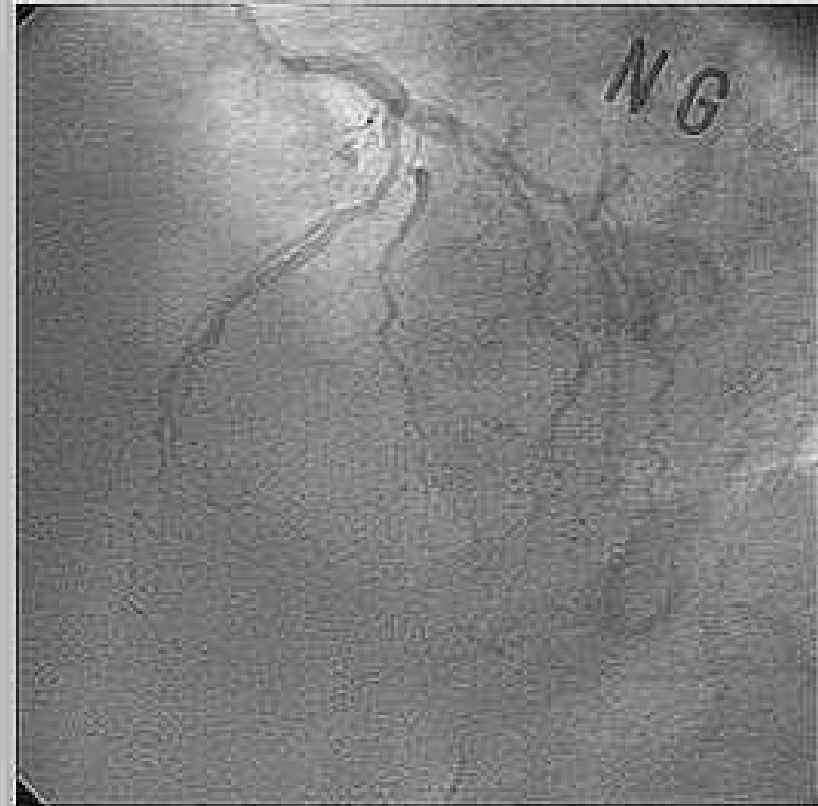
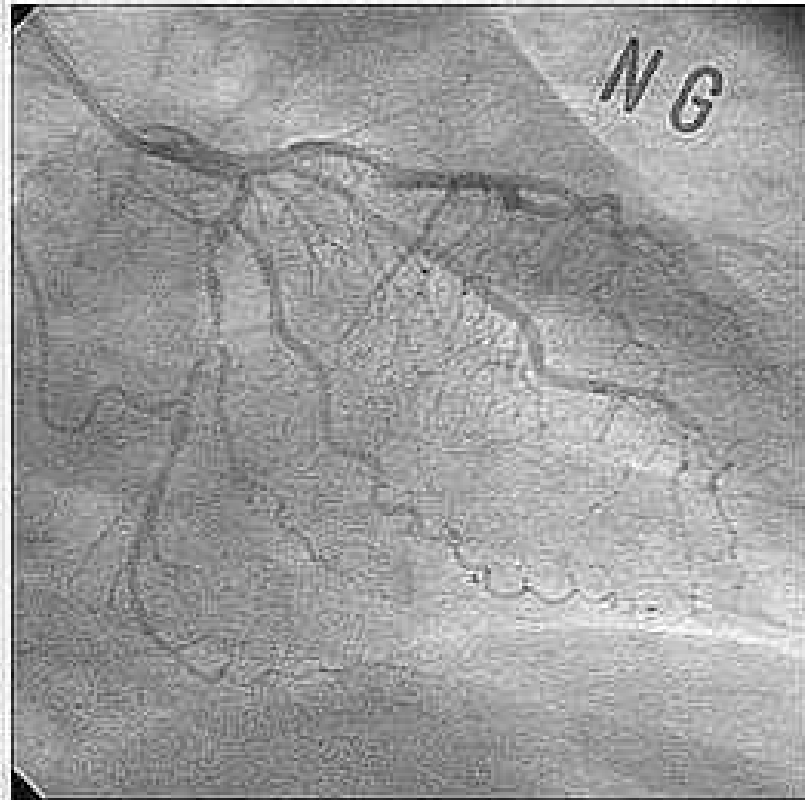
## LAD Calcifications with Calcium Score 473



# MRA of LAD



# Catheter CAG



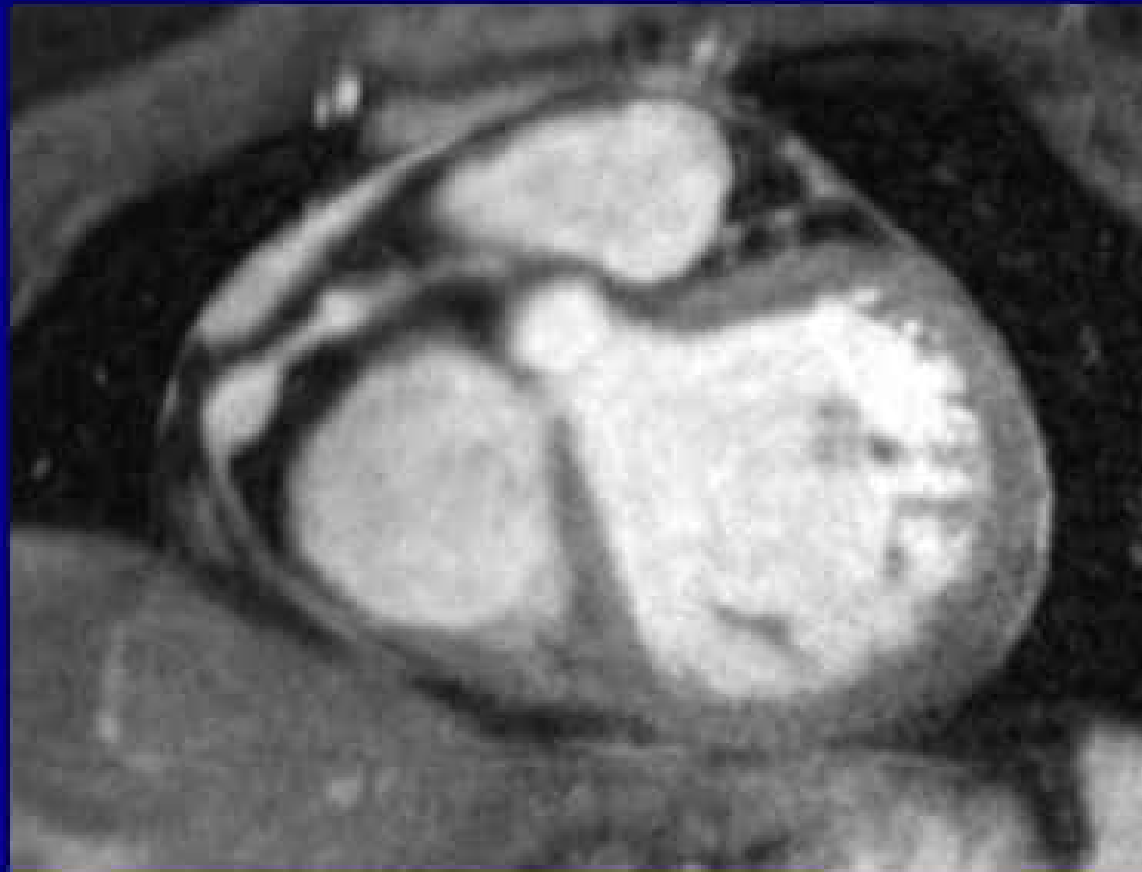
# Whole Heart Coronary MRA at 1.5 T

- Sakuma H et al. J Am Coll Cardiol 2006;  
48:1946-1950.
- In 131 patients, MRA showed a patent-based sensitivity and specificity of 82% and 90% for lesions > 50% with vessel diameter >2 mm.
- Their lesion-based sensitivity and specificity were 78% and 96%.
- The study was successful in 86% and took  $12.9 \pm 4.3$  min in average.

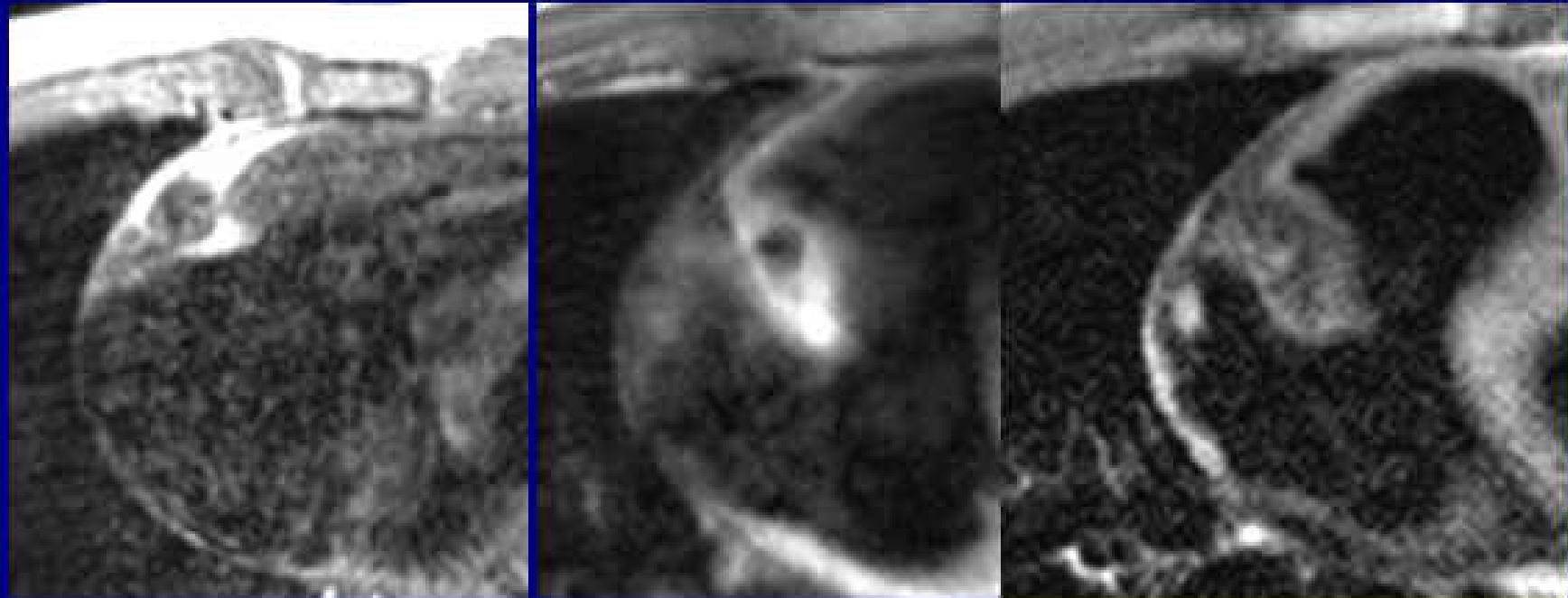
# MRCAs in Pediatric Age



# Kawasaki Disease (14/M): Coronary MRA



# 1.5T vs 3T MRI



1.5 T SE T1WI

T1WI@3T

T2WI@3T

# Dobutamine-stress MRI



normal



ischemic



hibernating  
+ ischemic

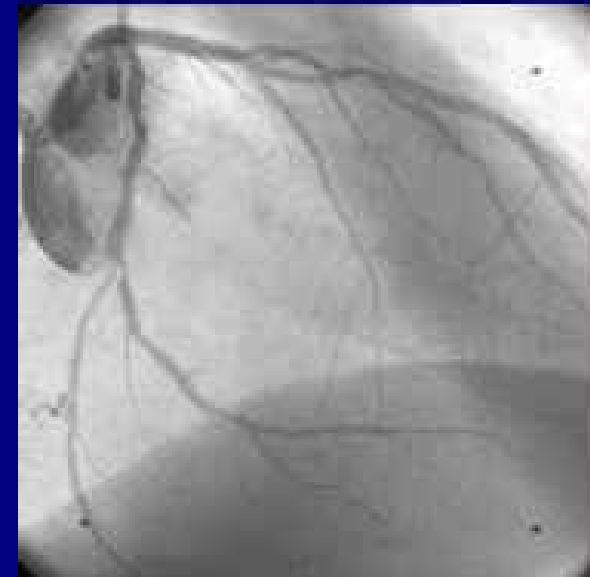
rest



20  $\mu$ g



40  $\mu$ g



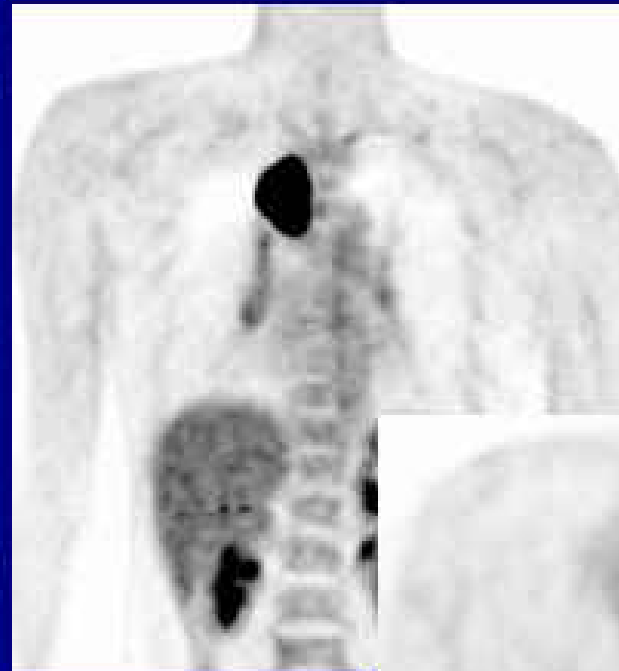
Courtesy of Eiki Nagel, MD

M/55

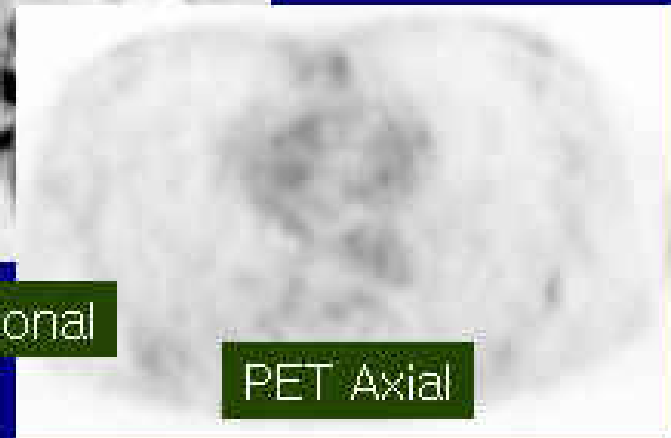
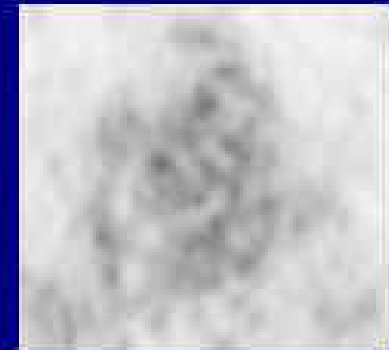
- Lung cancer, 3 years ago
- Follow-up chest CT showed incidental aortic valve mass
- Echocardiography also showed mass.



Chest CT



PET Coronal



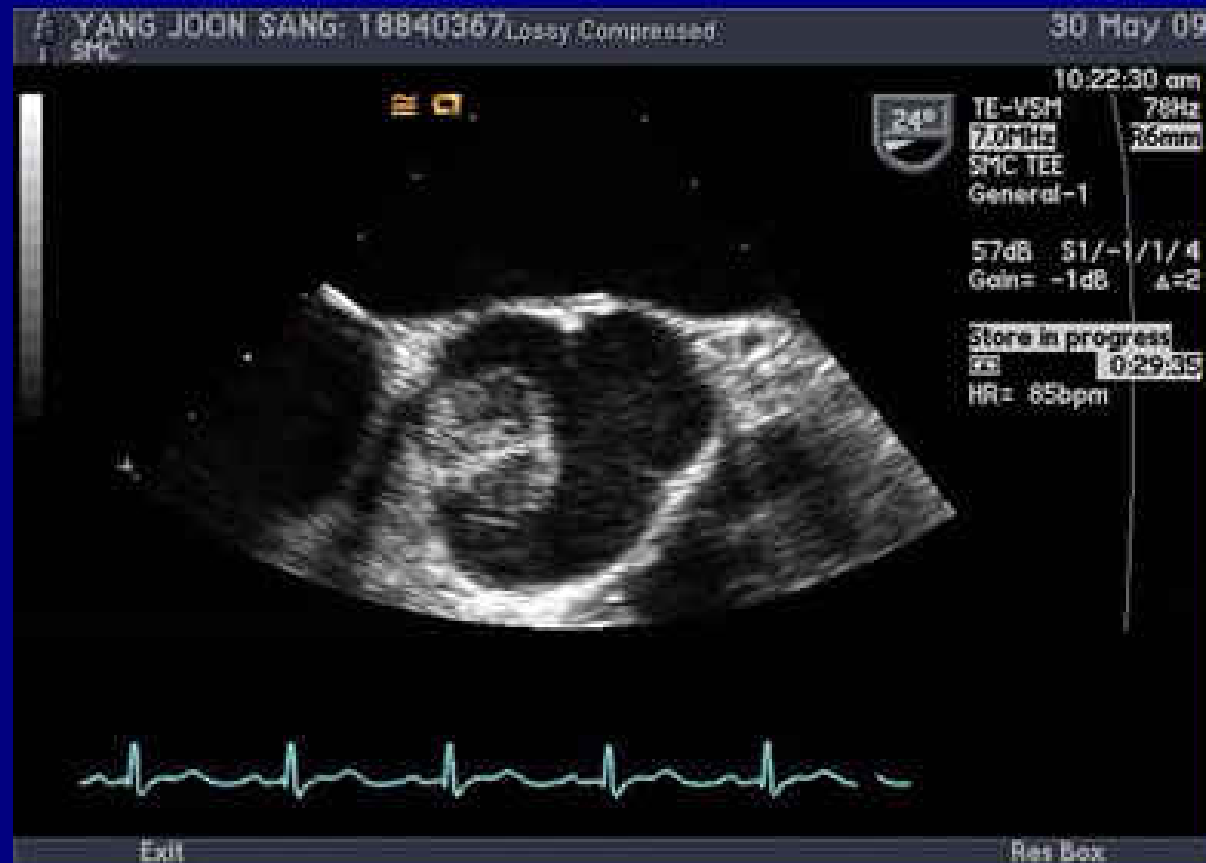
PET Axial

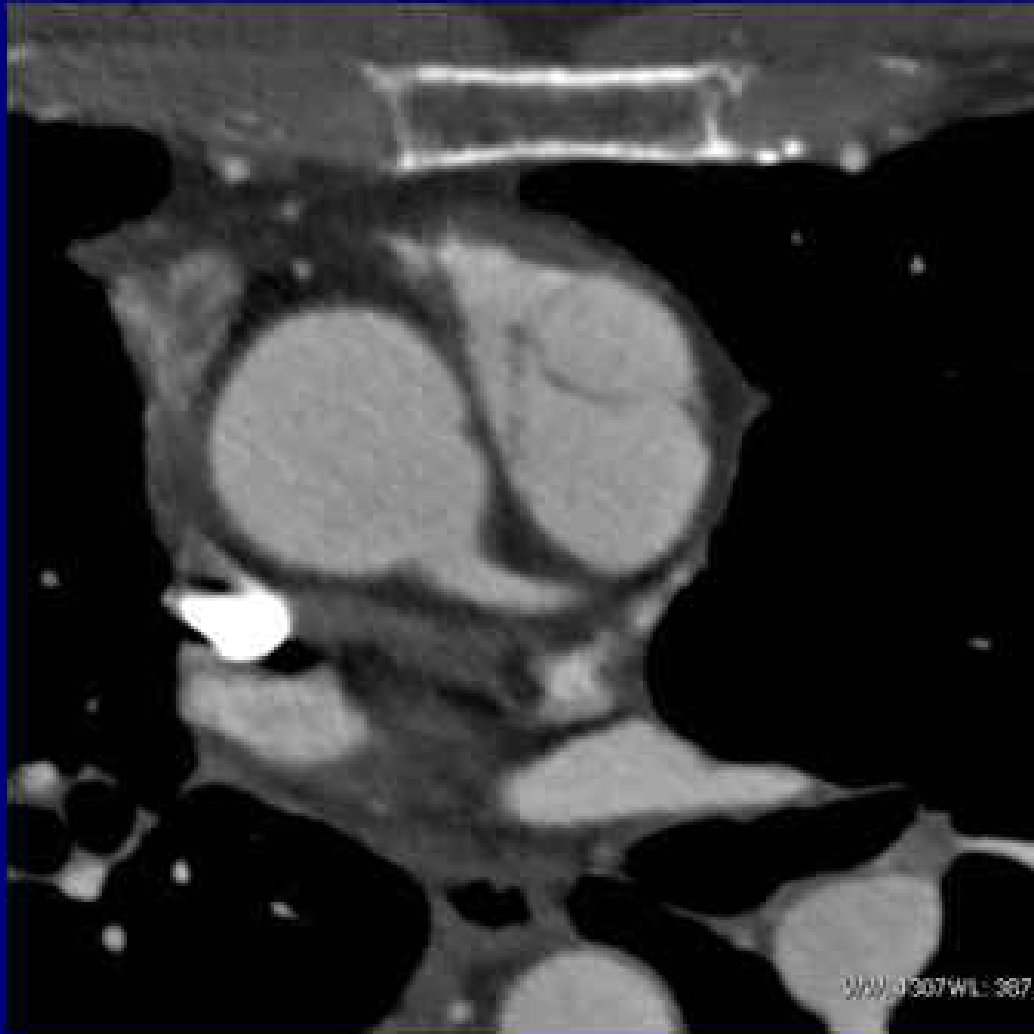
# Nongated Chest CT

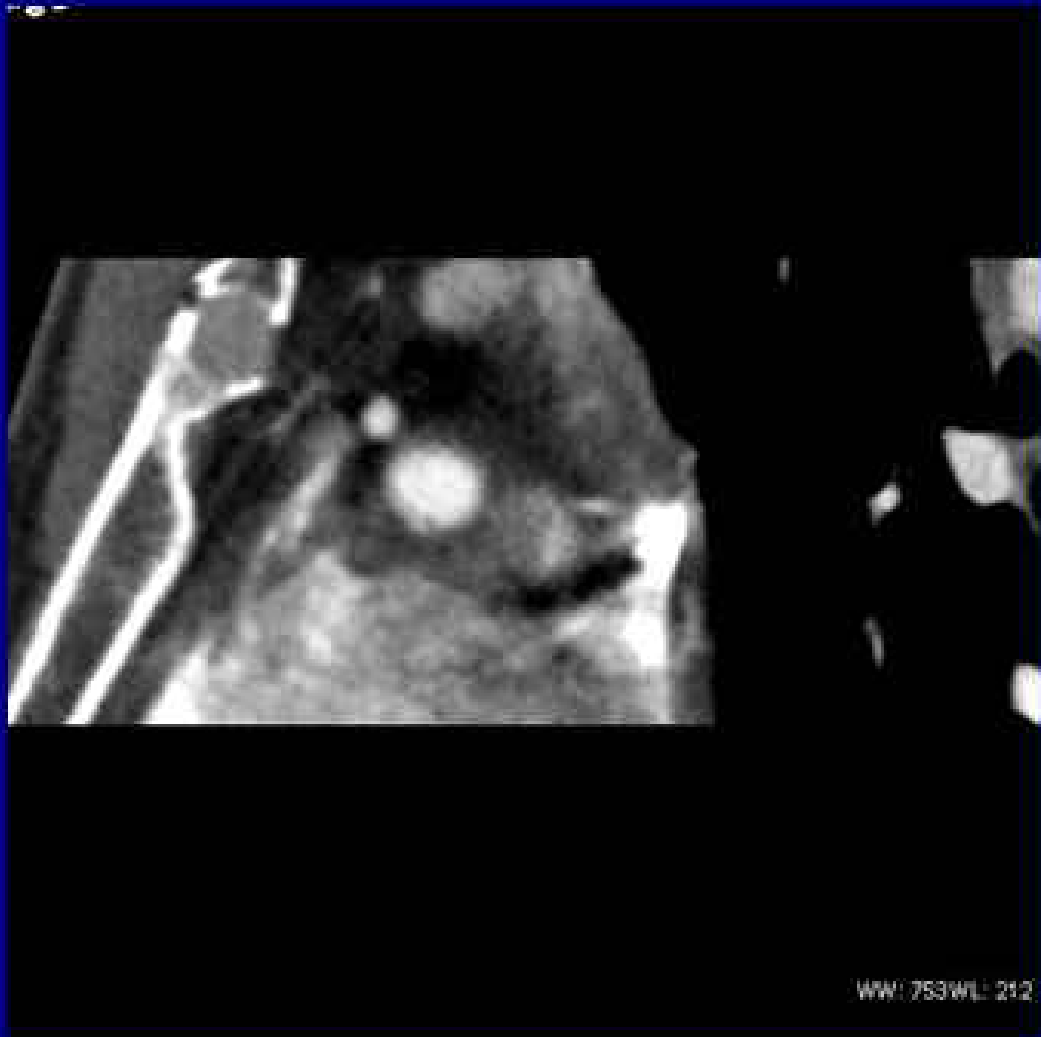




# Transesophageal Echo



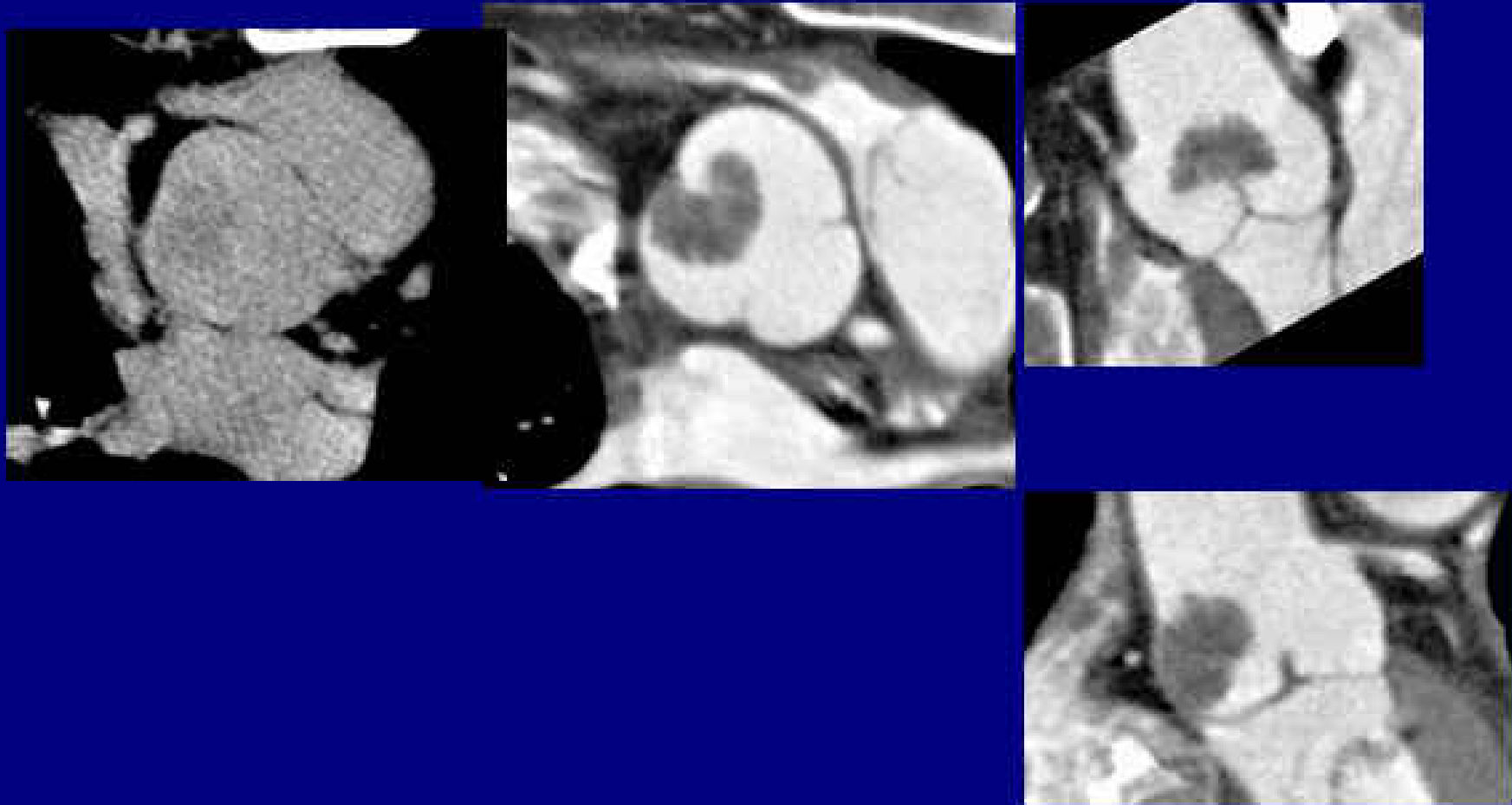




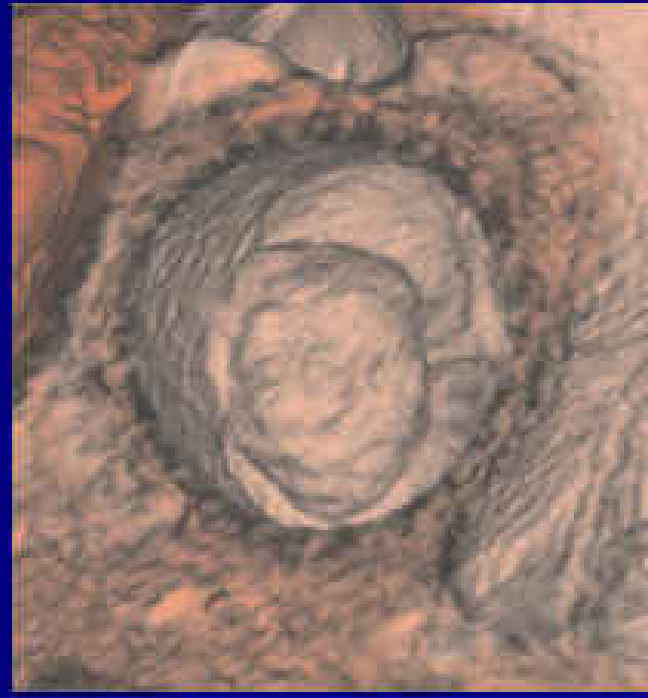
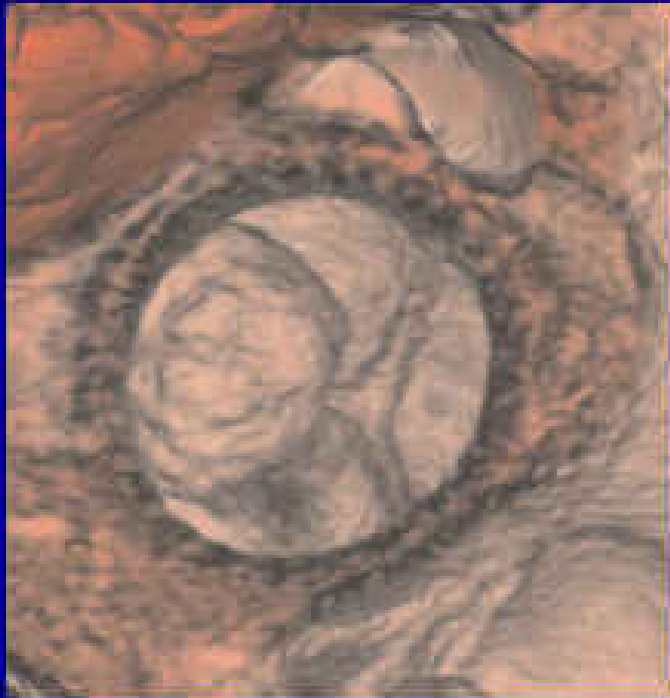
www.753wll-212

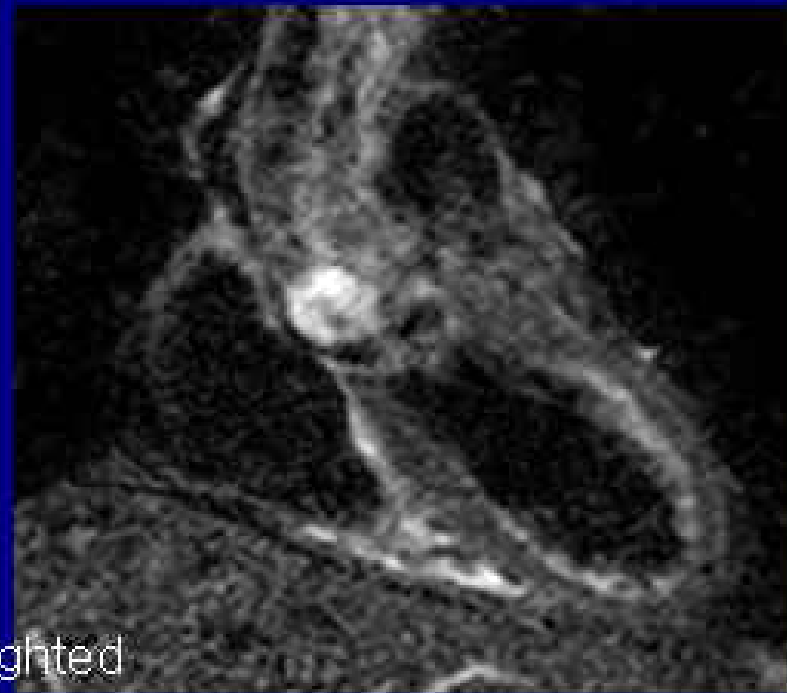
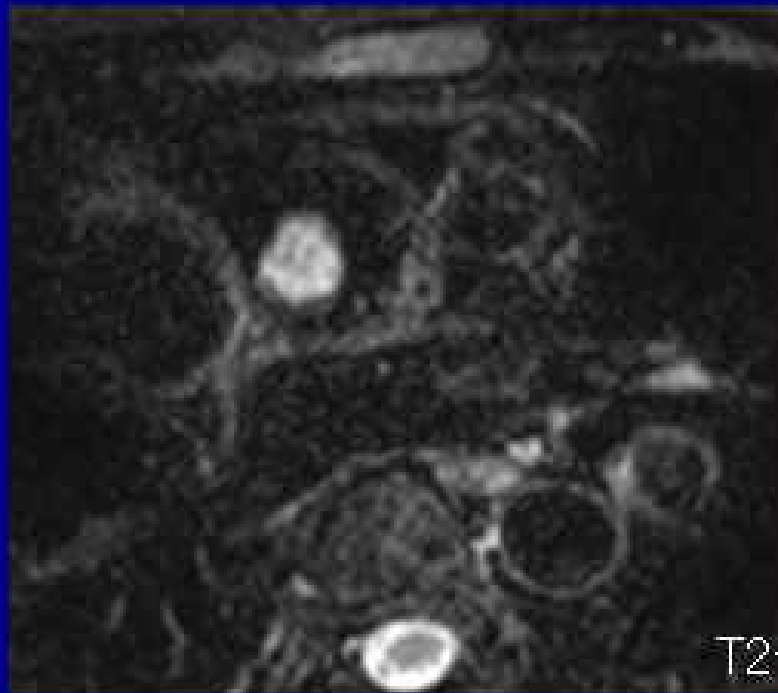
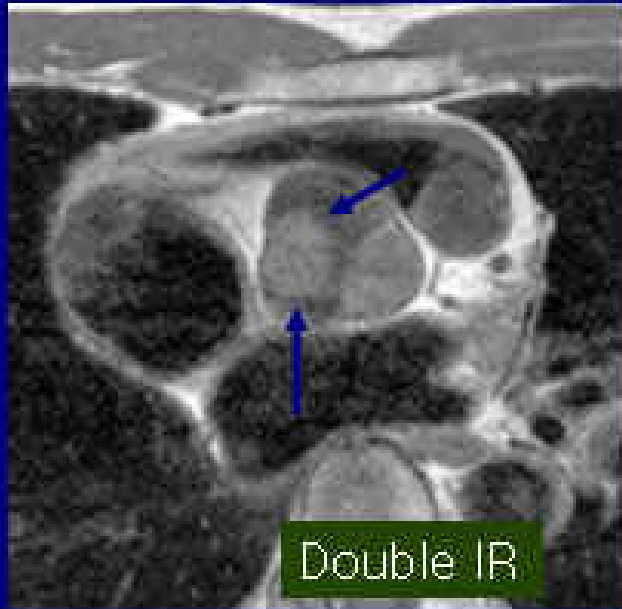


# Heart in Heart?



# CT Virtual Angioscopy





# Postcontrast MRI

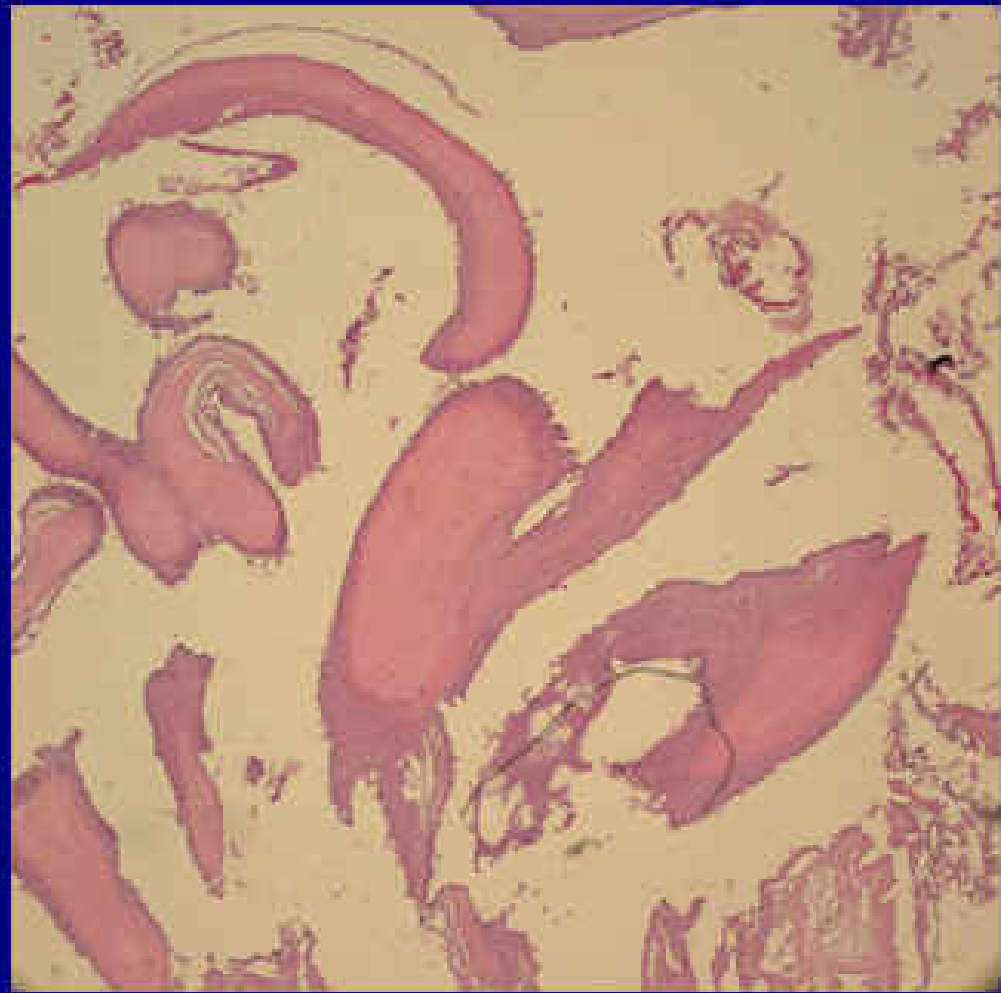


# What is your diagnosis?

1. Vegetation
2. Thrombus
3. Fibroelastoma
4. Intimal sarcoma







# Papillary fibroelastoma

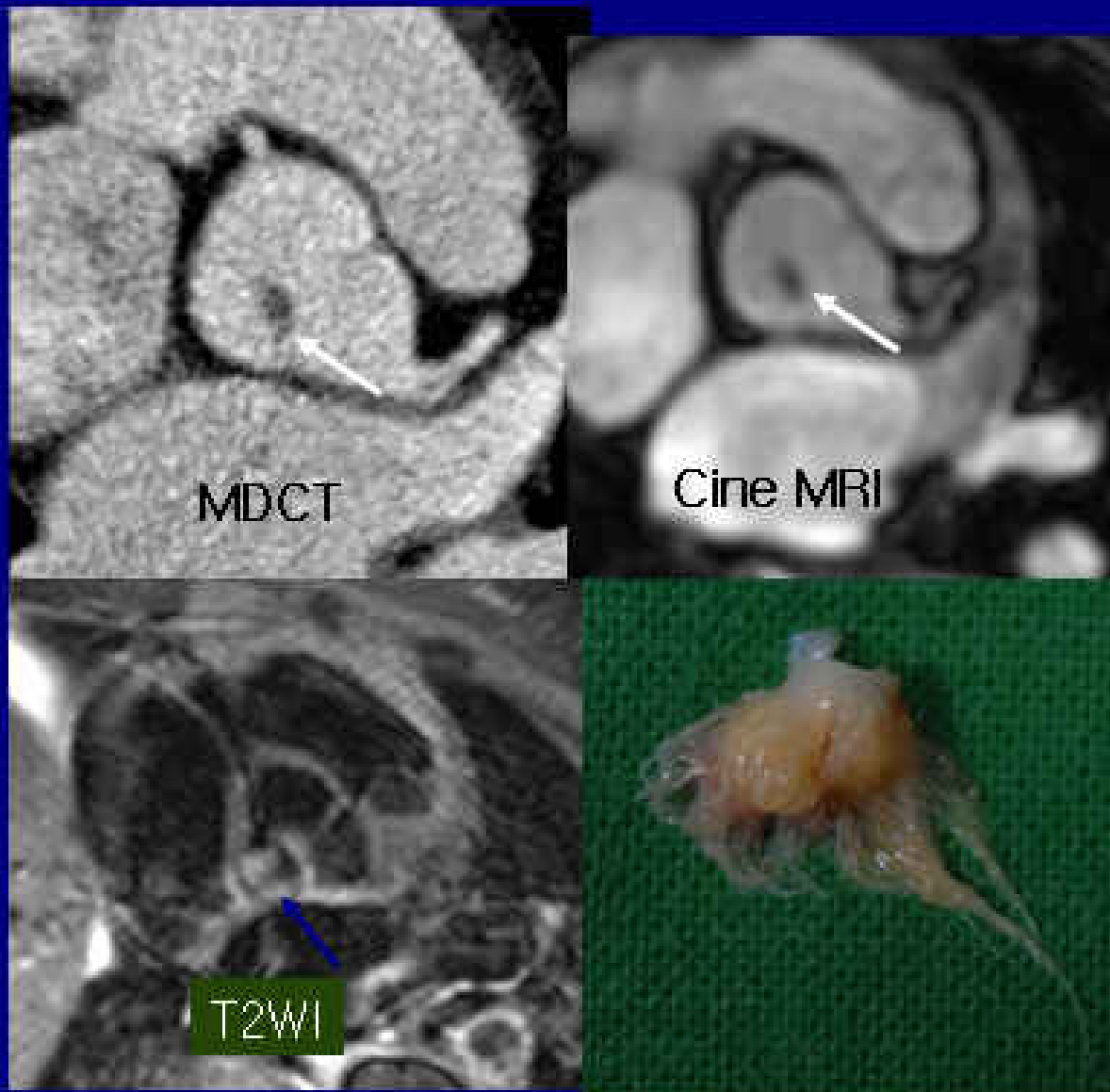
- The third most common primary benign cardiac neoplasm (myxoma > lipoma)
  - Predominantly affect the cardiac valves
    - Approximately three-fourths of all cardiac valvular tumors
  - may also occur on the endocardial surfaces of the atria or ventricles
  - Left sided valve , more common

# Papillary fibroelastoma

- DDx: vegetation
- Papillary fibroelastoma
  - Free from valvular leaflet destruction and valvular incompetence
  - Away from the free edge
  - Incidentally detected, no infective endocarditis symptoms

# Papillary Fibroelastoma

- Radiologic Features
  - <1cm : > 80%
  - A few descriptions of MR findings
- Tx. simple surgical excision for prevention embolism.



Kim EY, Choe YH et al.  
Korean J Radiol 2009;10:164-175

Thank You!