Detection of Source of Emboli

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Embolus

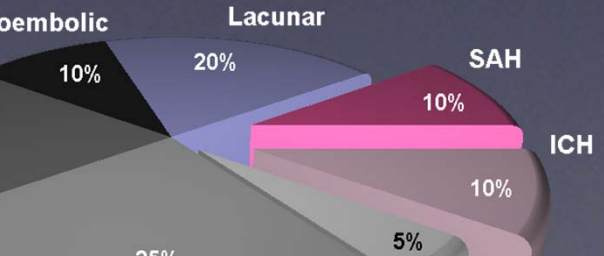
- "any detached, itinerant intravascular mass (solid, liquid, or gaseous) as carried by circulation and capable of clogging arterial capillary beds at a site distant from its point of origin"
- In medicine, an **embolism** (from the Greek ἐμβολισμός "insertion") is **the event of lodging of an embolus** into a narrow capillary vessel of an arterial bed which **causes a blockage** (vascular occlusion) in

WHY DO WE NEED TO DETECT CARDIAC SOURCES OF EMBOLISM?

A Matter of Importance

WHY DO WE NEED TO DETECT CARDIAC SOURCES OF EMBOLISM?

- Stroke is the 3rd leading cause of death in several industrial countries.
- Ischemic stroke : 80%
- Cardiogenic embolism accounts for 15-30% of ischemic strokes.



Arch Neurol 1989;46:727-4

iagnosis of Cardioembolic Stro

"The presence of a potential cardioembolic source in the absence of cerebrovascular disease in a patient with a non-lacunar stroke"

Cerebral Embolism Task Force, 1989

Diagnosis of cardioembolic sourc

Why do we det

Cause of death after
I st stroke

In the first 6 months
- Stroke-related

Within the subsequent 4~5
- Cardiovascular disorde
: MI, CHF

✓ Poor outcome : 50
mortality after 3 yr

Classification of Stroke

The TOAST criteria

i. Large-artery atherosclerosis

ii. Cardiac embolism

iii. Cerebral small artery occl

iv. Stroke of another determi

v. Stroke of undetermined etiology

None
or
2 or more eti.
in the same pt.

Category ii, v : particular interest for echocardiography

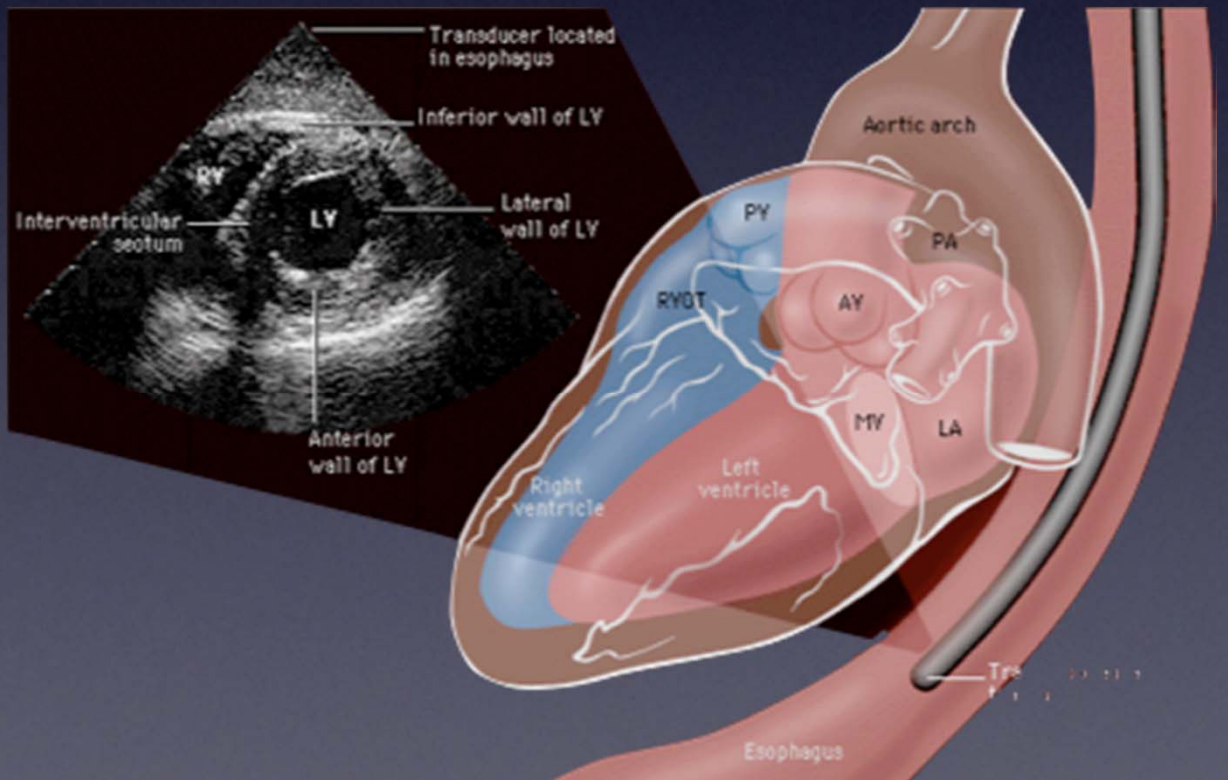
Findings

indicating *cardioembolic stroke*

- Abrupt onset
- Striking stroke severity in the elderly
- Previous infarction in various arterial distribution
- Other systemic thromboembolism
- Territorial distribution involving cortex, ...
- Hyperdense MCA Sg.
- Rapid recanalization of occluded major branch artery

Which Tool ?

- **Cornerstone of evaluation**



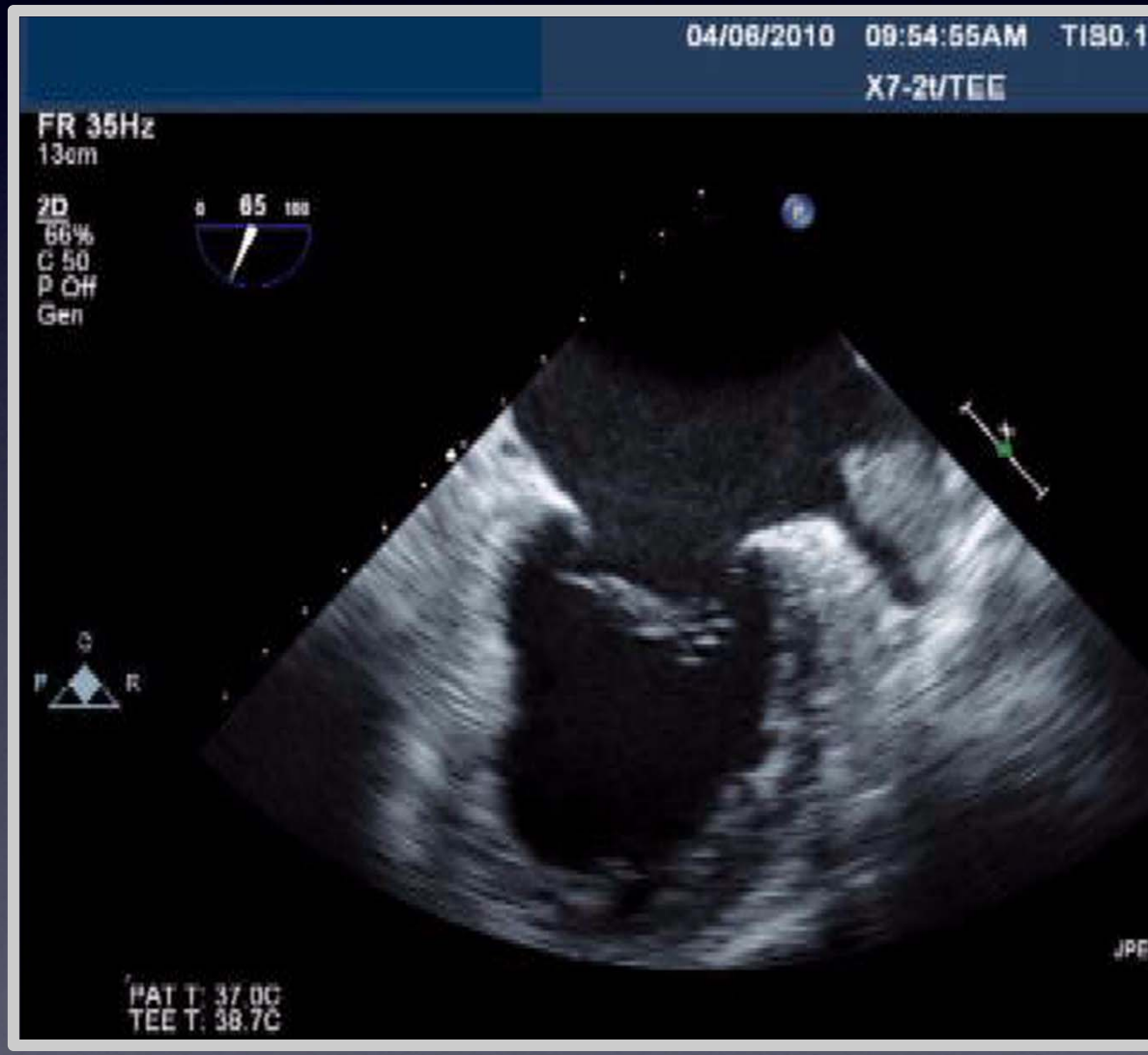
Proven sources

- **Thrombus : LA, LV or DVT** (/c shunt)
- **Atherosclerotic thrombus**
- **Vegetation**
- **Cardiac Tumor**

Proven Source

AFib
Acute : 14%
Chronic : 27%

- **LA thrombus**



Proven Sources

Embolism : 29%

- **Tumor**
- **Vege**
- **Atheromatous thrombus**

Embolism : 4~16%/yr

✓ Myxoma

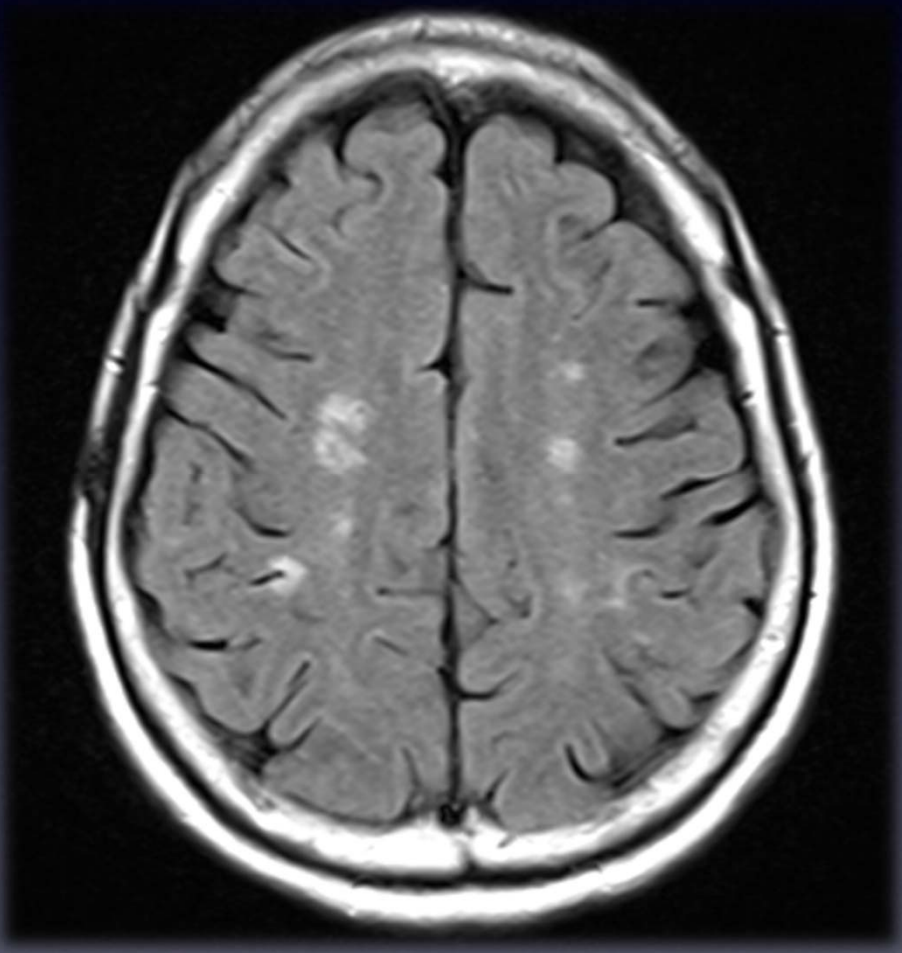
Infective endocarditis MV, AV

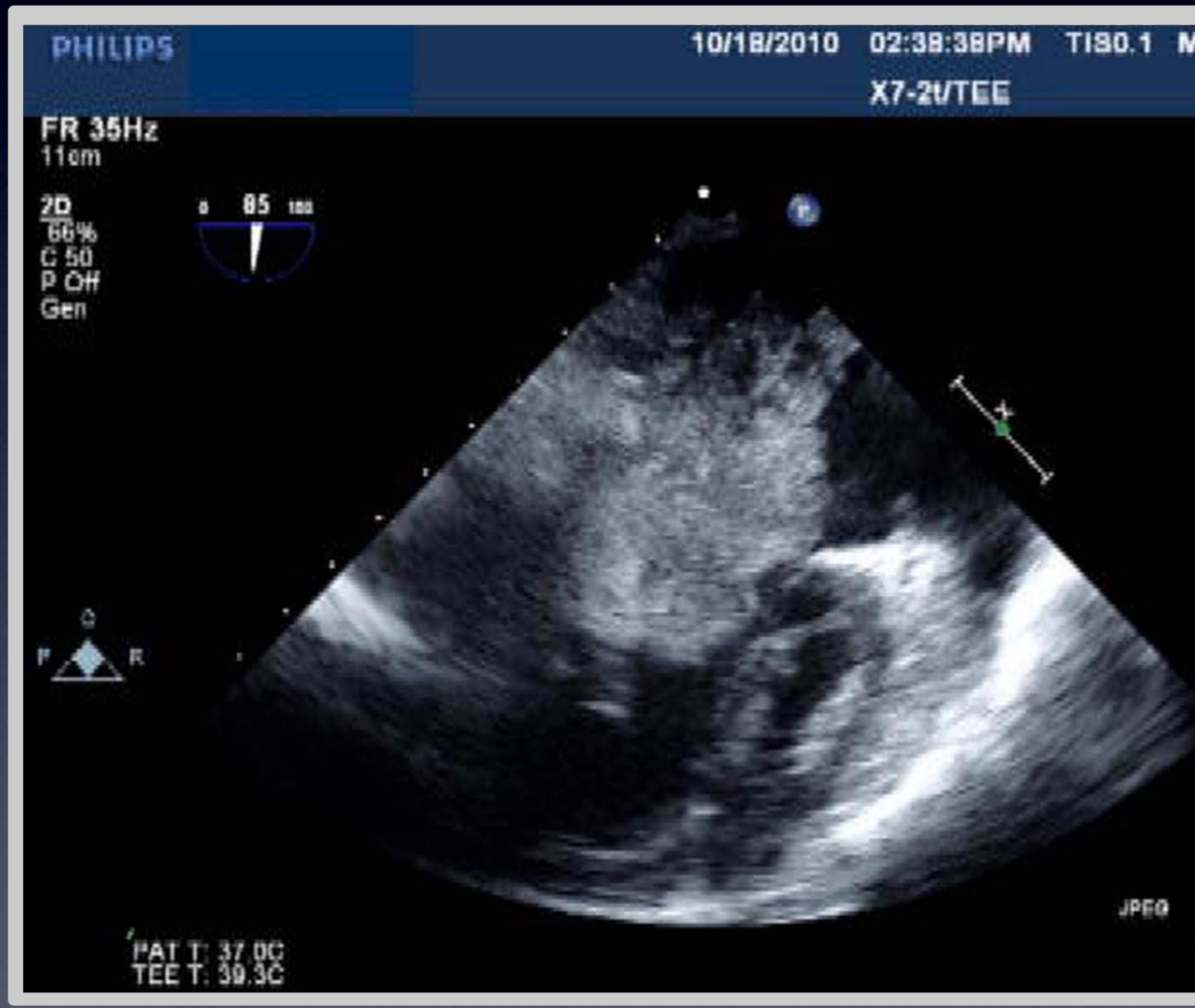
✓ Aortic atherosclerosis arch, prox. DTA

Embolism : 12~40%

Stroke in LA myxoma

63/F, CVA

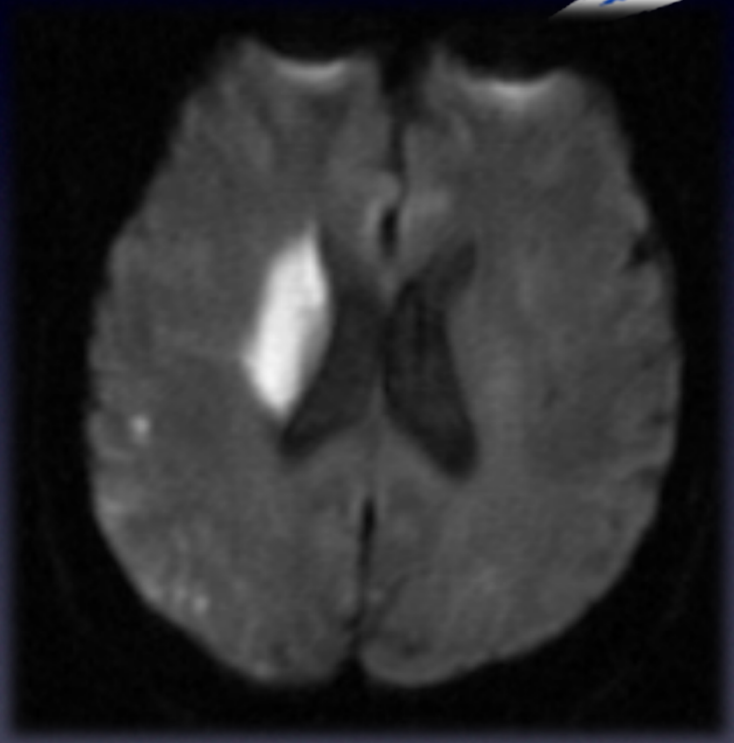




Stro[illegible] IE

TTE : 65%
TEE : 85~90%

M/57, CVA



Vegetation (MV)

Atheromatous plaque

- In SPAF, 35% with
- ✓ Complex aortic plaque (mobile, ulcerated, > 4mm)
- ➡ 4 fold increased rate of stroke

Grading of *aortic atherosclerosis*

- Grade I : intimal thickening < 4 mm
- Grade II : diffuse intimal thickening ≥ 4 m
- Grade III : atheroma < 5 mm
- Grade IV : atheromas > 5 mm
- Grade V : any mobile atheroma

Montgomery DH et al. JACC 1996;27:95-101

Potential sources

Potential so

Embolic rate
SR : 8~14%
AF : 31%

- AF : clinically most important cause of cardiogenic brain embolism

✓ VHD : MS
✓ IHD
✓ HCM
✓ LVNC
✓ RCM : EMF

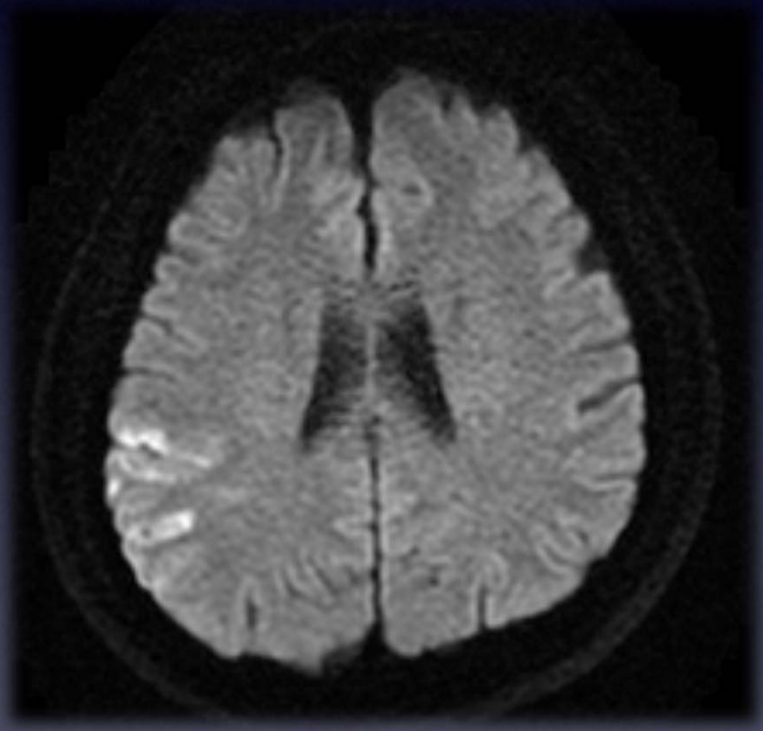
LA thrombus

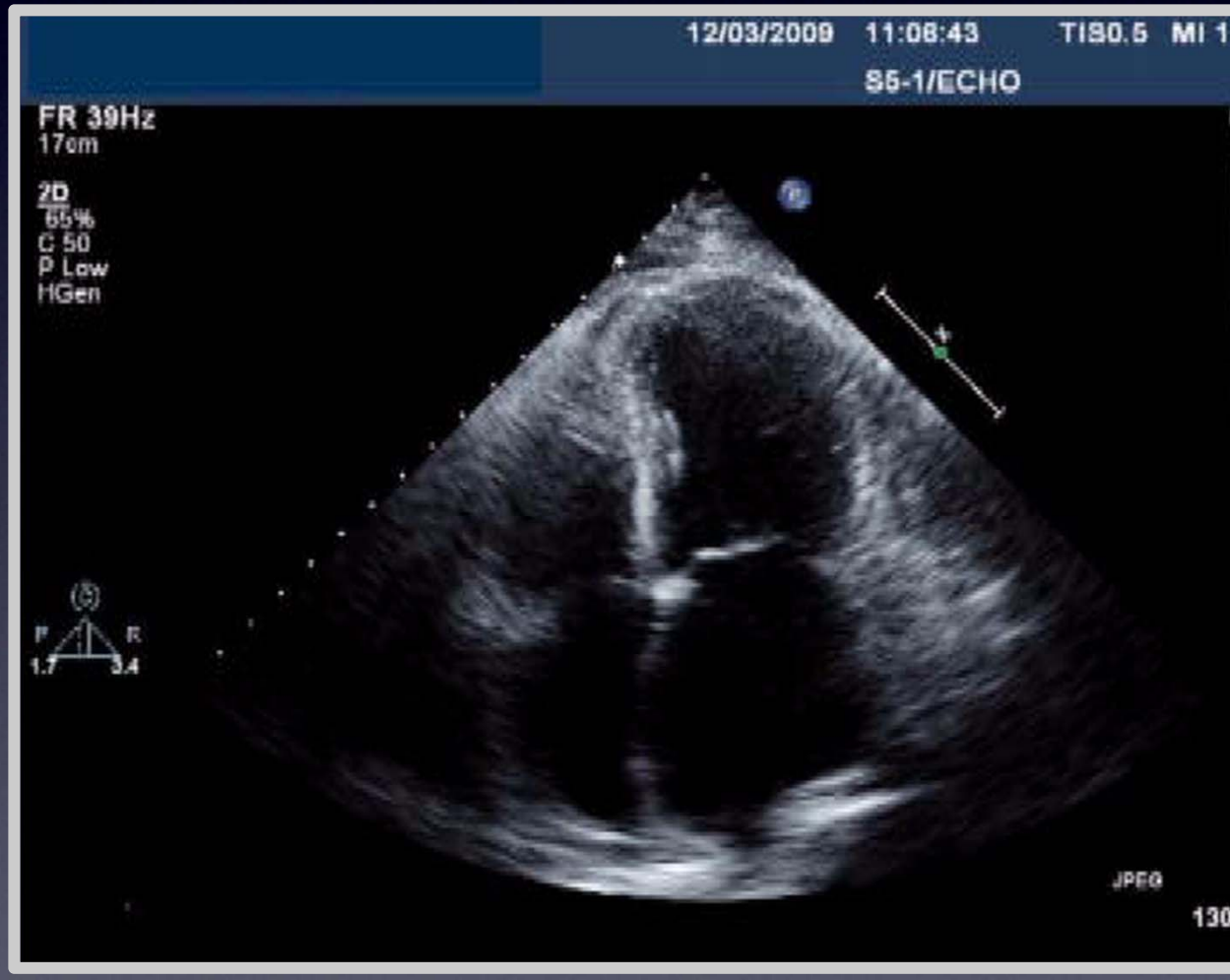
Stroke in HCM

Stroke in RCM

Stroke in RCM

M/54, CVA





Stroke in RCM

M/54, CVA

Potential Source

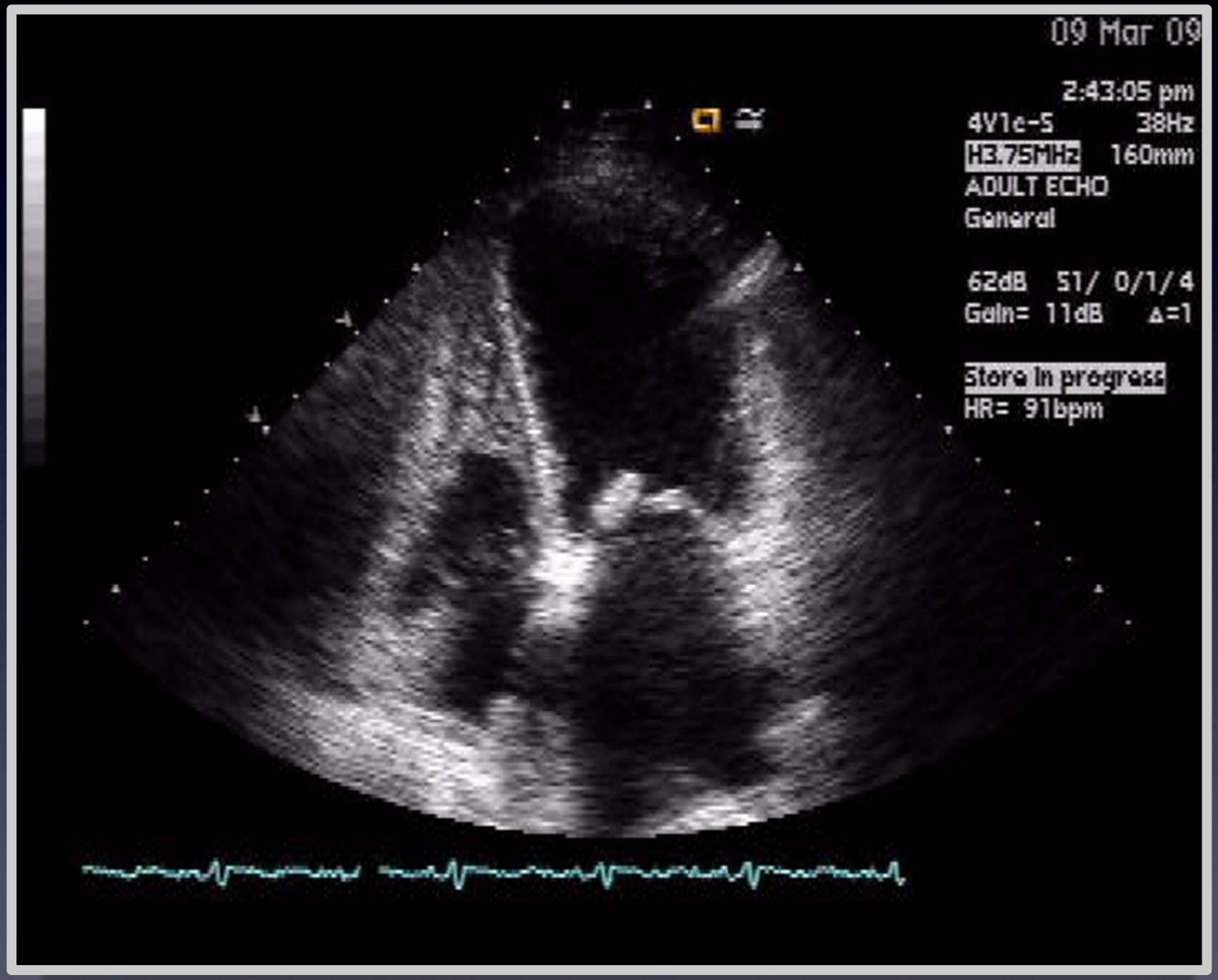
- **LV thrombus**

- CHF : DCM
- MI : aneurysm
- Myocarditis
- Stress-induced CM
- LVNC
- RCM : EMF, Loeffler endomyocarditis

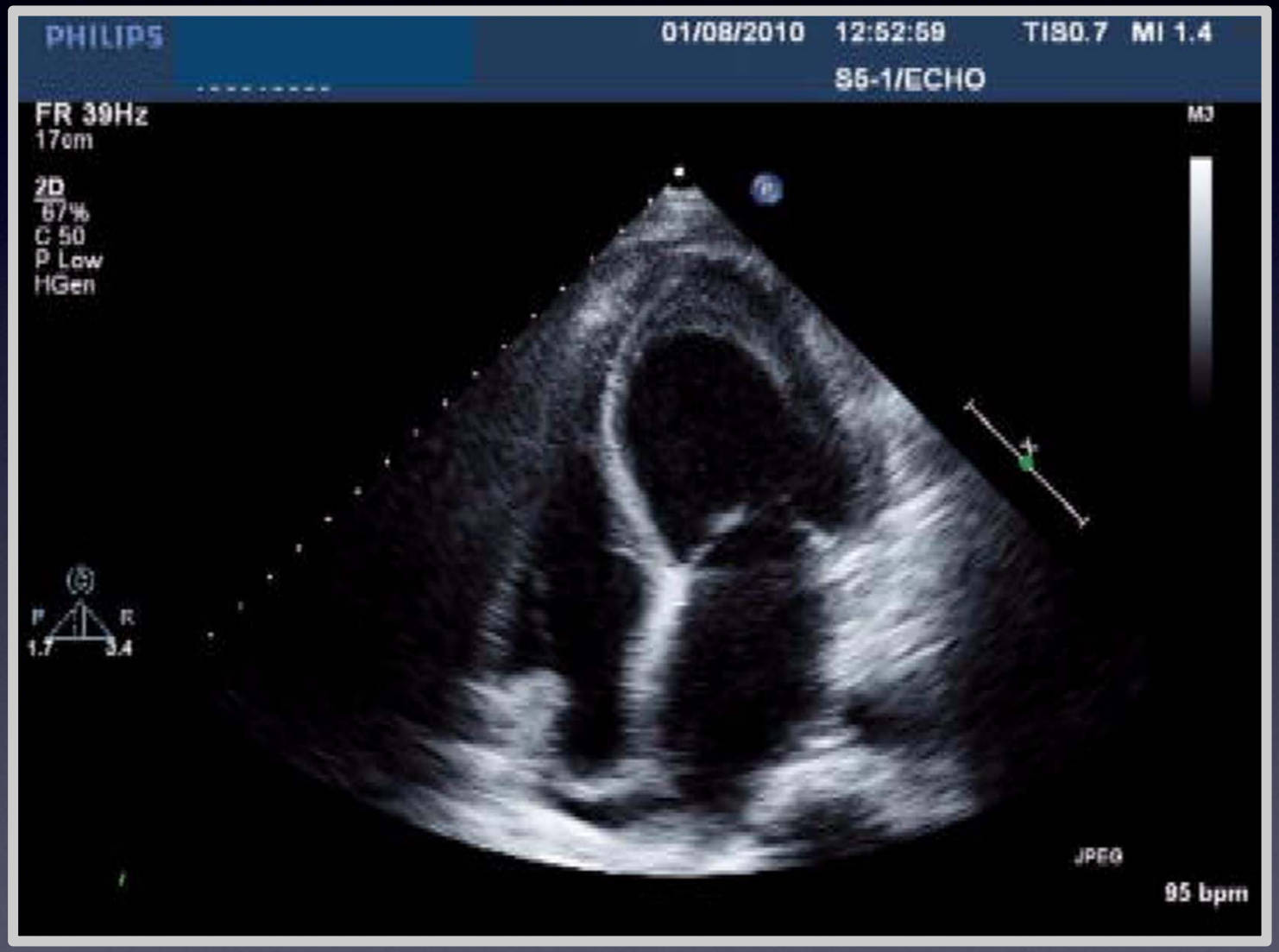
Left Ventricular Thrombus
: Acute Myocardial Infarction

- 7~20% of acute MI
- Most frequent in anterior or apical MI
- Aneurysm
  - Mural thrombi in 50% of pts
  - Embolisation tend to occur early after MI
  - Systemic emboli extremely uncommon in pts with chronic LV aneurysm in pts not

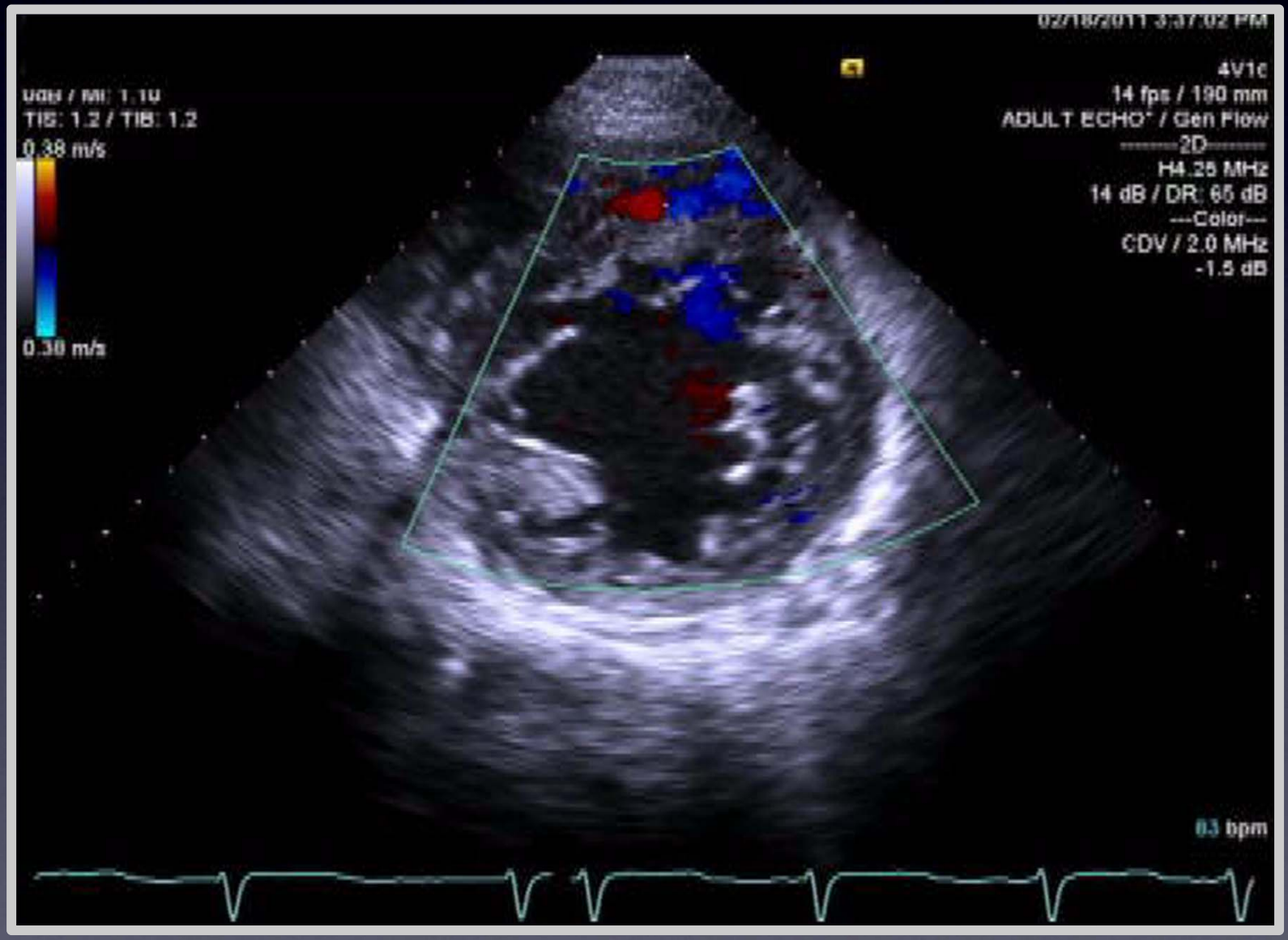
Stroke in MS & SCM



Stroke in RCM



Stroke in LVNC



Embolism

- **Systemic**

LA thrombus

LV thrombus

Atherosclerotic plaque

Tumor

Vegetation

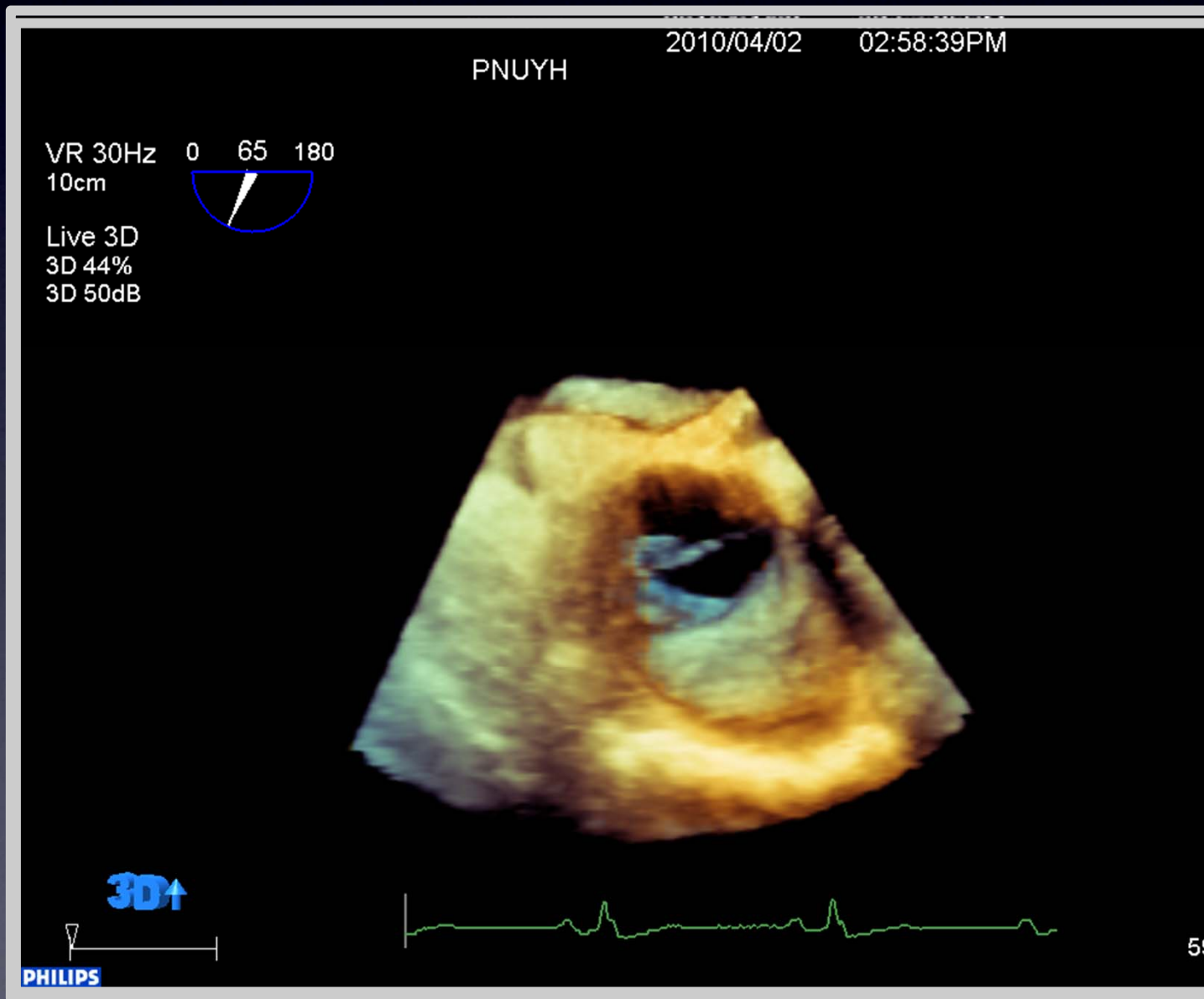
...

Pulmonary

Venous thrombus

Gate

- DVT
- +
- PFO
- PAVF



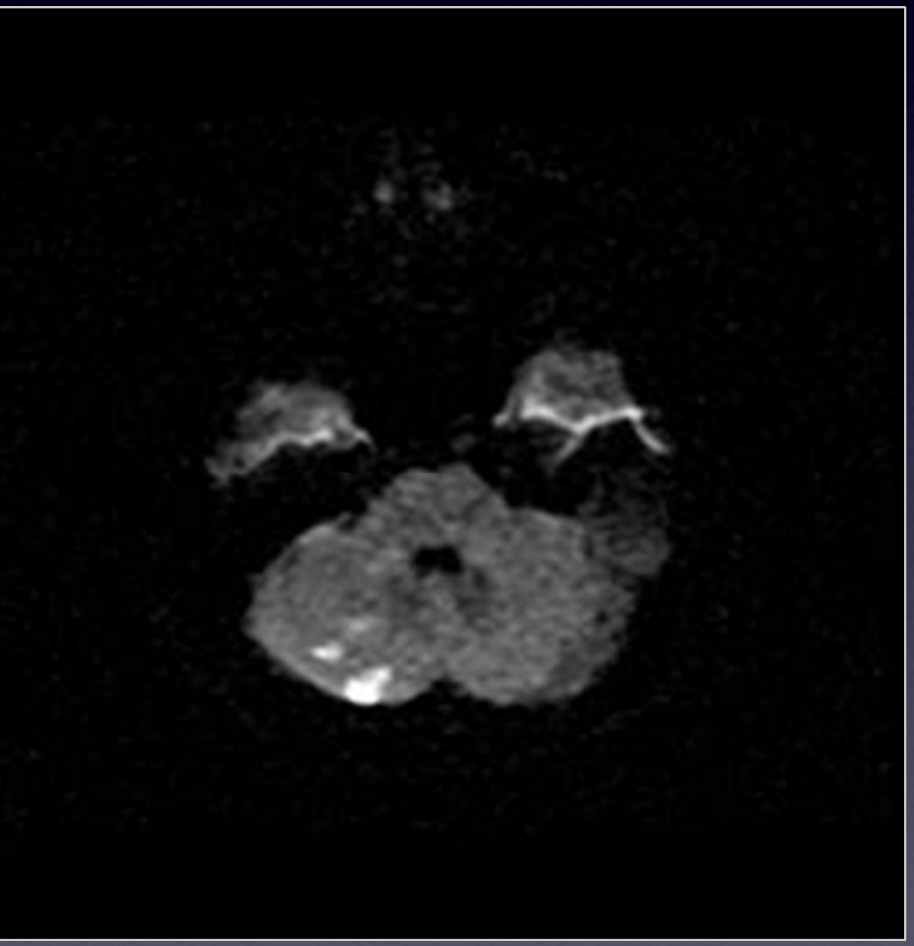
Protocol in PNUYH

1. TTE : Routine views
2. TTE : agitated saline test for R-L shunt
3. TEE : LA/LAA thrombus or SEC
4. TEE : IAS → ASA → PFO (agitated saline)
5. TEE : Thoracic aorta
   (asc. → desc. → arch)

Sources?

Sources ?

27/F, Dizziness



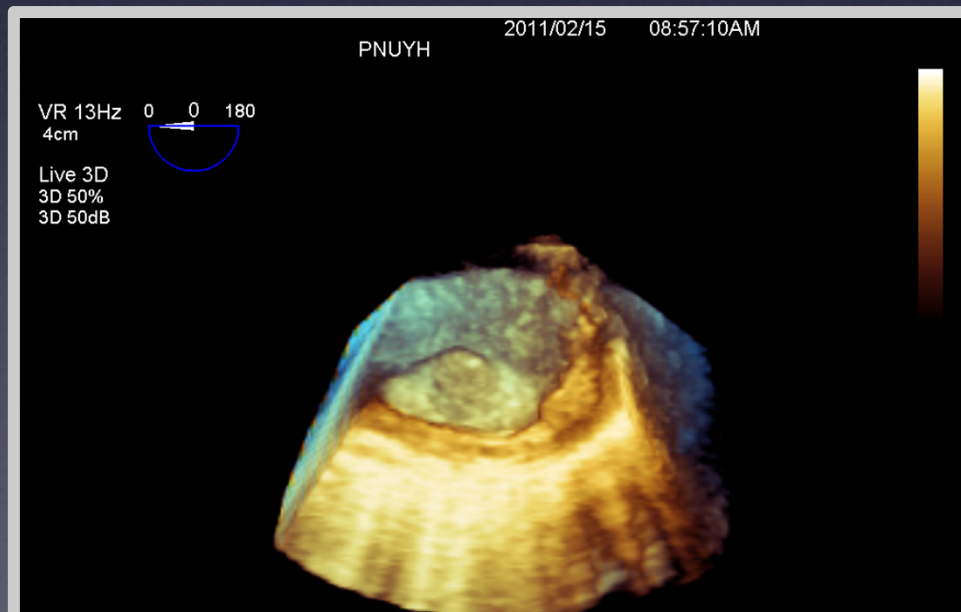
Cbll Infarction

Sources?

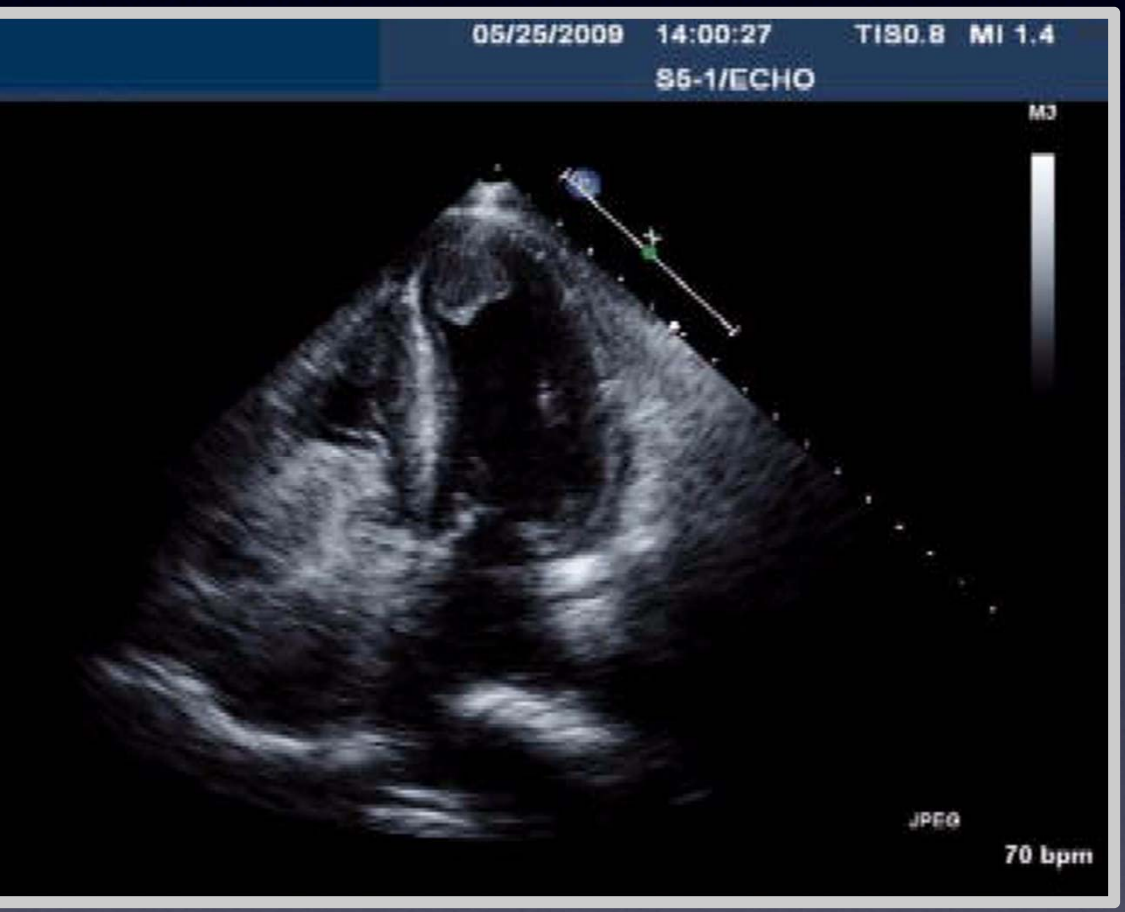

PHILIPS
10/01/2009 12:44:50
TIS0.1 MI 0.6
X7-2t/TEE
FR 35Hz
7.0cm
M4
2D
60%
C 50
P Off
Gen
105
JPEG
84 bpm
PAT T: 37.0C
TEE T: 38.4C

Sources?

Not always monocausal !

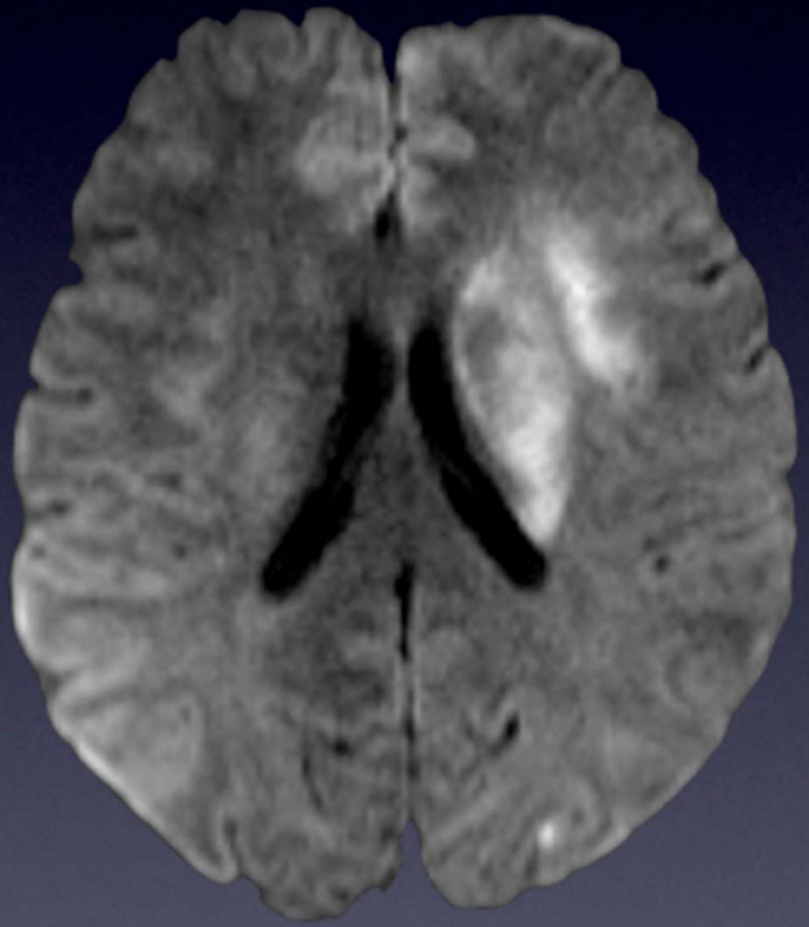


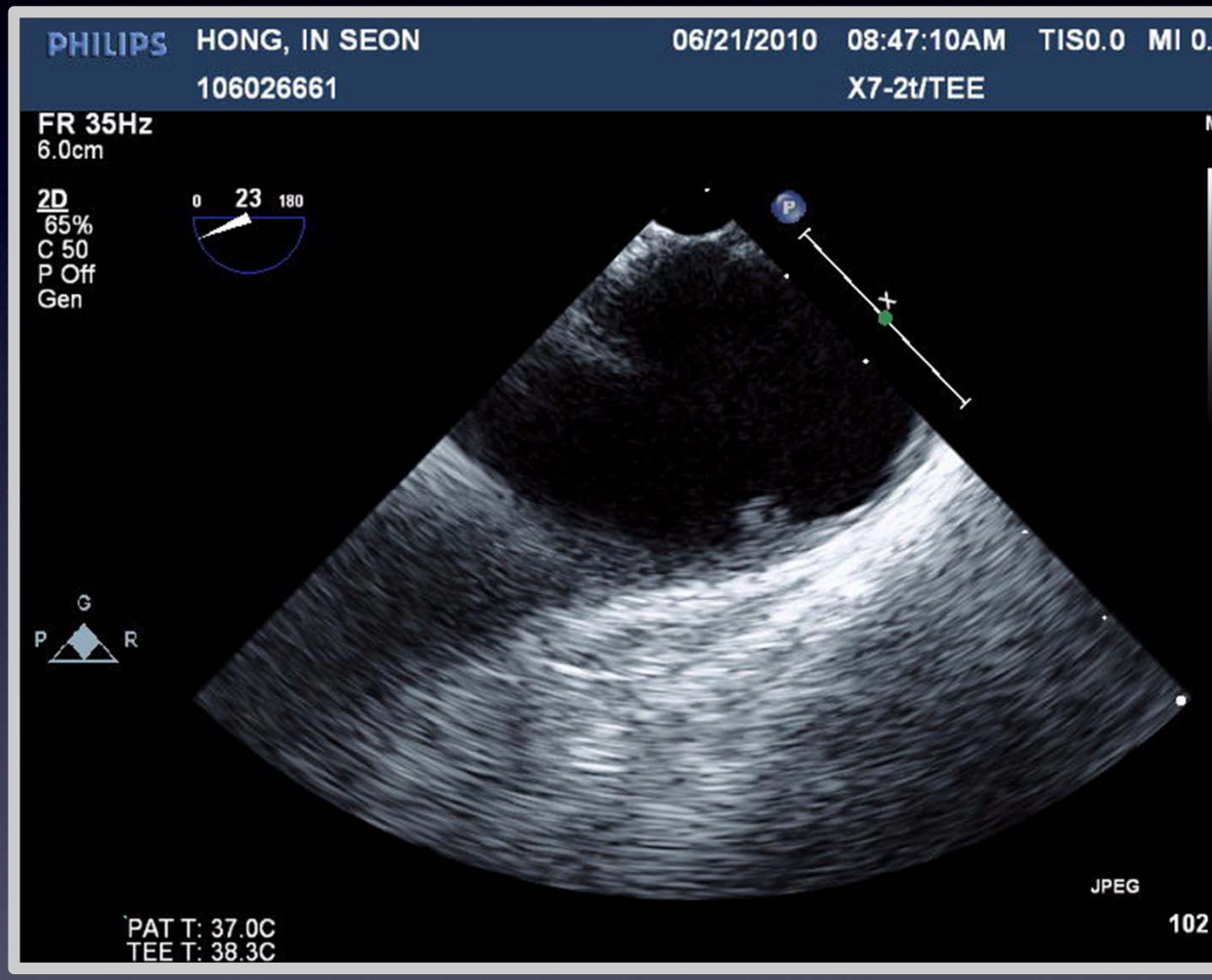
Not always monocausal !



Not always usual!

34/M, Stroke

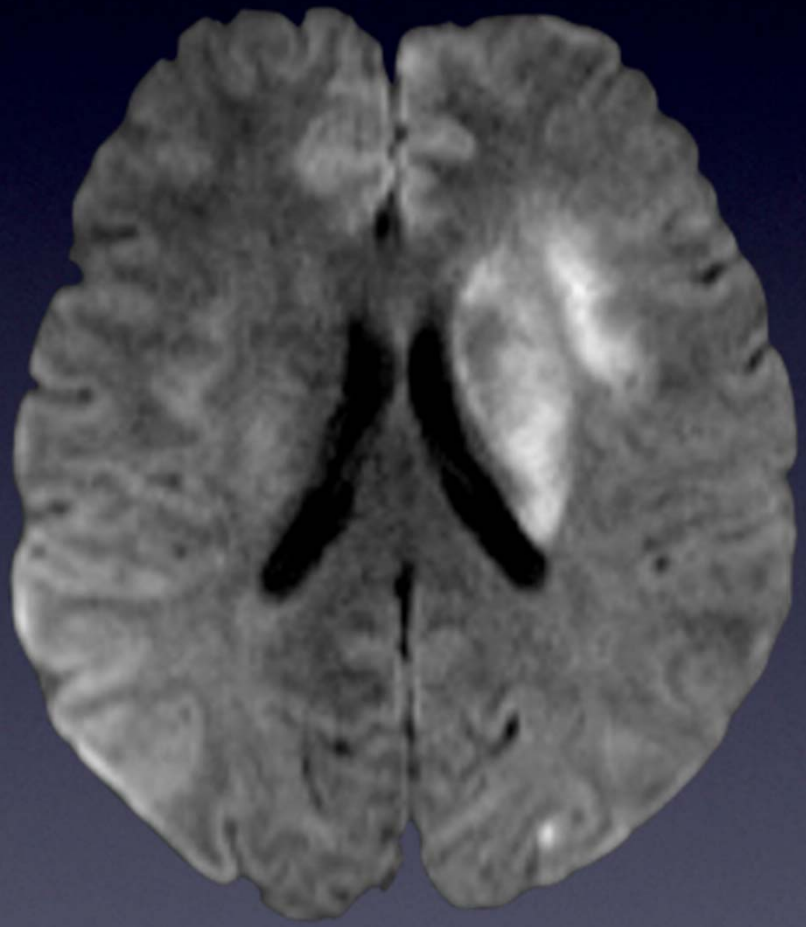


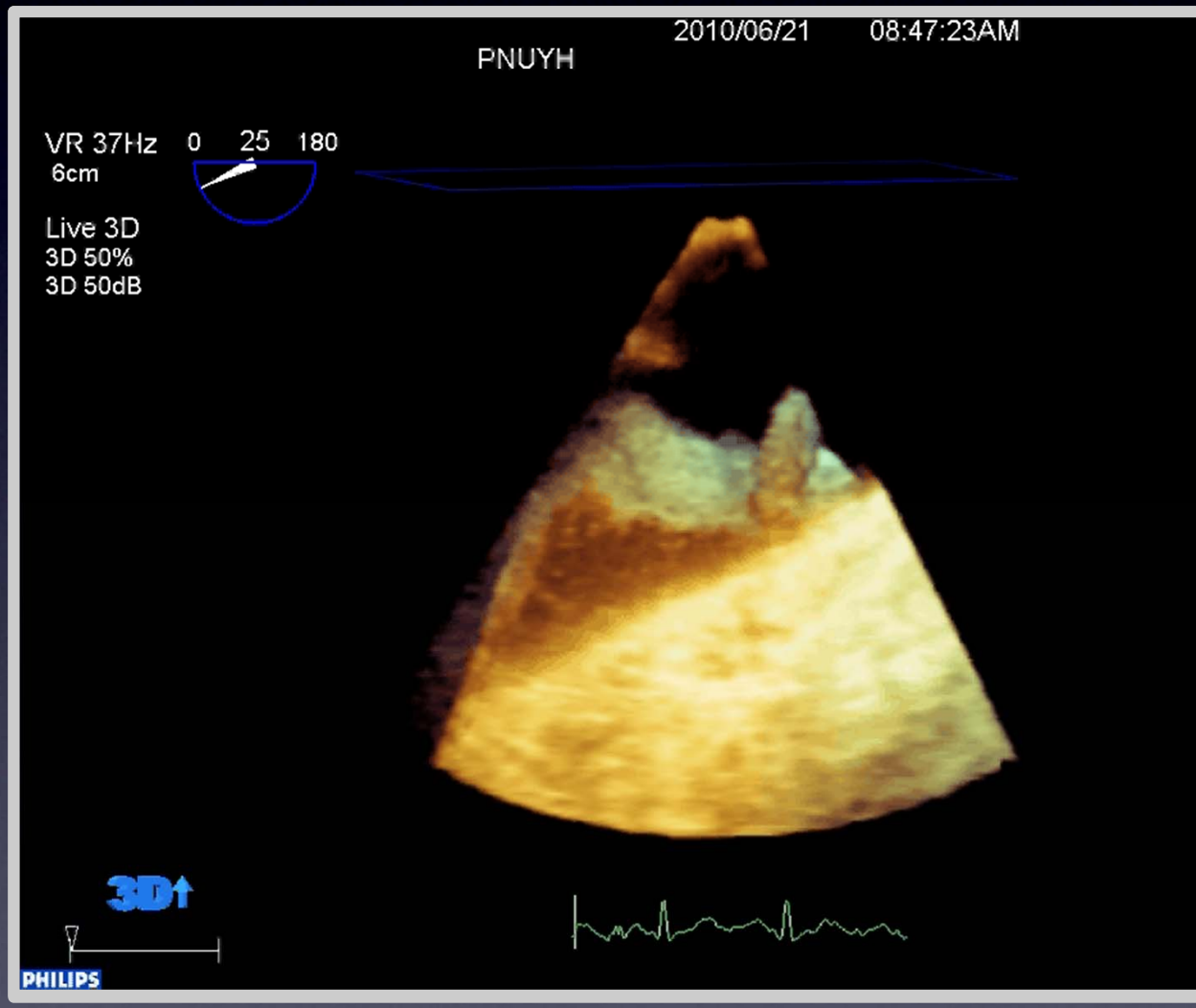


Aortic thrombus

Not always usual!

34/M, Stroke





Aortic thrombus

Conclusion

- ***All patients*** with stroke or TIA can have potential sources
- Remember *"**not monocausal**" & "**unusual**"*
  - ***comprehensive evaluation***
- Echo is powerful tool
  - ***for the evaluation***
  - ***to establish recommendations***

Thank you for your attention!