

Pitfalls

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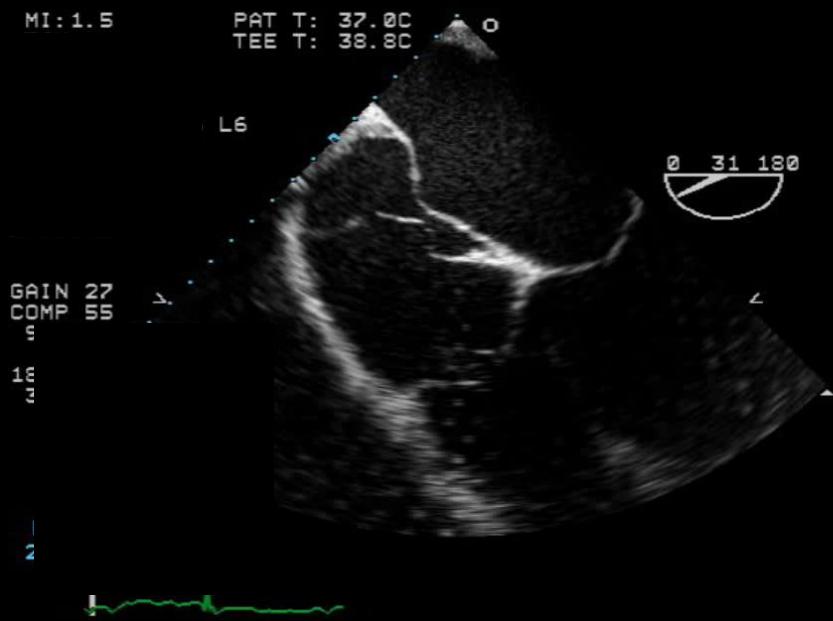


Toronto General Hospital Department of Anesthesia
Perioperative Interactive Education

<http://pie.med.utoronto.ca/TEE/>



Question 1

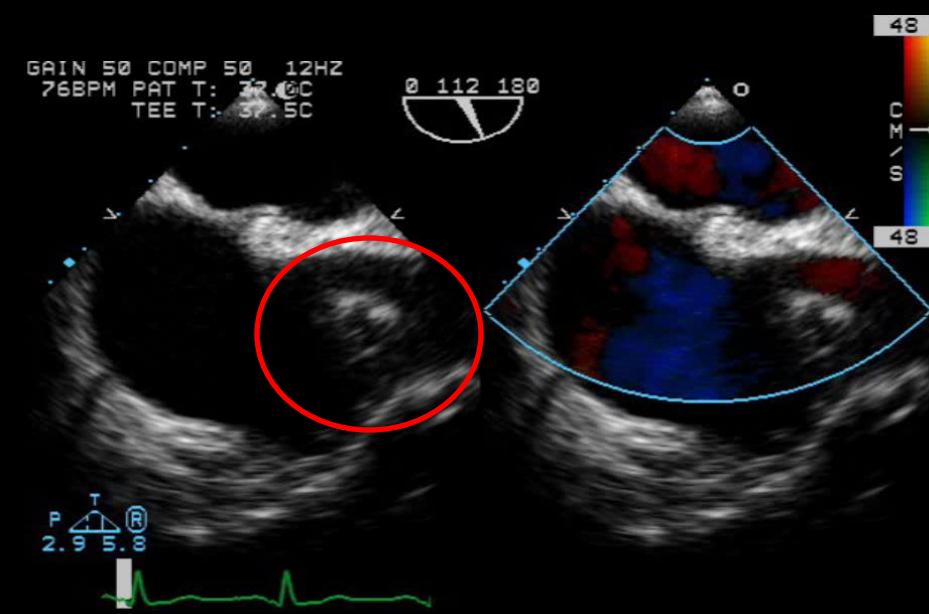


What structure is shown in this clip?

1. Eustachian valve
2. Thebesian valve
3. Chiari network
4. Cor triatriatum



Question 2



What structure is shown in this clip?

1. Eustachian valve
2. Thebesian valve
3. Coumadin ridge
4. Crista terminalis

Question 3

Lossy Compression - not intended for diagnosis

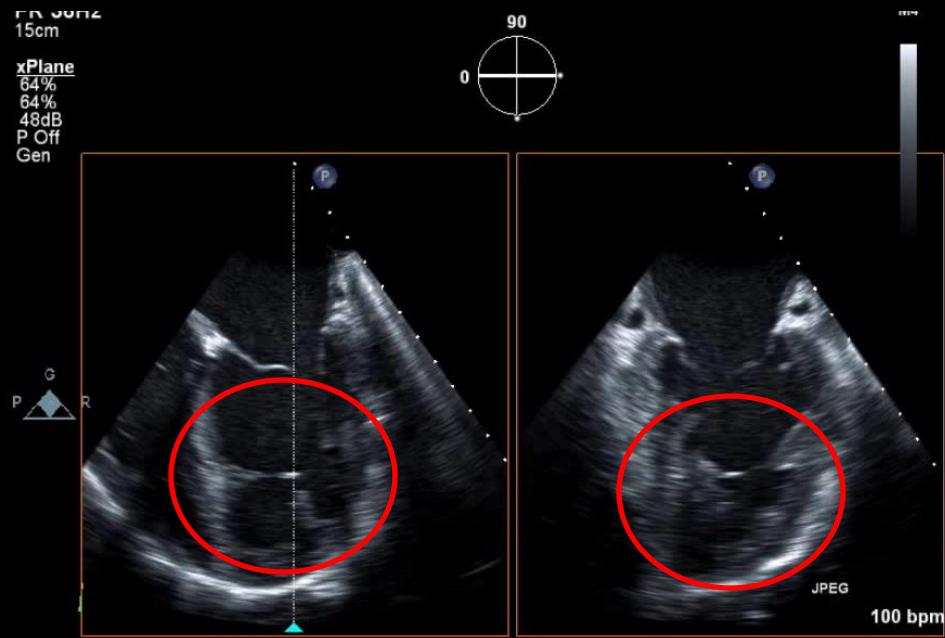


What structure is shown by the double arrows in this clip?

1. Pericardial fat
2. Epicardial fat
3. Hematoma
4. Myocardium



Question 4

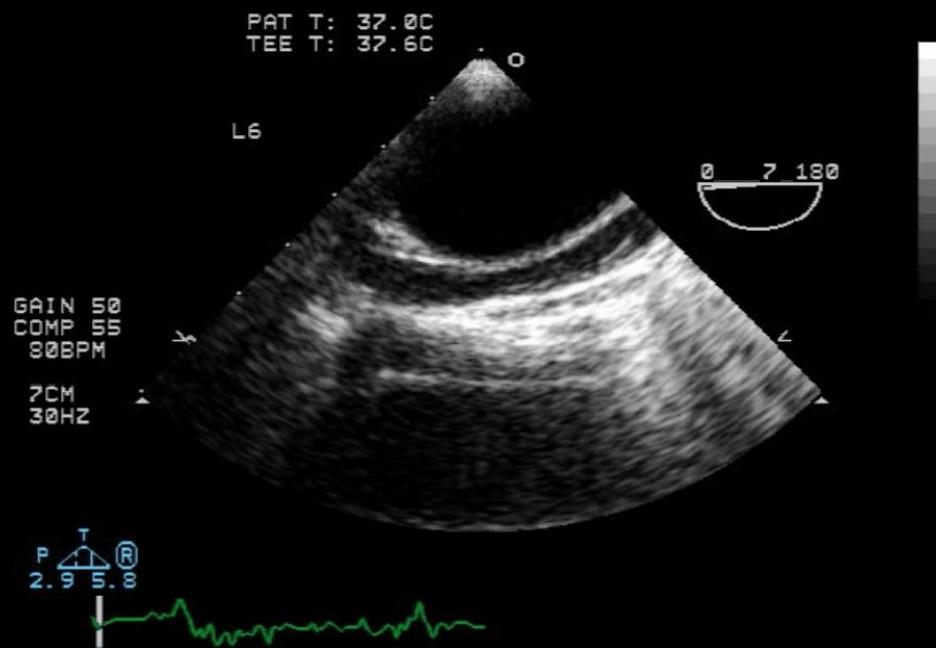


What structure is shown in this clip?

1. Moderator band
2. False chordae
3. False tendon
4. Papillary muscle



Question 5



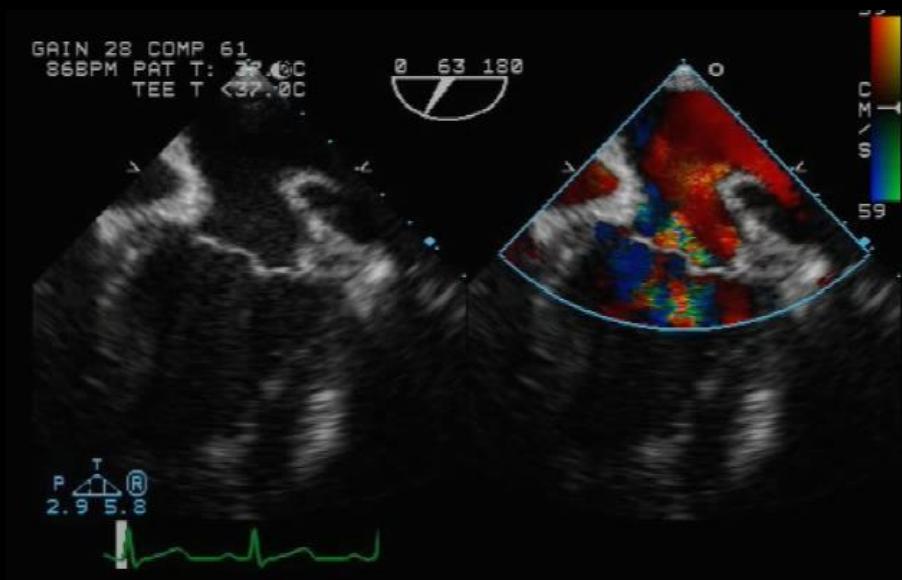
What finding is shown in this clip?

1. Aortic dissection
2. Pericardial effusion
3. Aberrant subclavian artery
4. Innominate vein



Question 6

What finding is shown in this clip?



1. Normal left upper pulmonary vein
2. Normal left atrial appendage
3. Cyst
4. Persistent left SVC



Outline

- Normal structures that mimic pathology
- 3 categories
 - Structures
 - Echo-free spaces
 - Foreign material
- Identify to avoid unnecessary clinical interventions

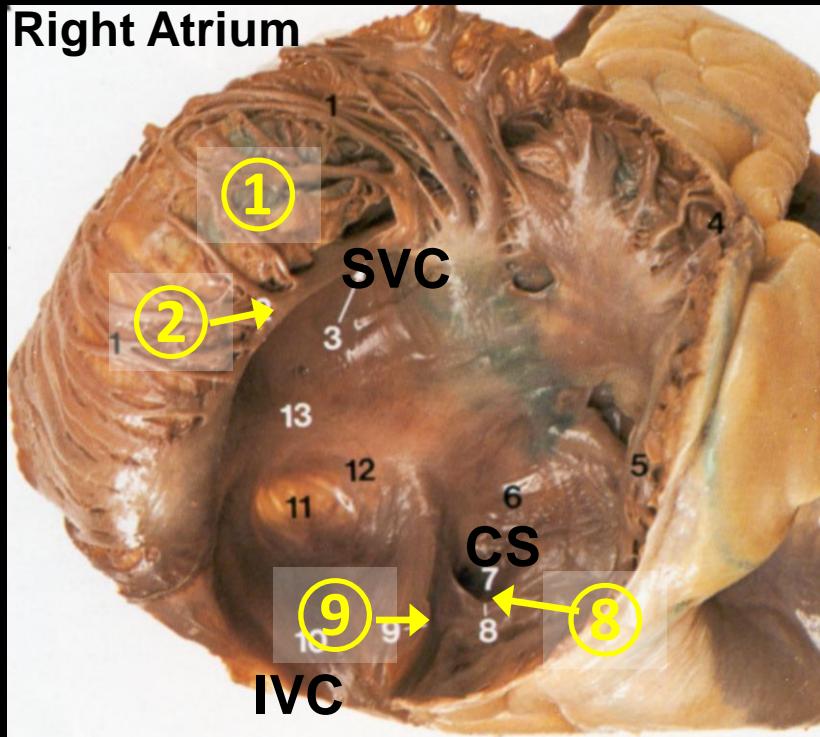


Structures

- **RA**
 - Eustachian valve
 - Chiari network
 - Crista terminalis
 - Thebesian valve
 - Pectinate muscles
- **RV**
 - Moderator band
 - Trabeculations
- **LA**
 - Coumadin ridge
 - Pectinate muscles
- **LV**
 - False tendon
 - Papillary muscles
 - Apical trabeculations
- **Aortic valve**
 - Nodules of Arantius
 - Lambl's excrescences
- **Pericardium**
 - Epicardial fat
 - Transverse sinus
- **Aorta**
 - Innominate vein
- **Interatrial septum**
 - Lipomatous hypertrophy
 - IAS aneurysm



RA Anatomy

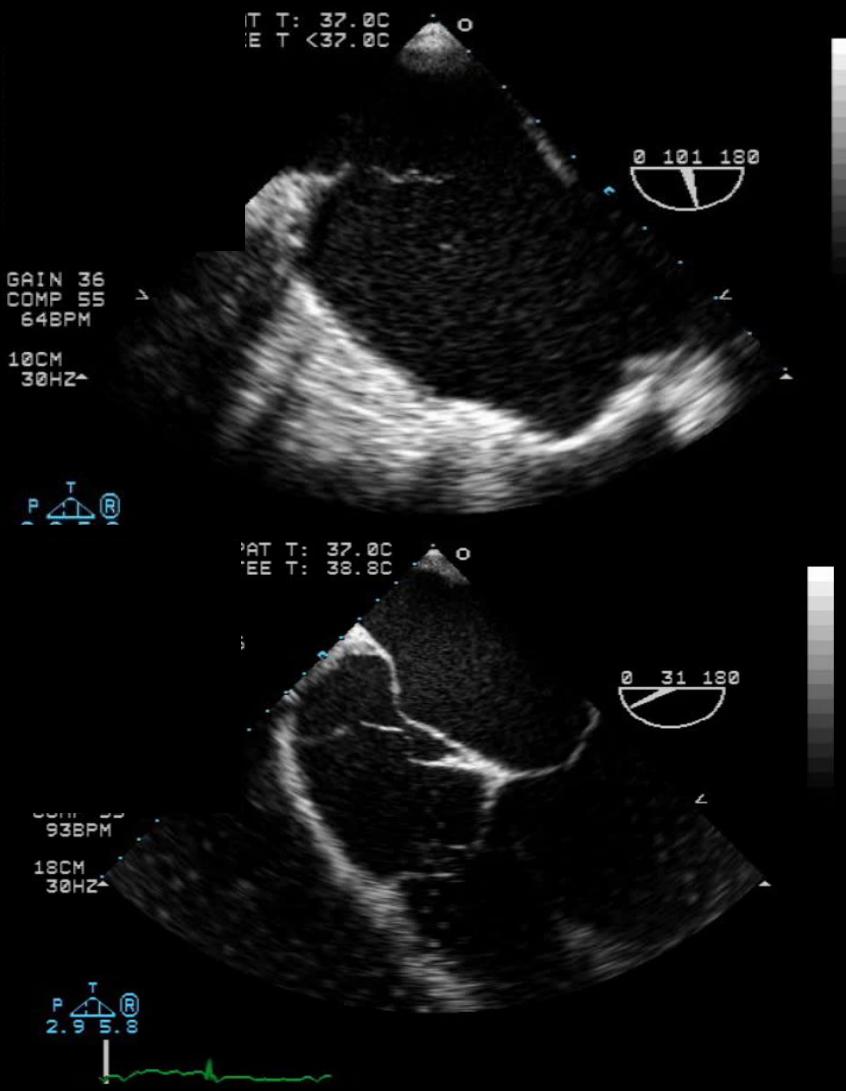


1. pectinate muscles
2. crista terminalis
3. SVC
4. right auricle
5. tricuspid valve
6. position of AV node
7. coronary sinus
8. coronary sinus valve
9. IVC valve (eustachian)
10. IVC
11. fossa ovalis
12. limbus of fossa ovalis

RA Eustachian Valve



Bartolomeo
Eustachi



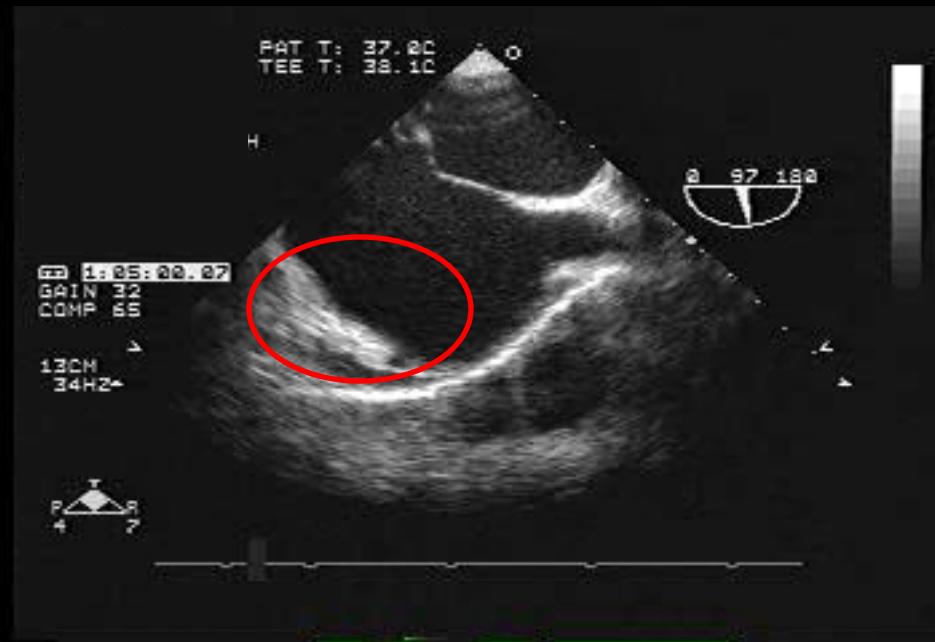
- Important fetal structure
 - Directs blood IVC to fossa ovalis
- Embryonic valve of IVC
 - Fold RA at posterior margin
- Often involutes, adult (25%)
- RA/IVC junction
- Variable length
 - Cortriatriatum dexter
- Independently mobile
- Mimic RA thrombus
- May obstruct IVC flow



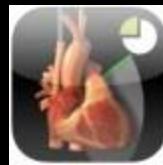
RA Chiari Network



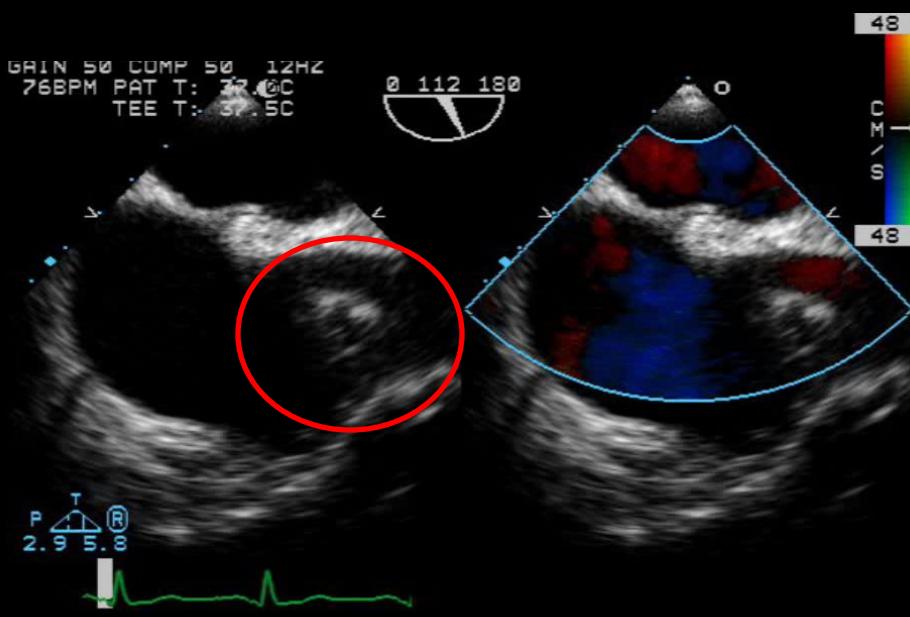
Hans Chiari



- Embryologic remnant
 - R sided sinus venosus valve
 - Variant of Eustachian valve
- 2-3% at autopsy
- Fenestrated membrane
- Connect vena cavae + RA
- IVC attachment, mobile curvilinear structure
- Mimic free RA thrombus, TV vegetation, tumors



RA Crista Terminalis

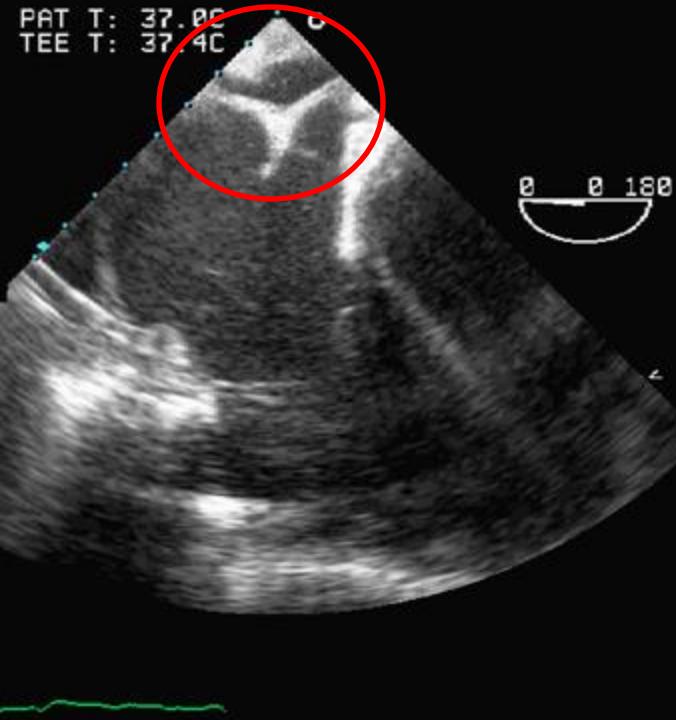


- Fibromuscular ridge smooth sinus venarum + trabeculated RA
- IVC to SVC at lateral RA wall
- Bicaval view
- Anterior SVC + RA
- Echogenic mass
- Moves with heart
- ↑ atrial systole
- Mimic thrombus or vegetation

Thebesian Valve



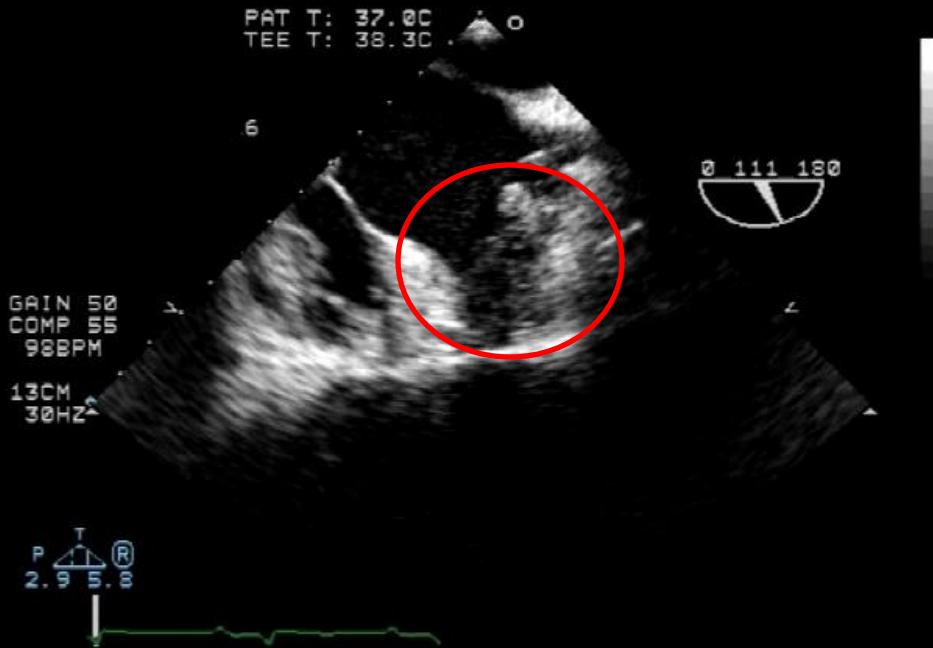
Adam
Thebesius



- Valve of coronary sinus
- Fold of RA endocardium
 - 65-90% of patients
- Posterior RA
- Between TV + IVC
- Rarely obstructs flow
- Complicate cannulation
- Mimic thrombus or vegetation



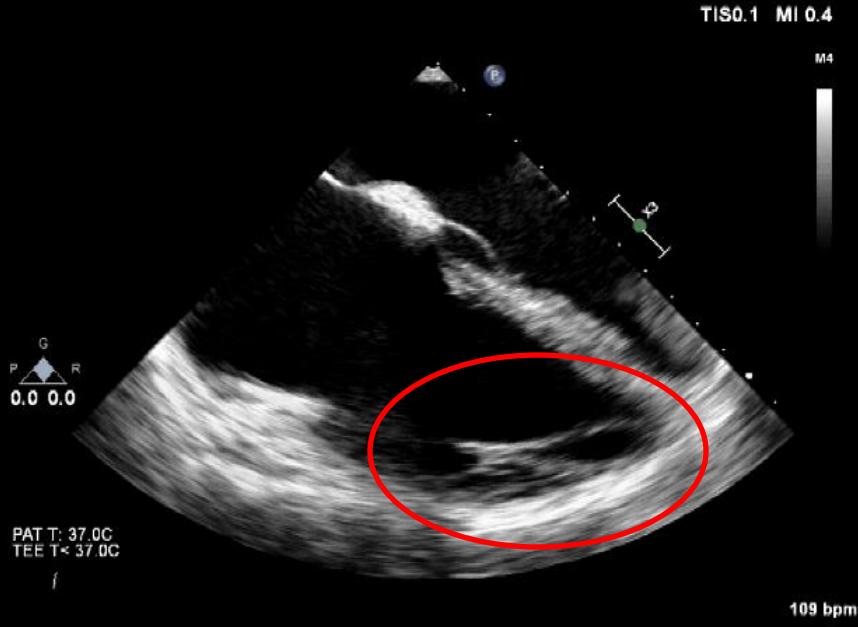
Pectinate Muscles



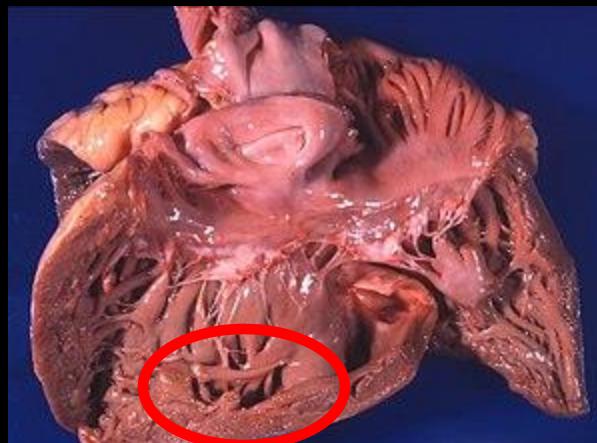
- Parallel muscle ridges in the RA free wall + RAA
- Echogenic masses
- Move with the RA
- Mimic thrombus or vegetation



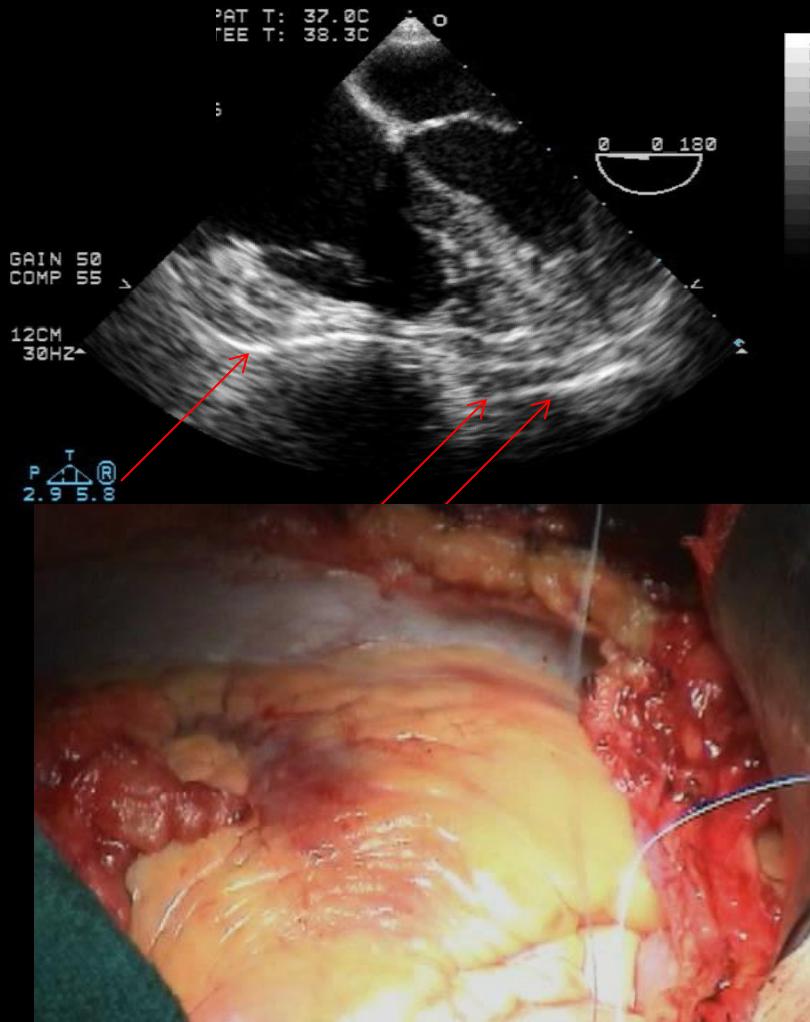
RV Moderator Band



- Prominent RV trabeculation
 - Differentiate RV from LV
- Base of anterior papillary muscle to IVS
 - Contains RBB
- ME 4C view
- Thick echo-dense muscle band
- Tumor, thrombus, vegetation



RV Epicardial Fat

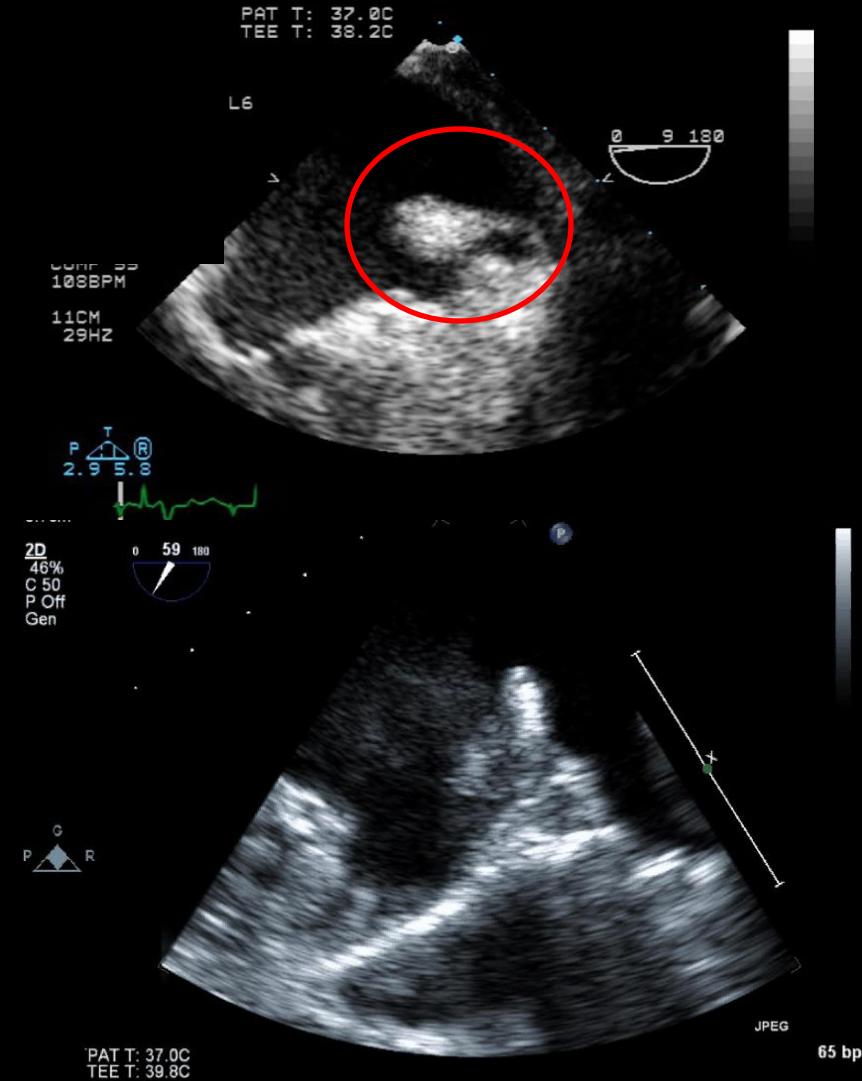


- Epicardial fat between outer myocardium and visceral pericardium
- Pericardial fat
 - between visceral + parietal pericardium
 - anterior to epicardial fat
- Echogenic layer
- Mimic pericardial effusion

Iacobellis G et al. J Am Soc Echocardiogr 2009;22:1311-9



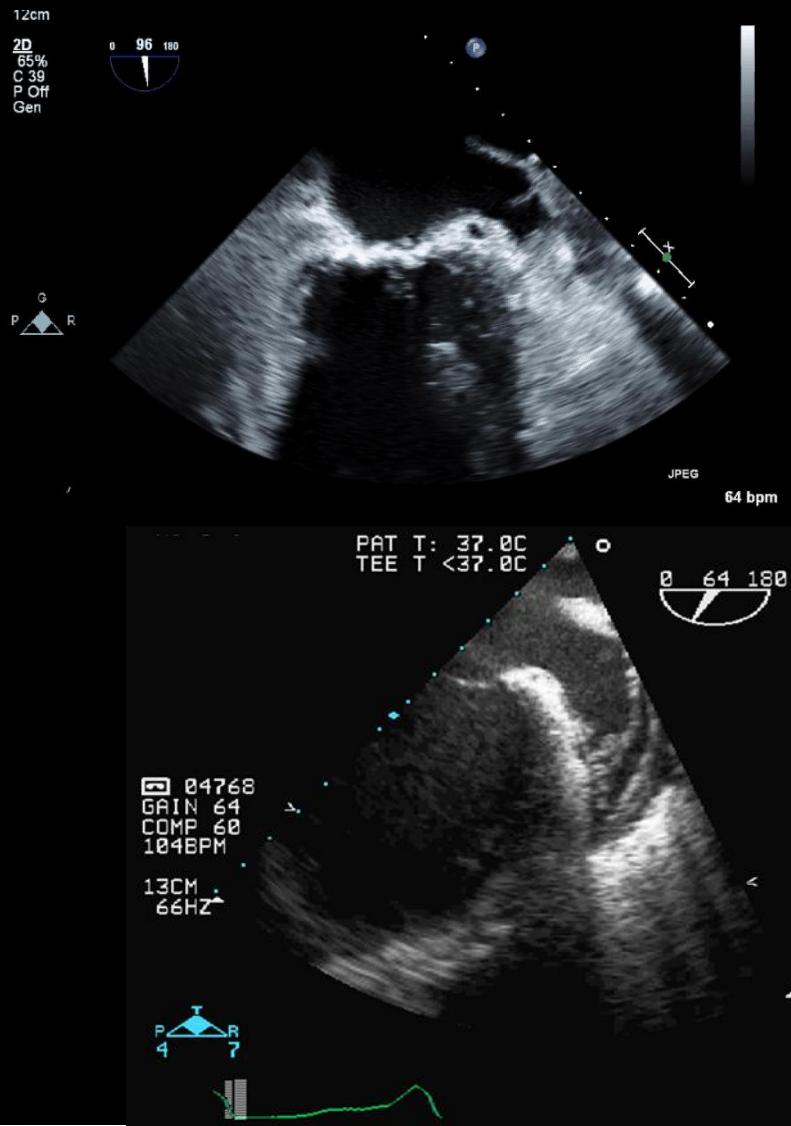
LA Coumadin Ridge



- LA tissue between LUPV + LAA
- Muscle ridge
- Moves with heart
- Globular fatty appearance
 - Q-tip sign
- Mimic tumor, thrombus



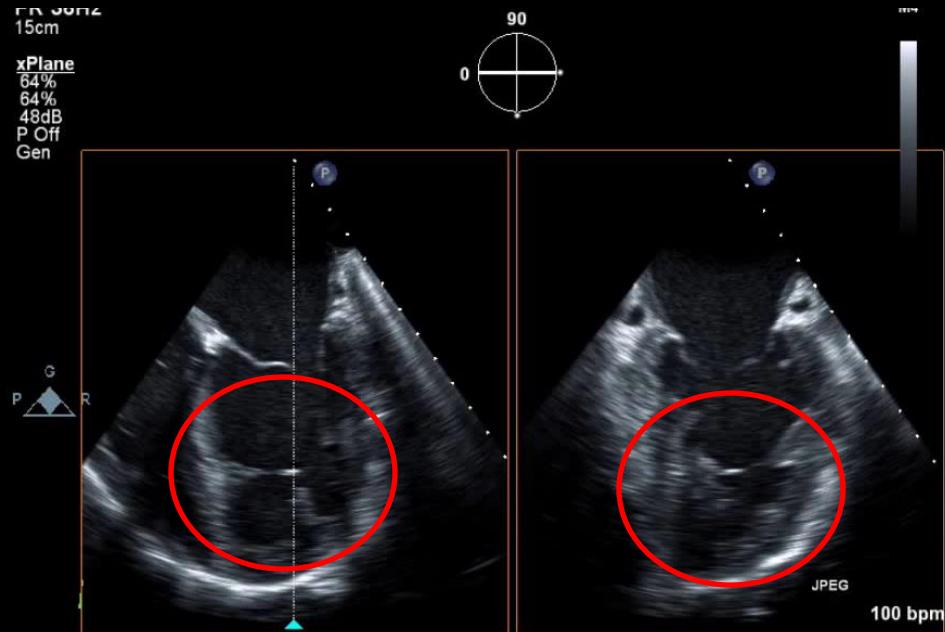
LA Appendage



- Variable number 1(20%), 2(54%), 3(23%), 4(3%)
- Pectinate muscles
- ME views
- Echogenic masses
- Mimic thrombus
- Inversion



LV False Tendon

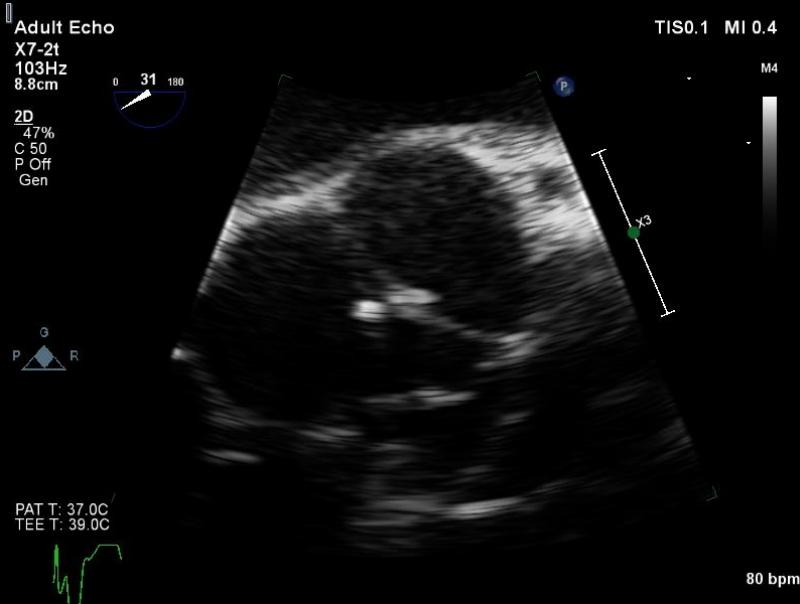


- Fibromuscular structures that cross the LV
 - Fine filamentous
 - Muscle band
- 55% of normal hearts
- ME views (2 views)
- Solid structure, non-contractile
- Not affect LV function
- Associated
 - Mural thrombus
 - Arrhythmias

AV Nodules of Arantius



Julius Caesar
Arantius



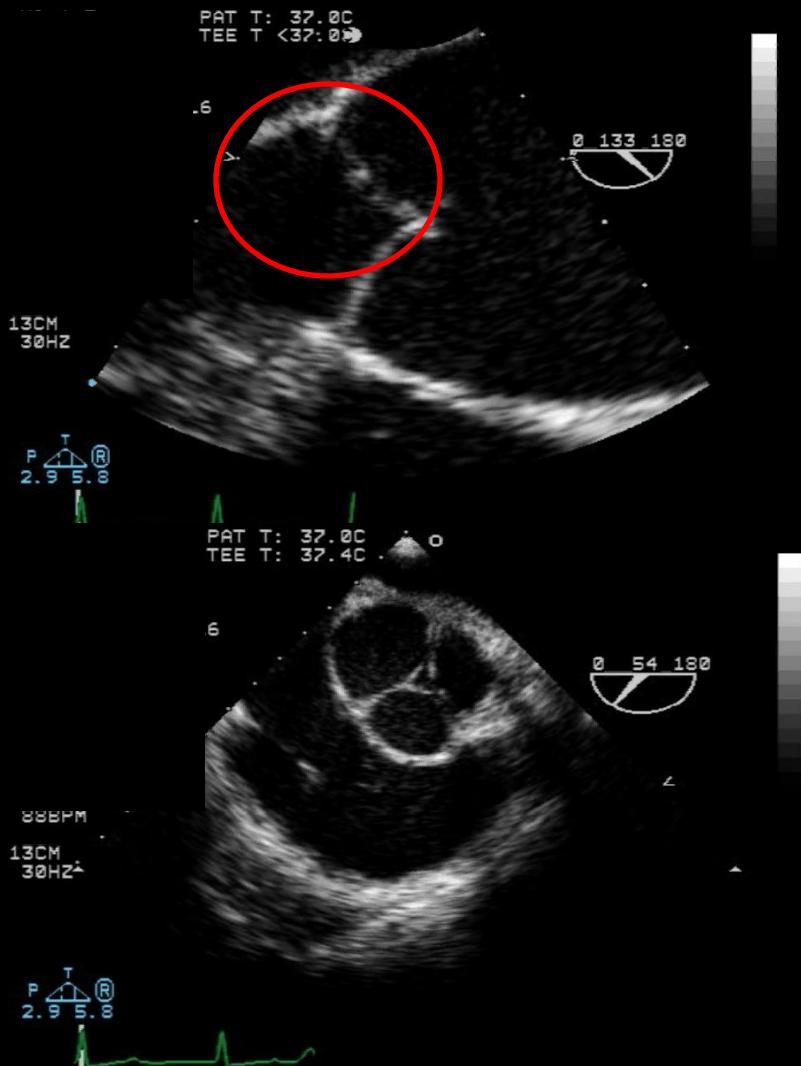
- Fibrous thickening at midpoint of AV cusp edge at point of coaptation
- Associated with excrescences
- Mimic vegetations
- May be calcified



AV Lambl's Excrecesences



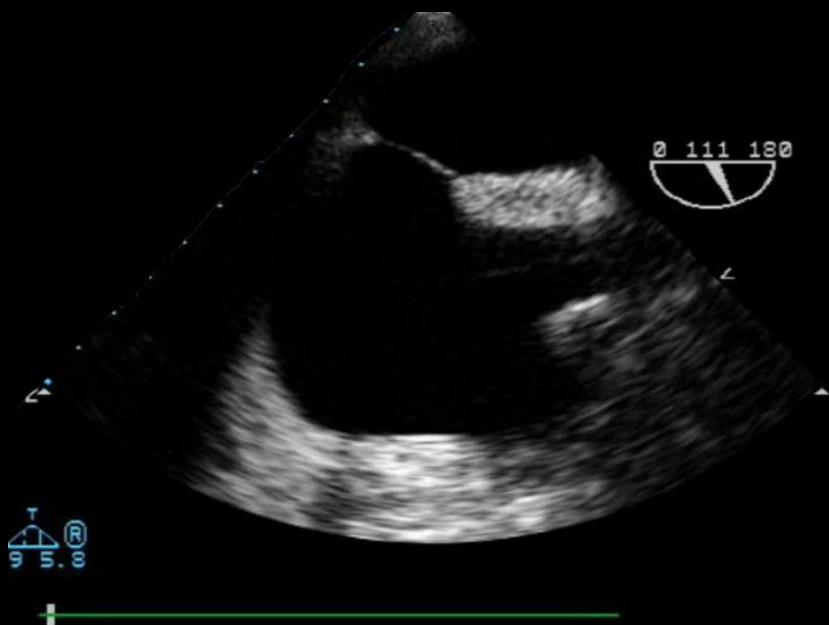
Vilem Dusan
Lambl



- Fibrous strands from nodules
- < 1mm thick, <1 cm long
- Filiform or lamellar
- 90% of patients
- Can occur on MV
- No independent motion
- No functional abnormality
- Mimic vegetation, tumor



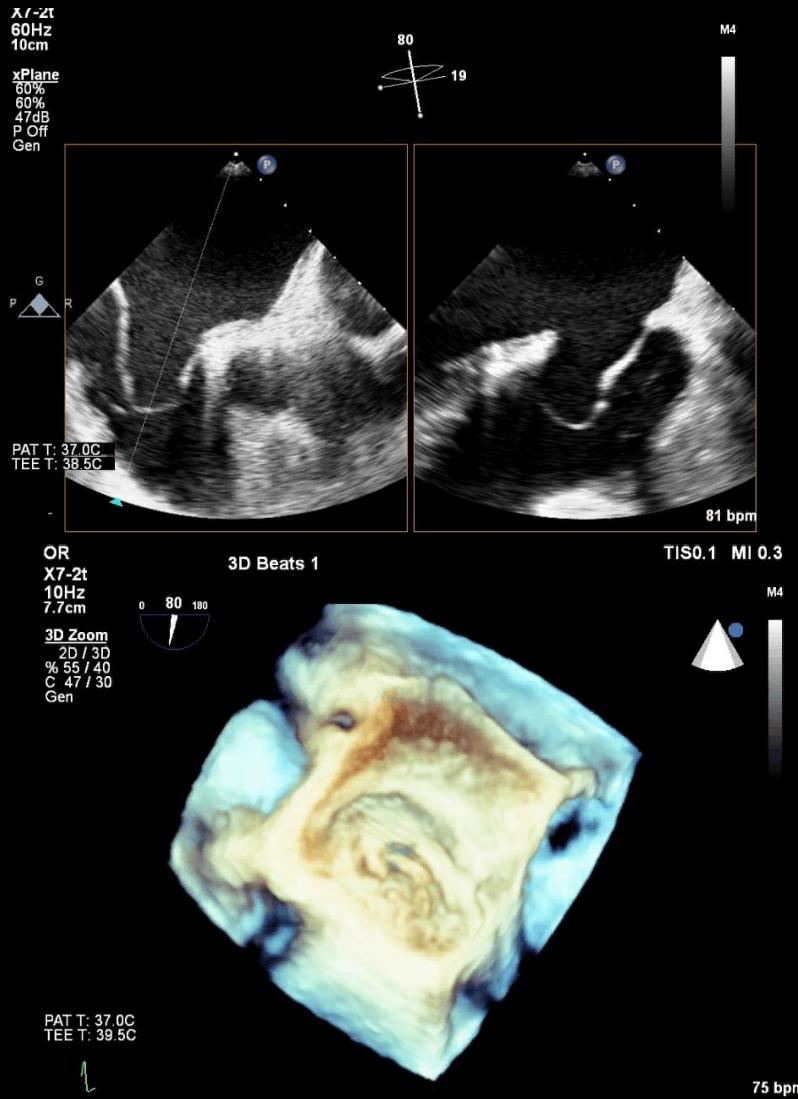
Lipomatous Hypertrophy of IAS



- Fatty infiltrate within IAS
 - Not true tumor
 - Also ↑ pericardial fat
- Bicaval view
- > 2cm thickness
- Dumbbell shape
 - Spares the fossa ovalis
- Rarely SVC obstruction
- Mimic amyloid (LV wall thickened), tumors



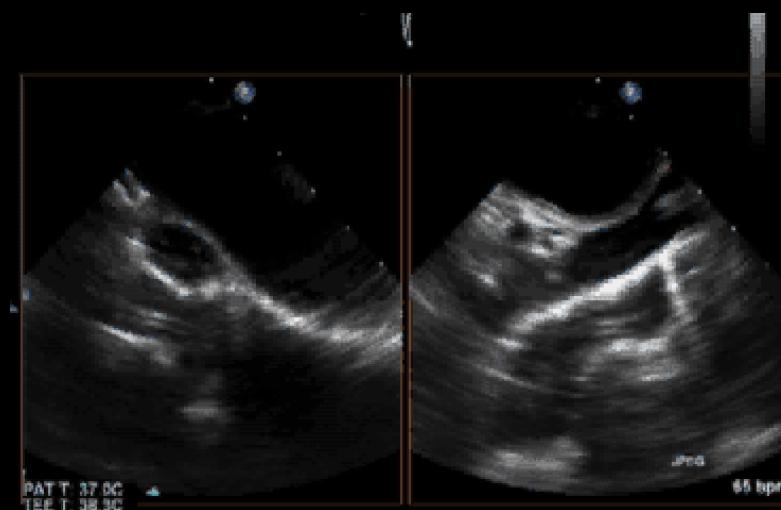
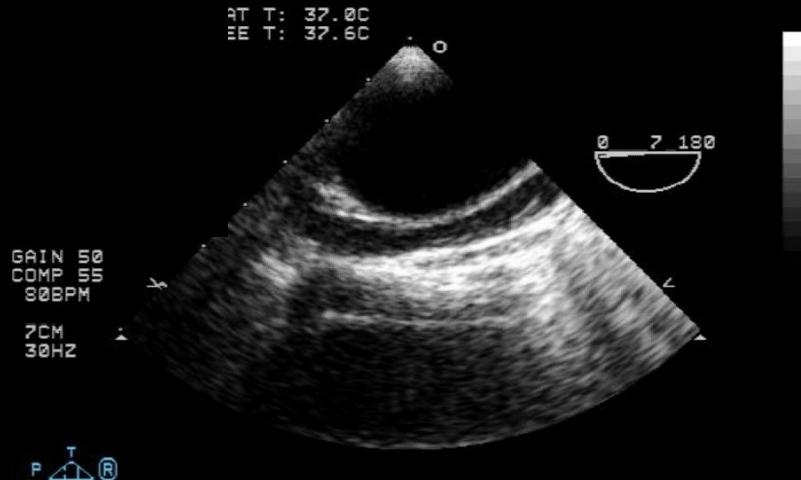
IAS Aneurysm



- Redundant IAS
- Mobile > 10mm beyond plane of IAS
- Passive motion with heart
- Increased stroke risk
- Associated
 - PFO
 - ASD
 - MV prolapse
 - Marfan



Aorta Innominate Vein



- Innominate vein anterior to aorta looks like an aortic dissection
- Differentiate color and spectral Doppler
- Agitated saline in left arm shows contrast in vein

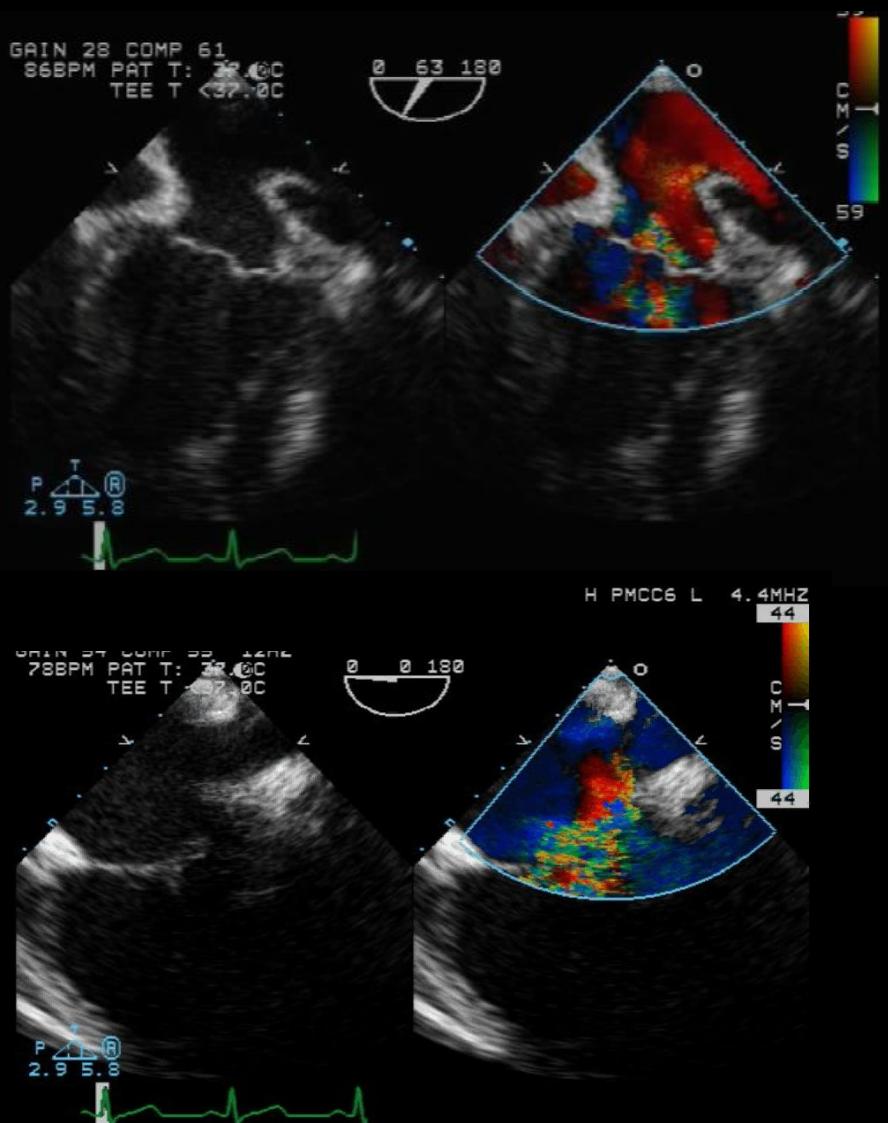


Echo Spaces

- Persistent left SVC
- Transverse sinus
- Oblique sinus
- Effusions



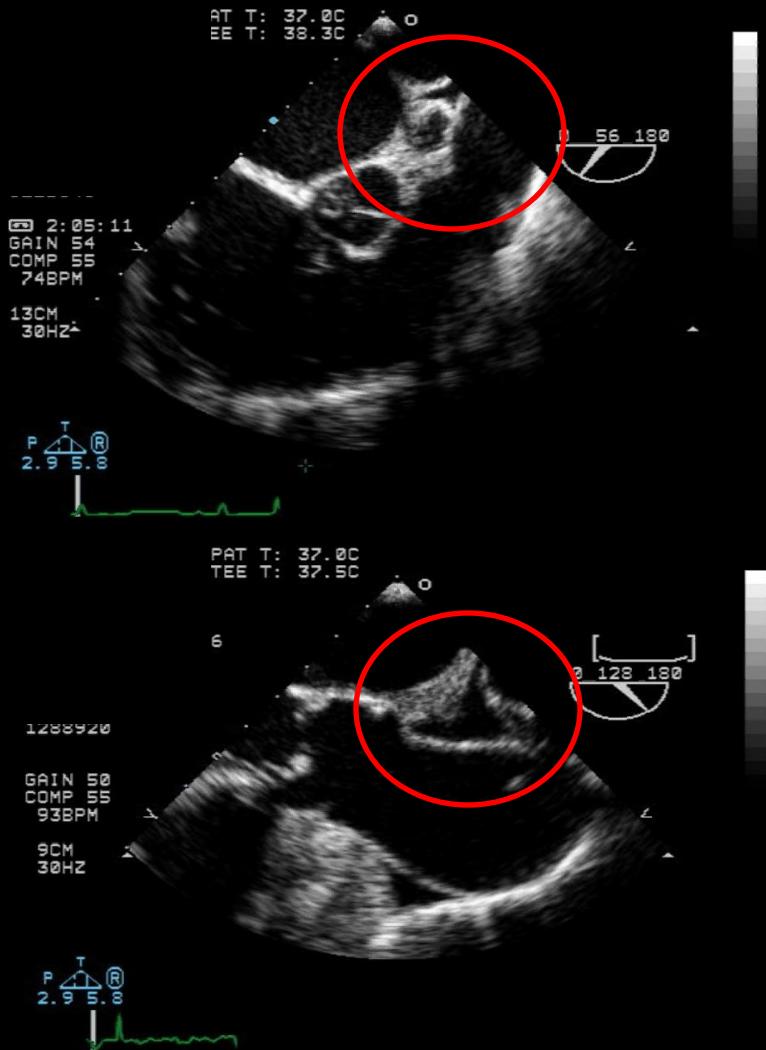
Persistent LSVC



- 10% congenital patients
- Echo free space between LAA + LUPV
- Color flow
- Big coronary sinus (> 2 cm)
- Left arm injection into CS
- Mimic cyst or abscess
- Associated
 - Coarctation
 - ASD
 - VSD
 - Cor-triatriatum



Transverse Pericardial Sinus



- ME AV LAX and ME RVOT views
- No color flow
- Fibrinous material
- Floating LAA tip
- Mimic cyst or abscess

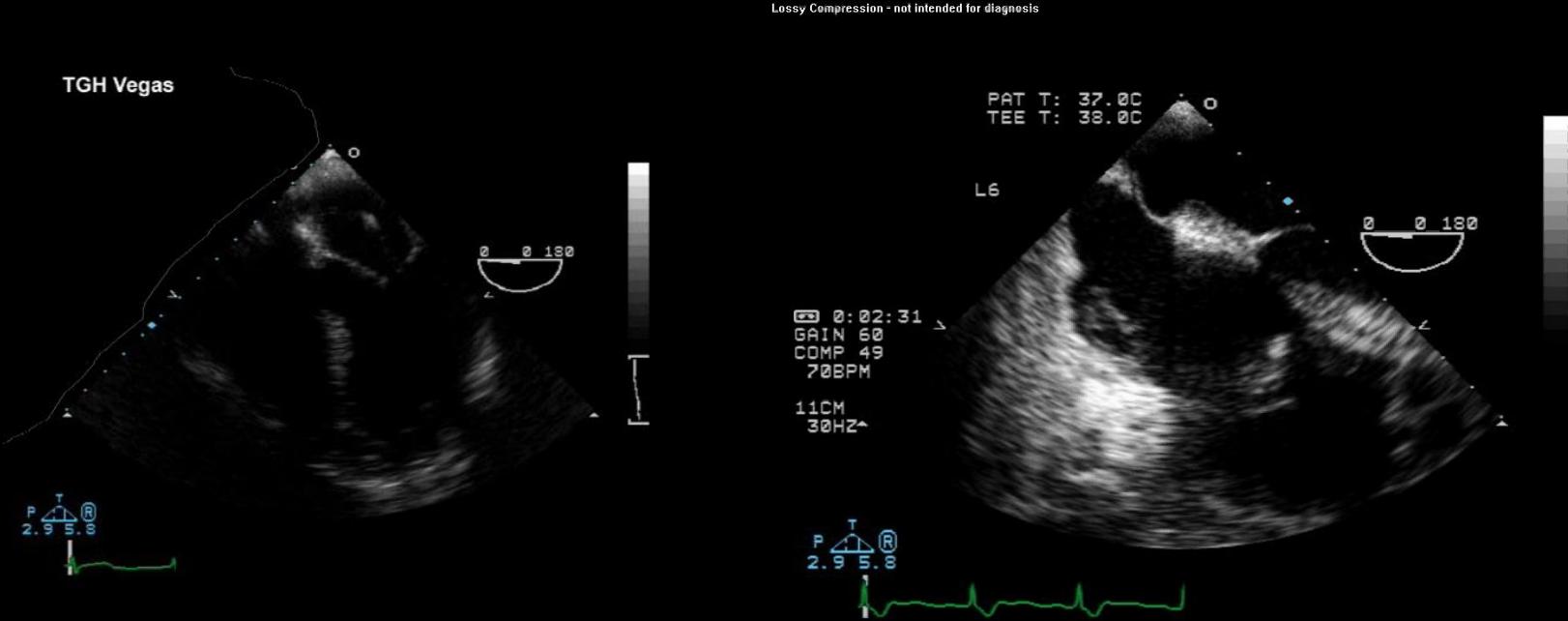


Foreign Material

- Catheters
- Pacer wires
- Sutures



Pacer Wires



Readings

- Kim MJ and Jung HO. Anatomic Variants Mimicking Pathology on Echocardiography: Differential Diagnosis. J Cardiovasc Ultrasound 2013;21(3):103-112.
- Katti K and Patel NP. The Thebesian Valve: Gatekeeper to the Coronary Sinus. Clin Anat 2012; 25:379–385
- Iacobellis G et al. Echocardiographic Epicardial Fat: A Review of Research and Clinical Applications J Am Soc Echocardiogr 2009;22:1311-9
- Goyal SK, et al. Persistent left superior vena cava: a case report and review of literature. Cardiovasc Ultrasound 2008 10;6:50. doi: 10.1186/1476-7120-6-50.

