

Cardiac Masses

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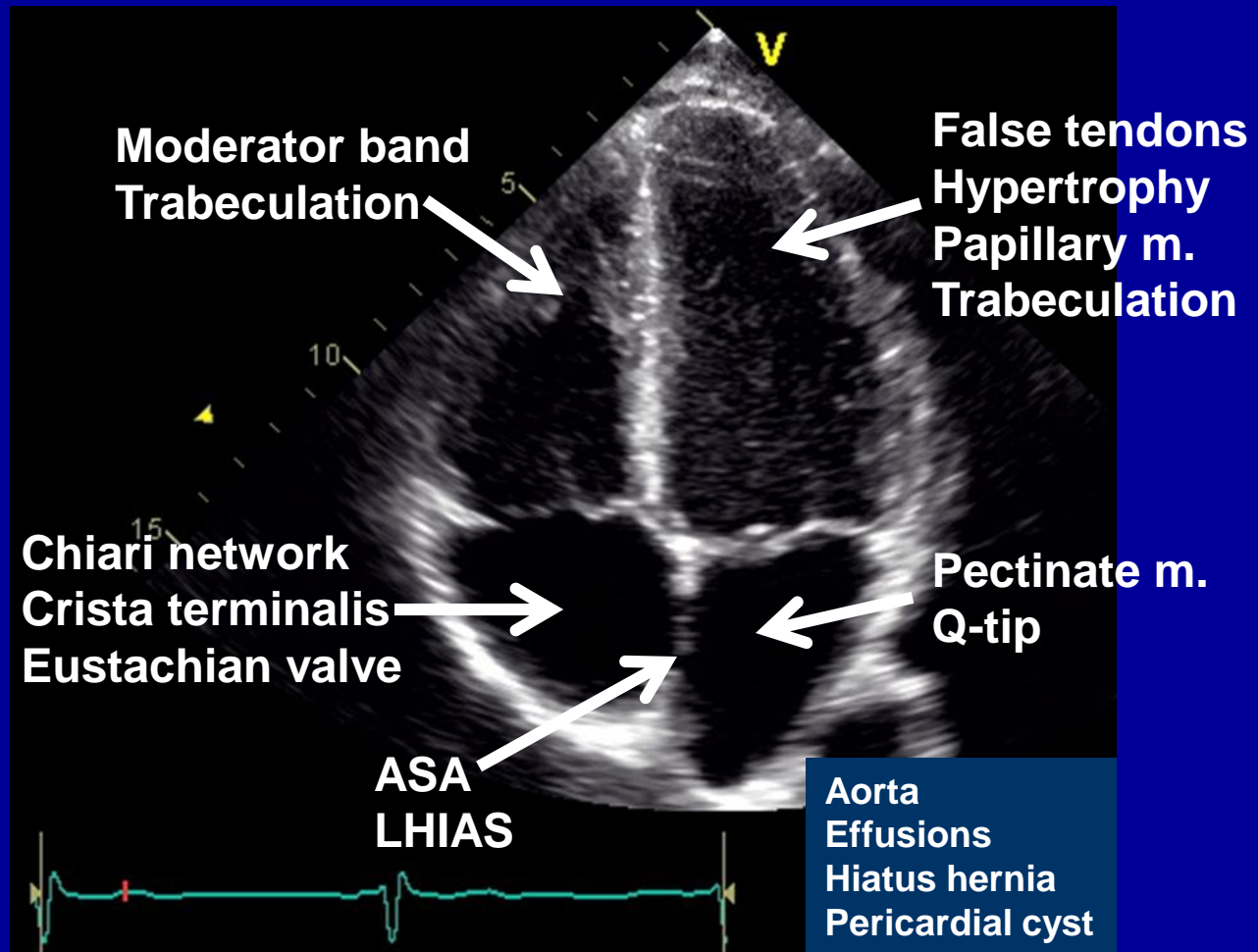
Cardiac Masses: Considerations

- **Definition of the mass**
 - Nature
 - Location
 - Benign or malignant
- **Presentation**
 - Incidental finding
 - Obstruction
 - Direct myocardial involvement
 - Embolization
 - Constitutional or systemic symptoms
- **Echocardiography remains 1° imaging modality**
 - Multimodality imaging may be required for characterization

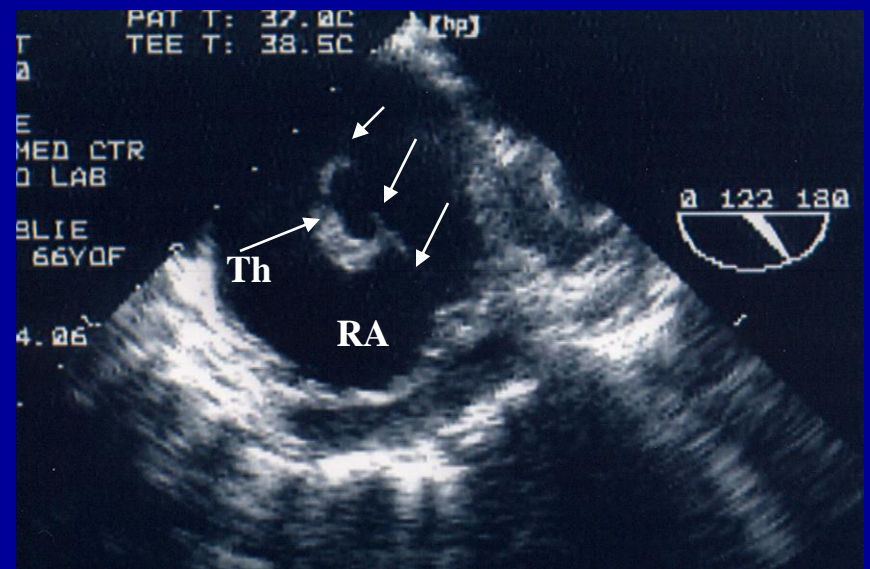
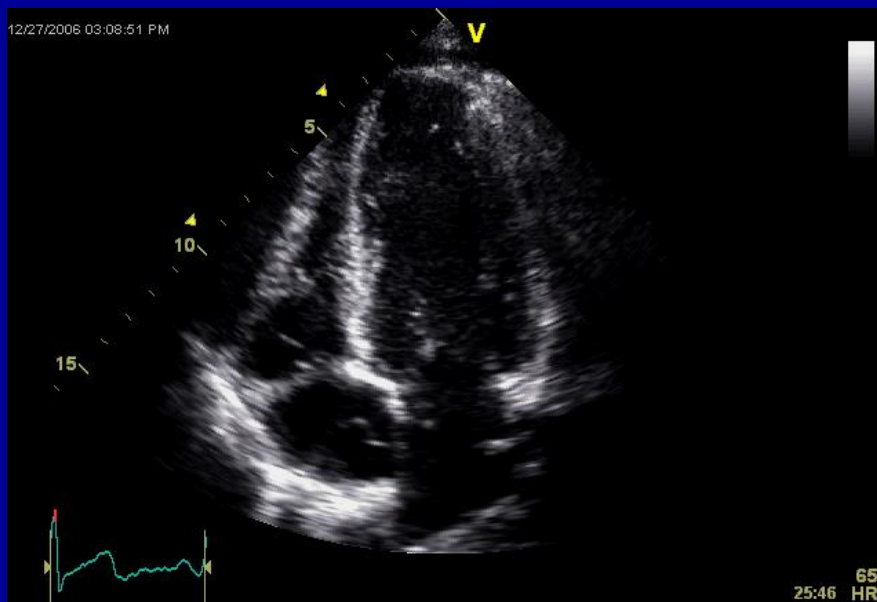
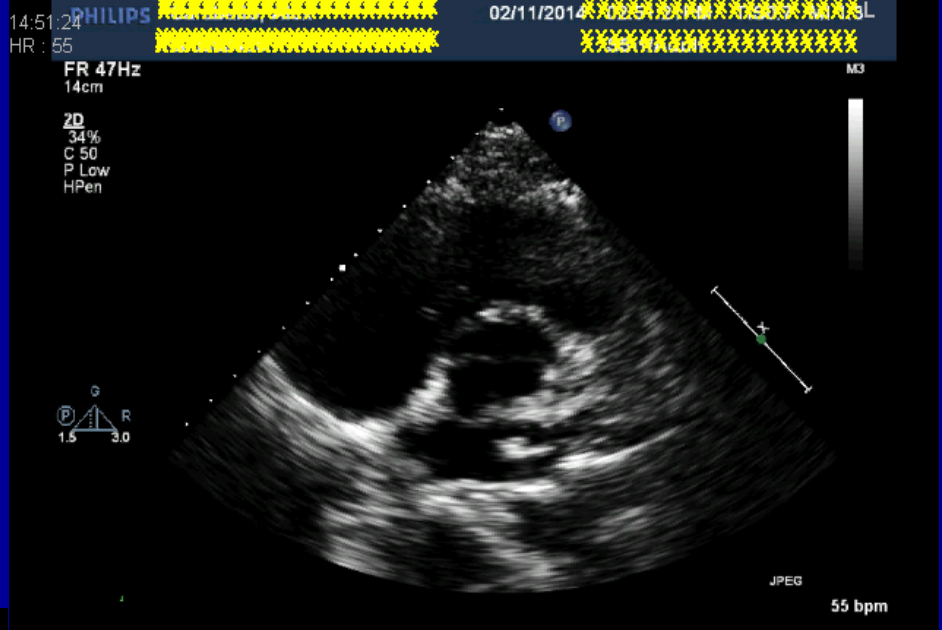
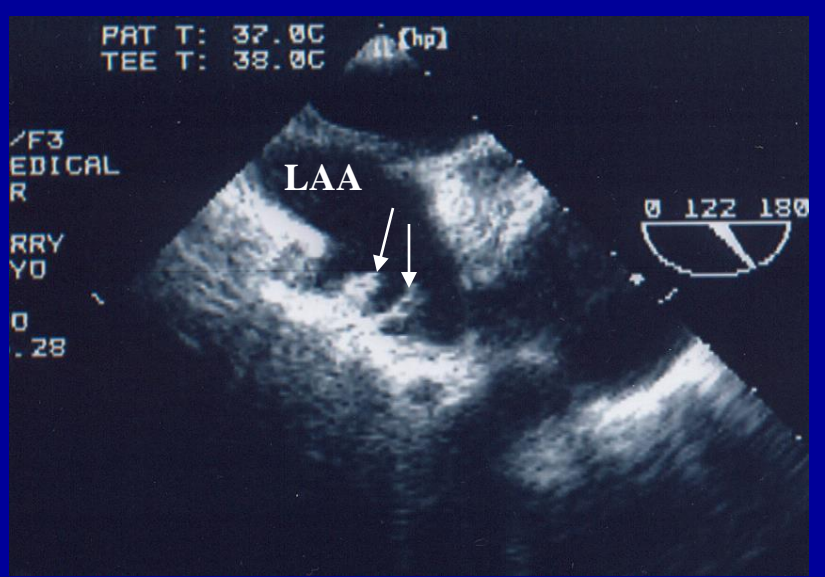
Cardiac Masses: Differential Diagnosis

- Anatomical variants
- Implanted devices
- Thrombus
- Vegetations
- Tumors
 - Primary
 - Metastatic
- Artifacts

Anatomical Structures



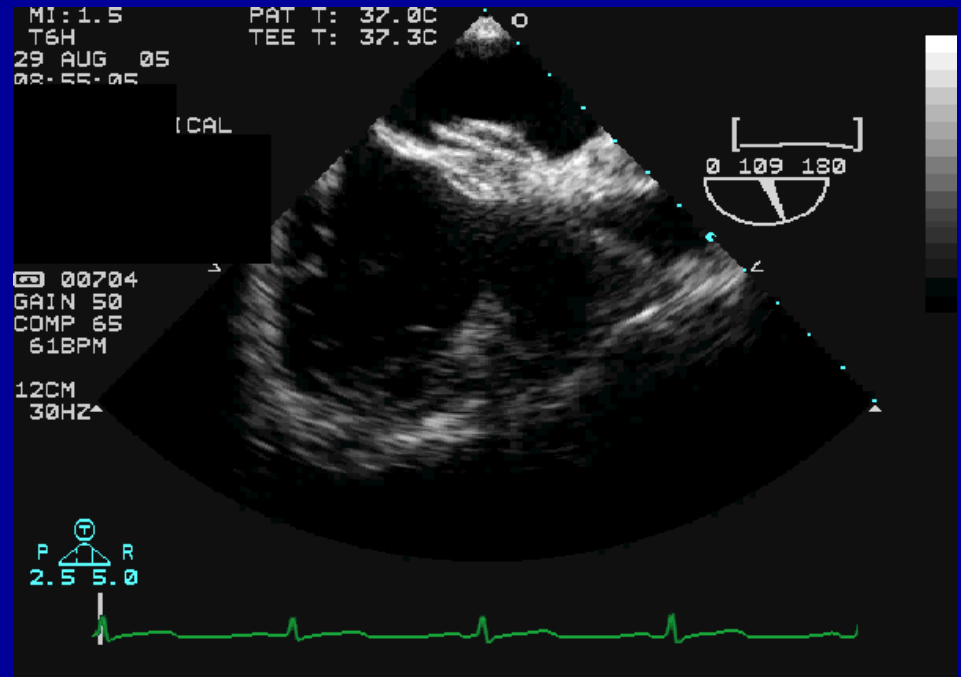
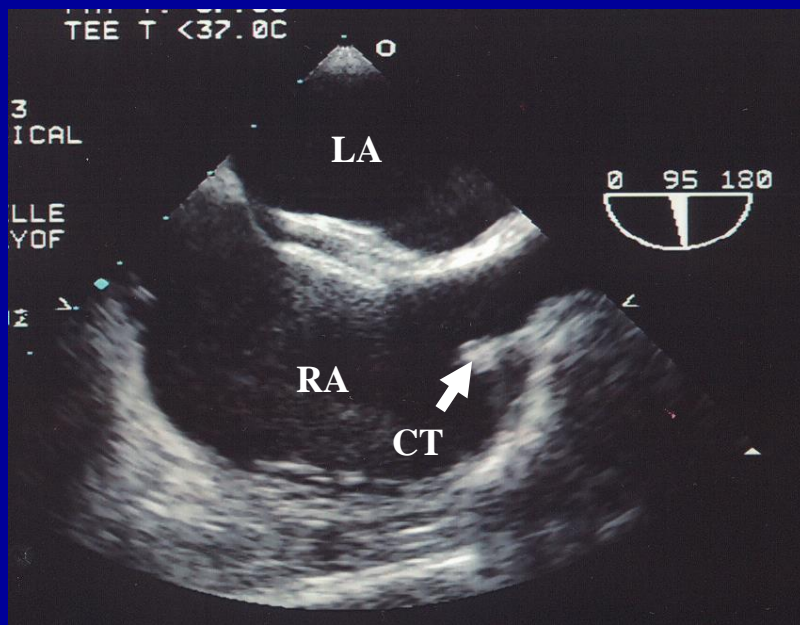
Anatomical Variants



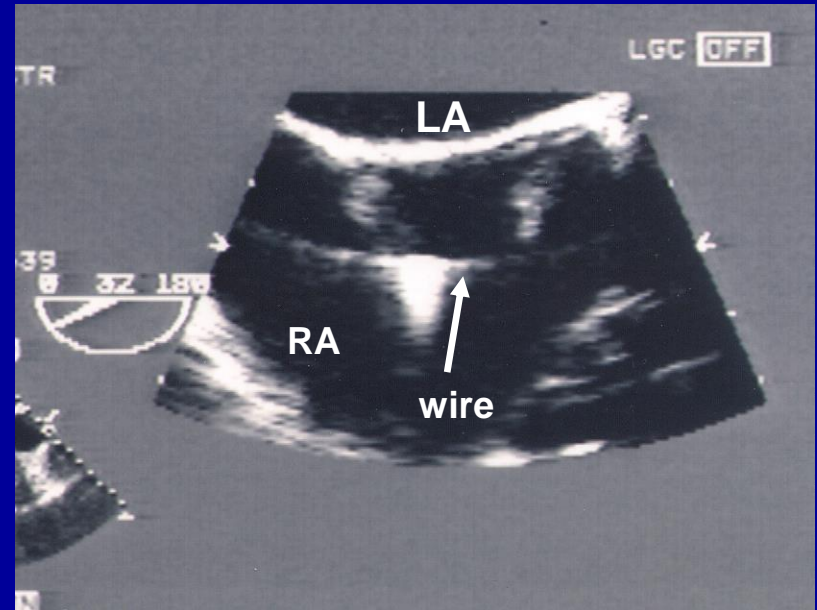
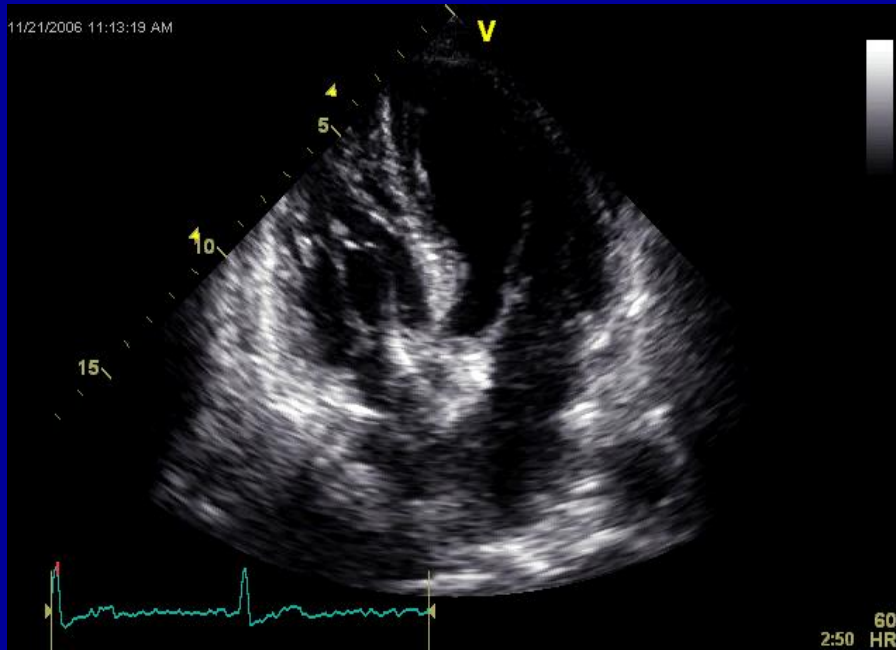
Implanted Devices

- Pacemaker leads
- Cardioverter-defibrillator leads
- Right heart catheters
- Occluder devices
- Prosthetic valves/clips
- Foreign bodies

Implanted Devices



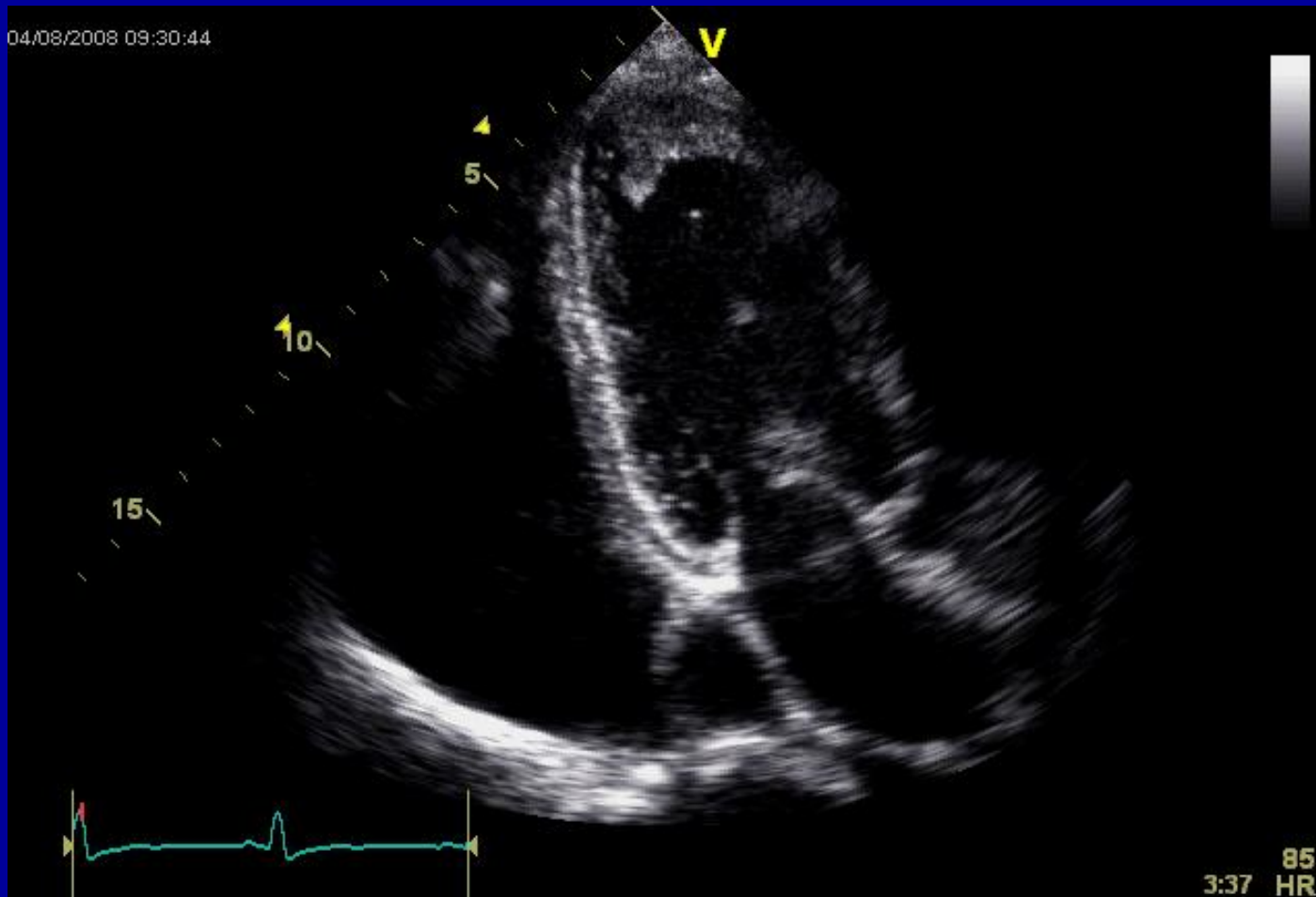
Implanted Devices



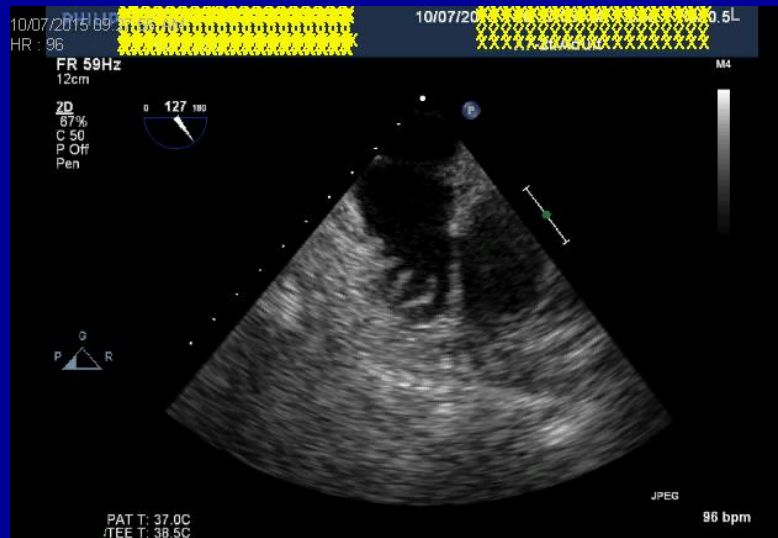
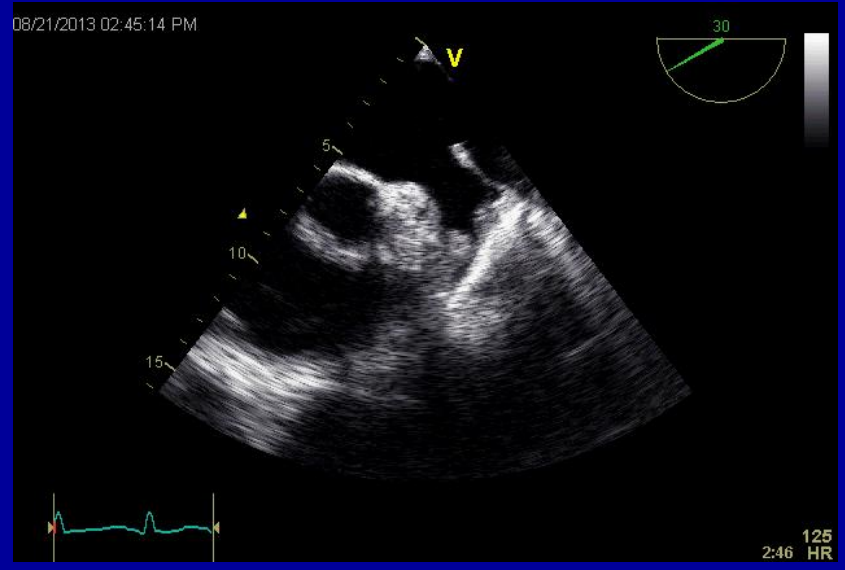
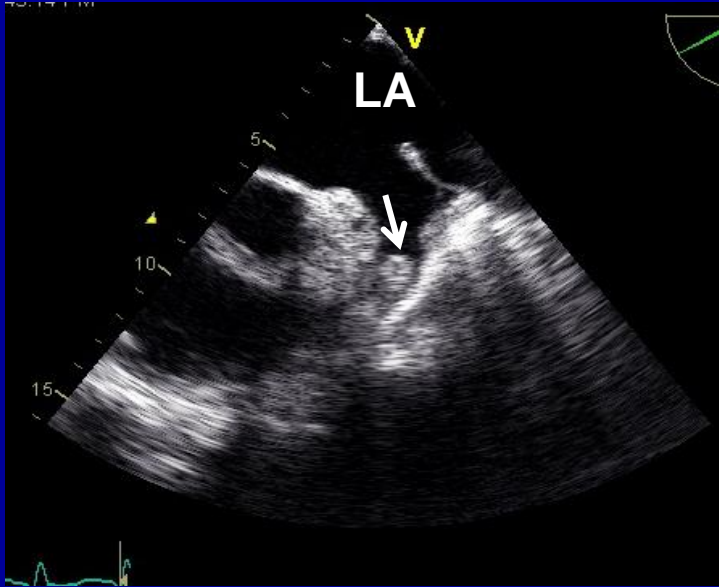
Thrombus

- Most commonly encountered intra-cardiac mass
- Often associated cardiac pathology
 - LV thrombus
 - Apex most common
 - Acute MI
 - » Estimated 4-15% patients with anterior MI
 - Dilated cardiomyopathy
 - » DDX: false tendons, trabeculations, artifacts, apical hypertrophy, tumors, non-compaction, HES
 - LA thrombus
 - Appendage
 - Body
 - Right heart thrombus
 - Catheter-related
 - Pulmonary embolism
 - Appendage
 - RV apical area

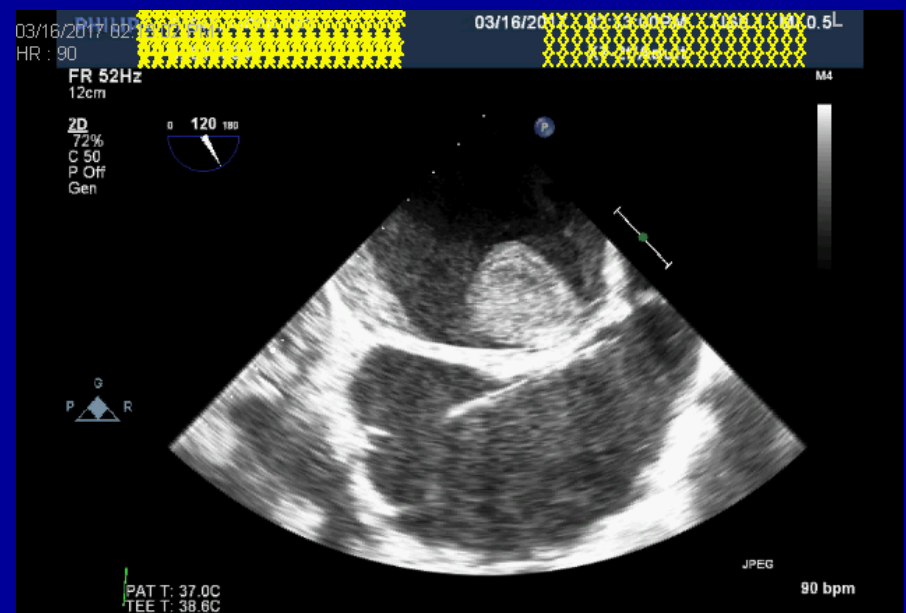
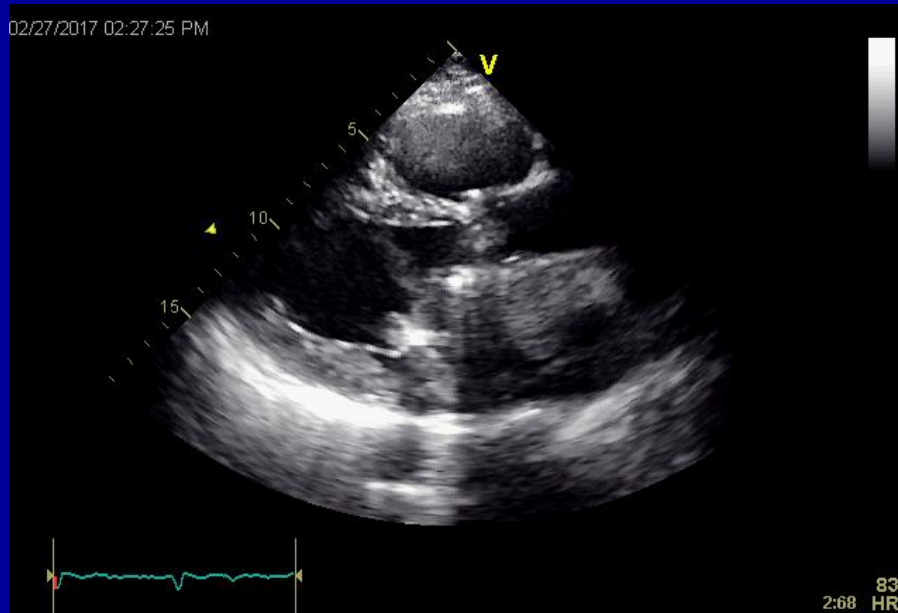
LV Thrombus



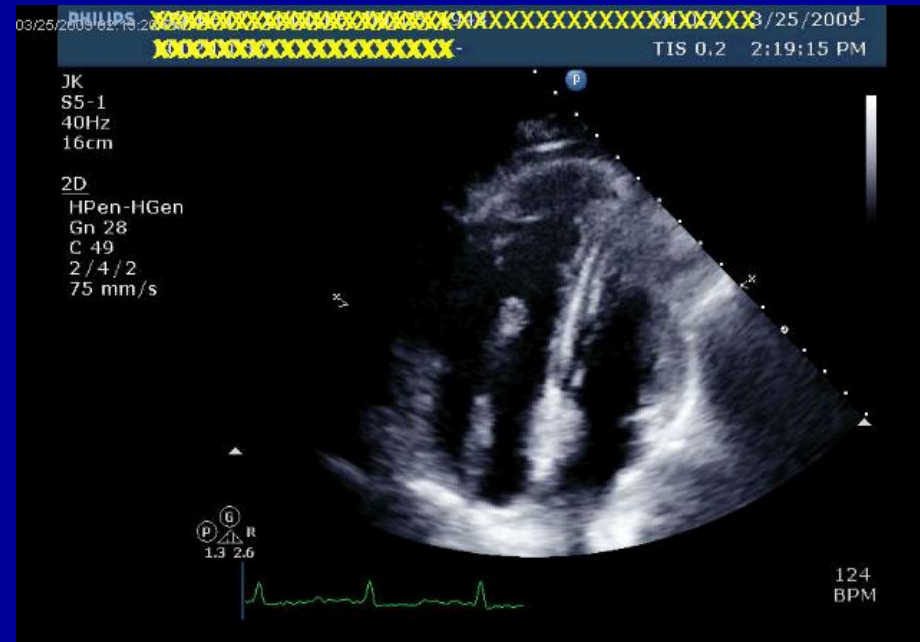
LAA Thrombus



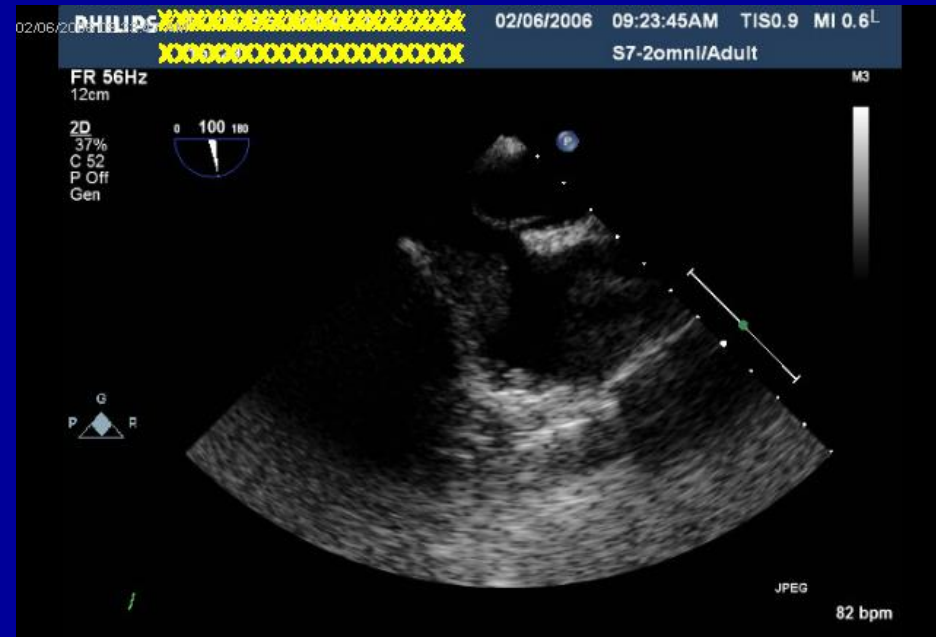
LA Thrombus



Right Heart Thrombus



Pulmonary Embolism

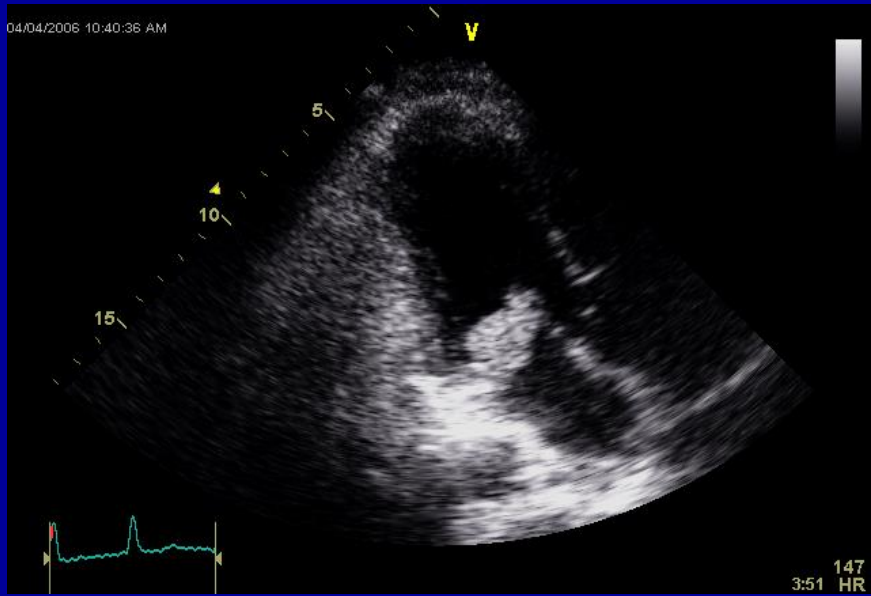


Catheter-related

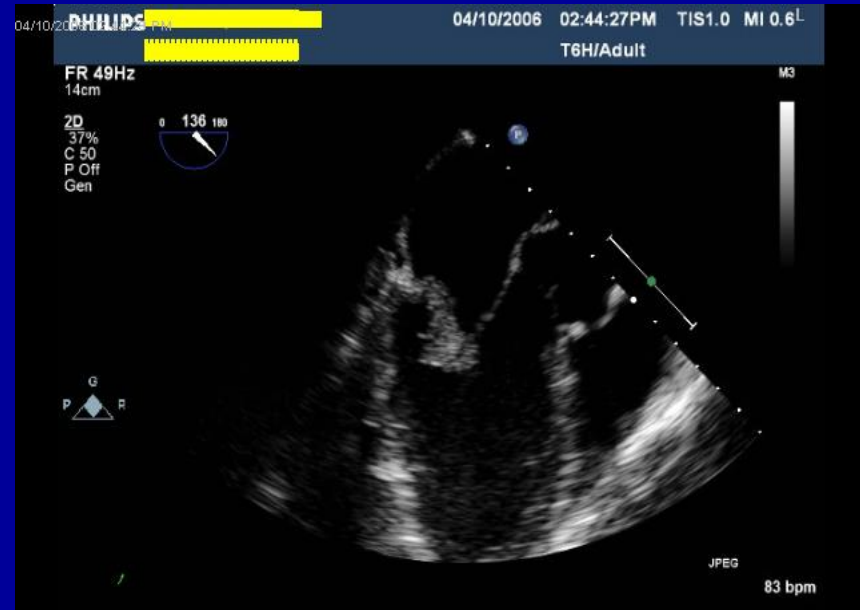
Vegetations

- Locations:
 - Valve surfaces, areas of endocardium opposite intra-cardiac shunts, or prosthetic materials
 - Atrial surface mitral valve
 - Ventricular surface of aortic valve
- Characteristics:
 - Mobile, oscillating
 - Tissue density differing from surrounding tissue
 - May calcify if chronic/healed
- Valve dysfunction may occur
 - Valvular regurgitation
 - Valvular stenosis (if large enough)
- Infective or non-infective

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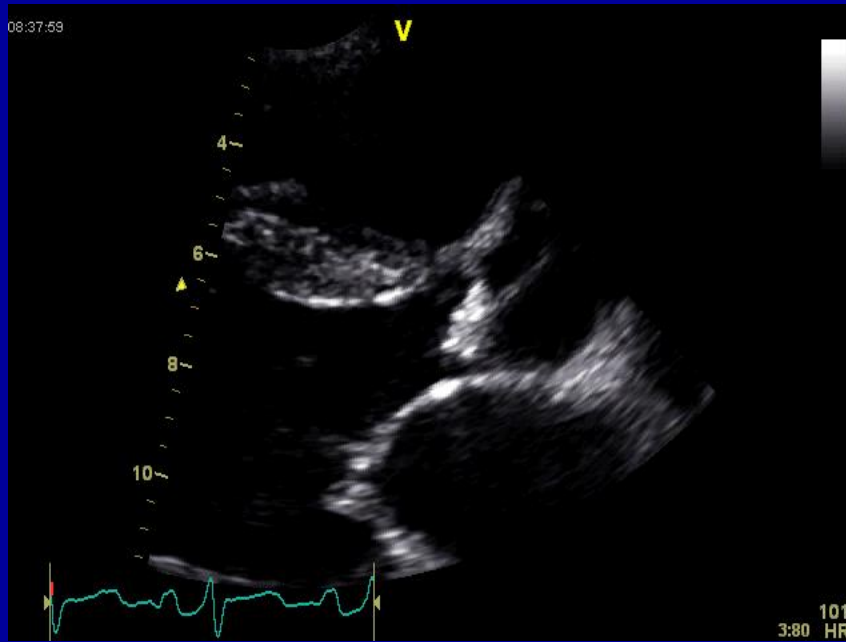
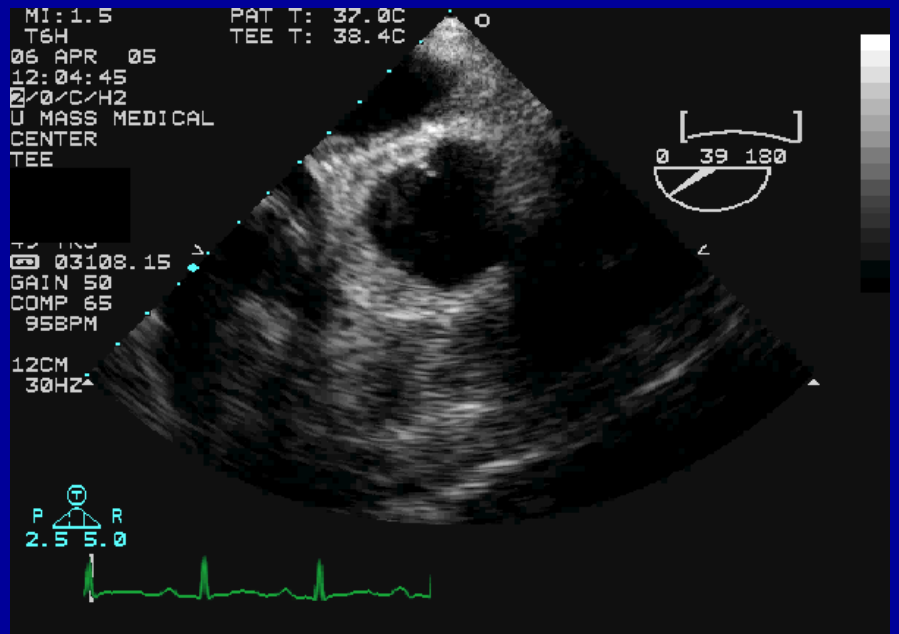
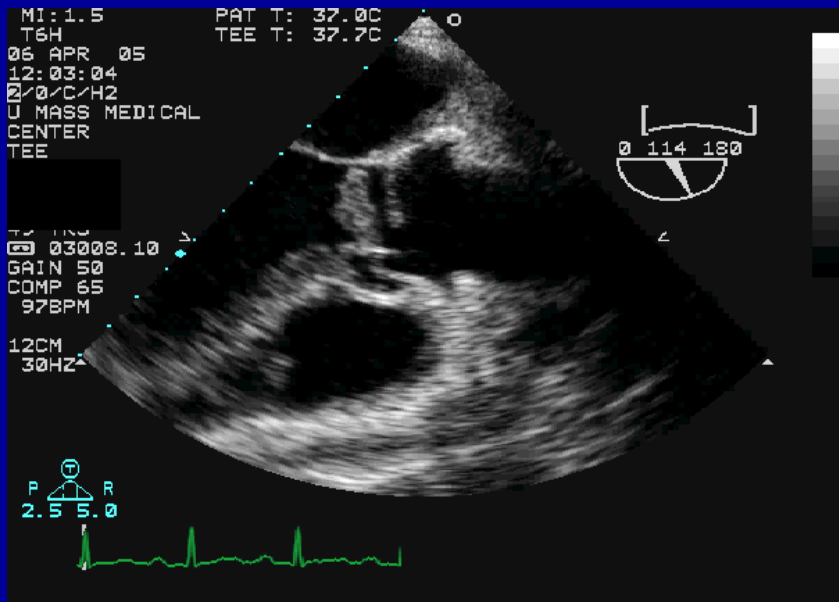


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Cardiac Tumors

- Primary
 - Rare
 - 0.017% to 0.033% of autopsies
 - Benign vs. malignant
- Secondary (Metastatic)

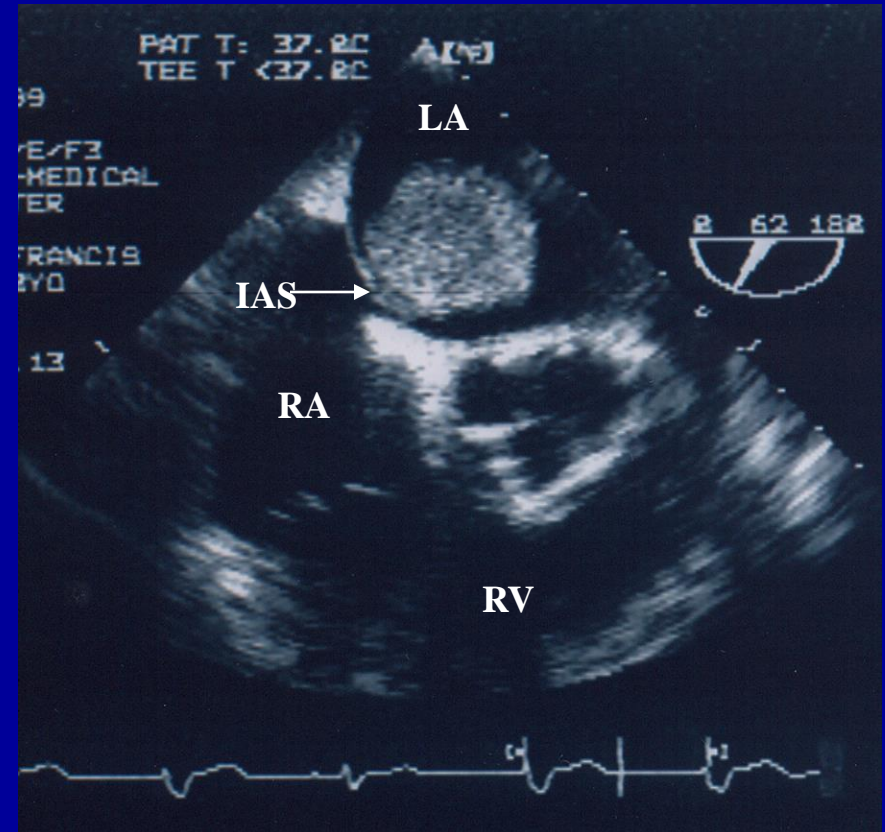
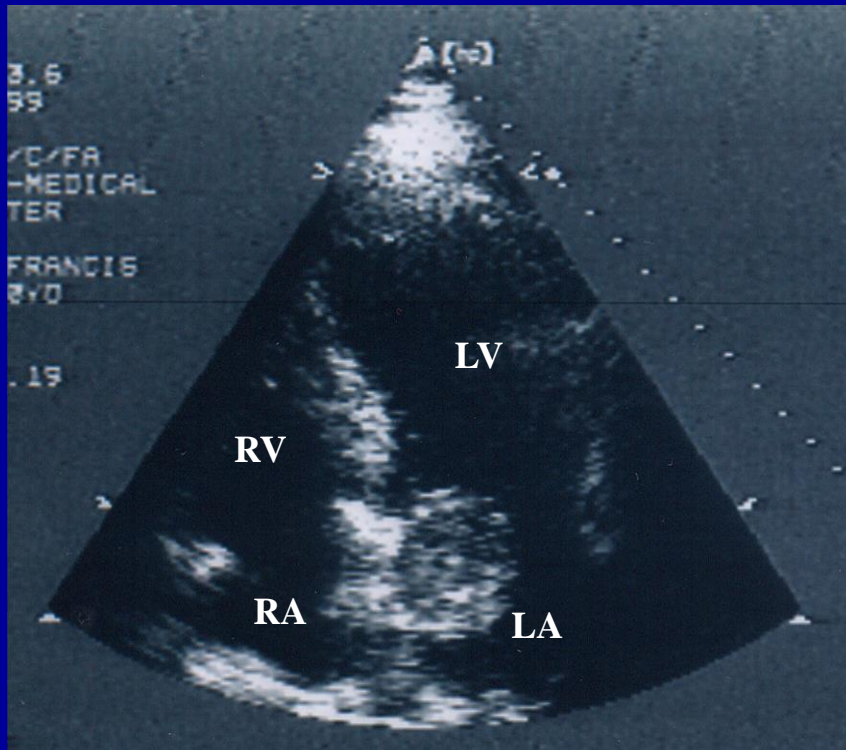
Primary Cardiac Tumors

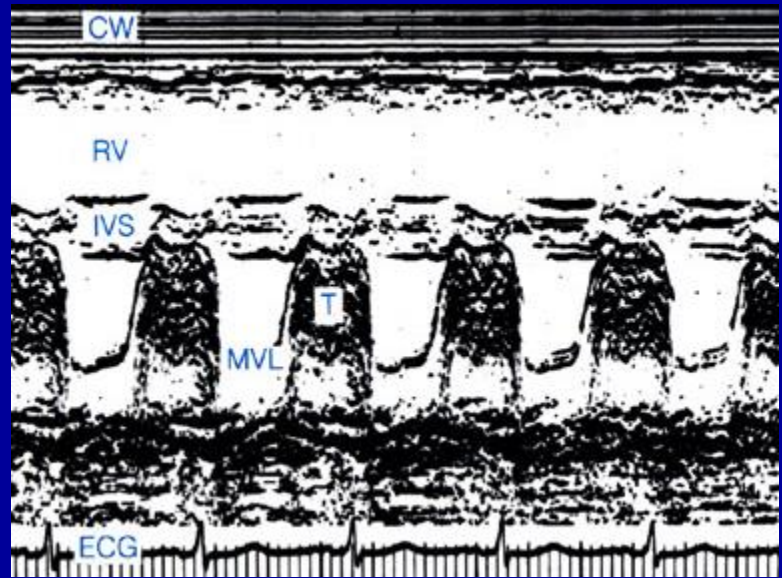
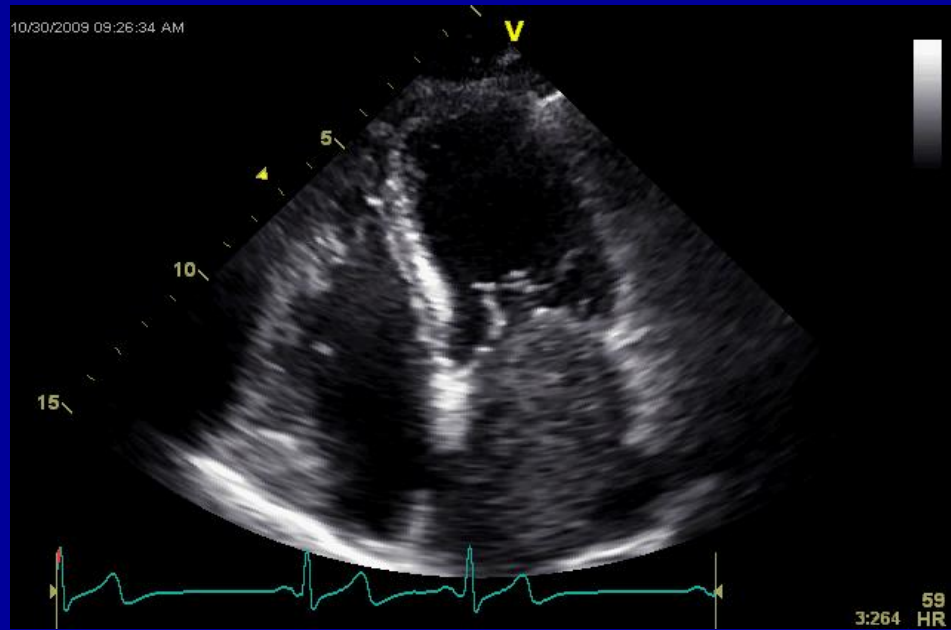
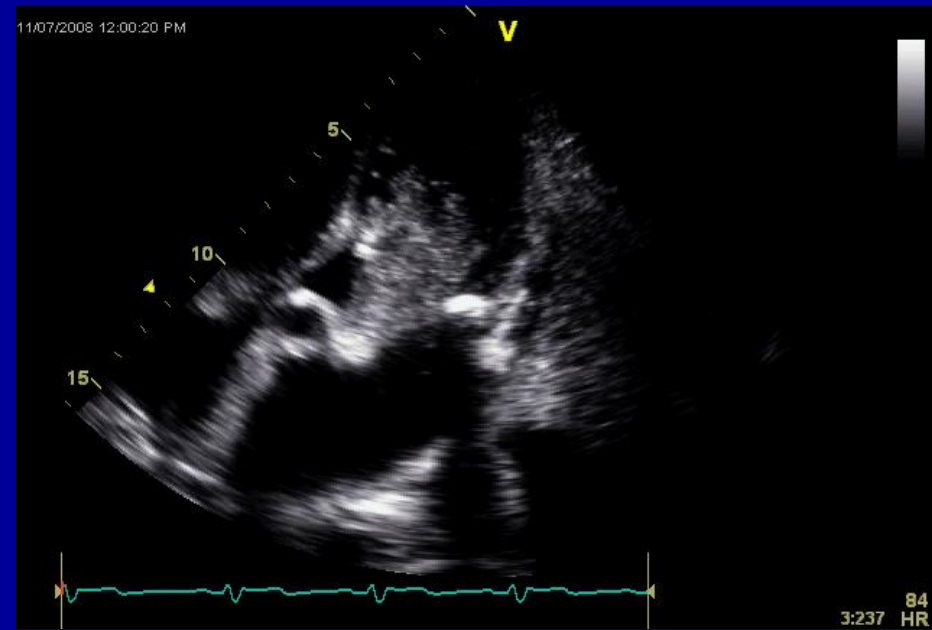
- Benign (80%)
 - Myxoma
 - Fibroelastoma
 - Rhabdomyoma
 - Fibroma
 - Lipoma
 - Hemangioma
 - Teratoma
 - Paraganglioma
- Malignant (20%)
 - Sarcoma
 - Lymphoma
 - Mesothelioma

Cardiac Myxoma

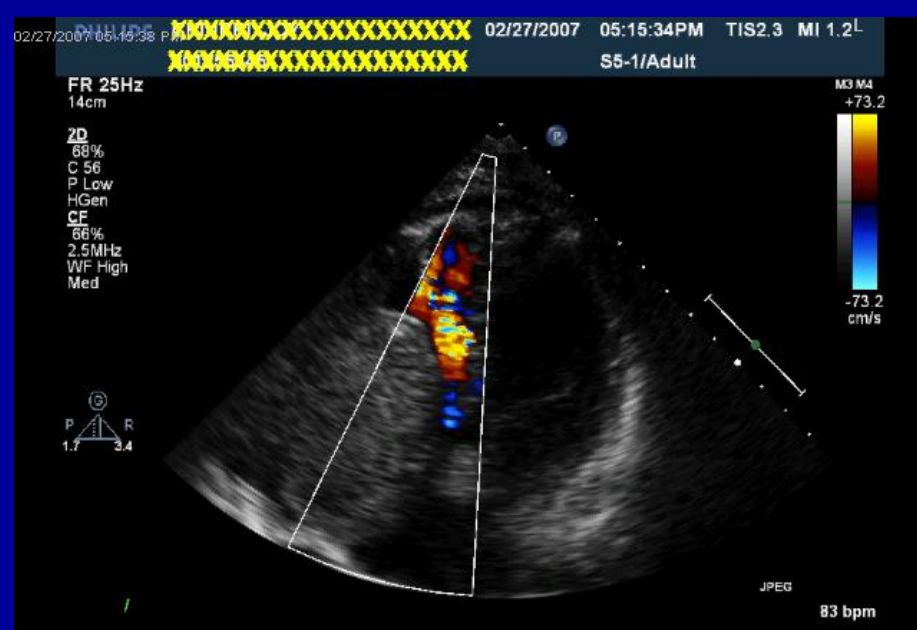
- Most common primary cardiac tumor
- Majority are sporadic
 - 10% familial
 - Can recur and may be multi-centric
- Most frequently discovered 3rd to 6th decades
- Female preponderance (60-70%)
- Can arise anywhere within the heart
 - About 75% occur in the left atrium near fossa ovalis
 - Stalk
- Clinical presentation
 - Constitutional, embolic or obstructive symptoms
 - Many detected asymptotically

LA Myxoma

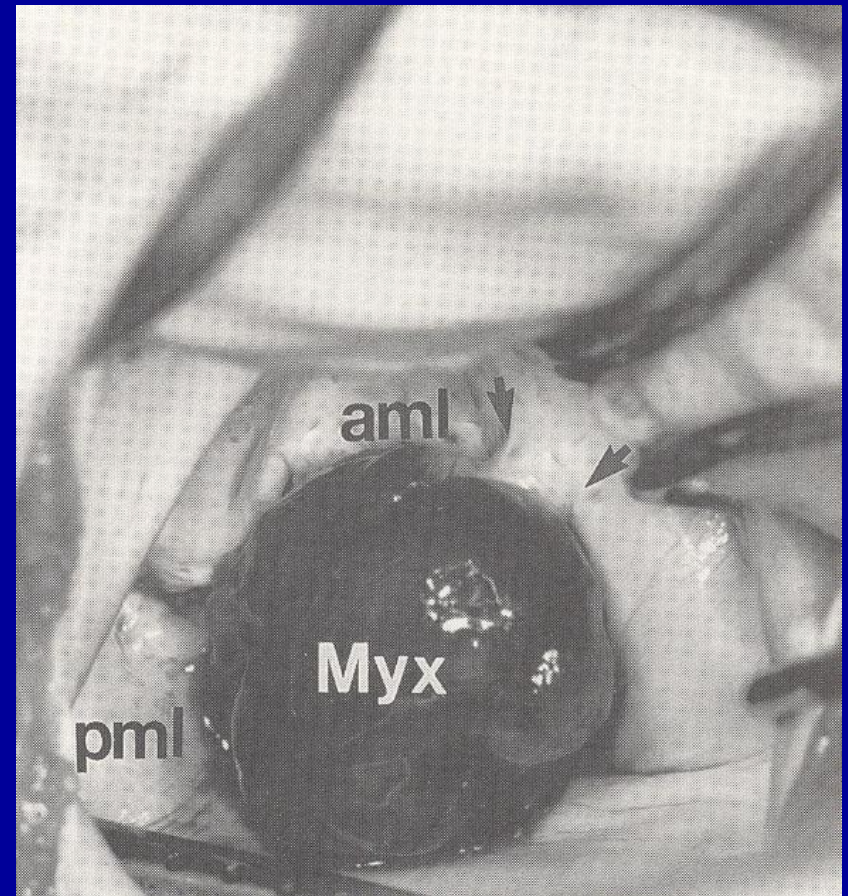
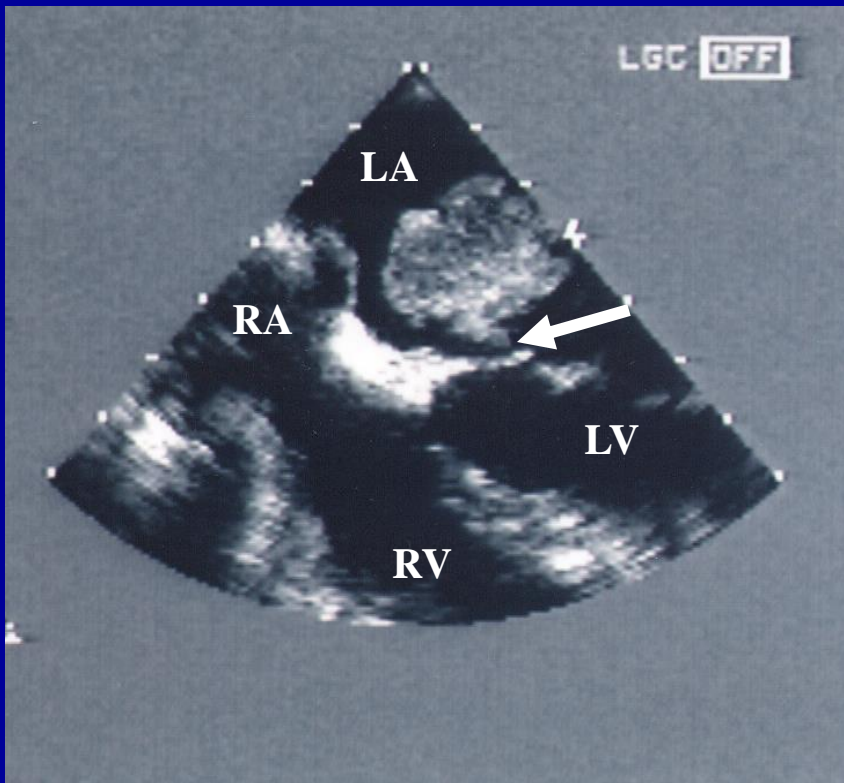




RA Myxoma

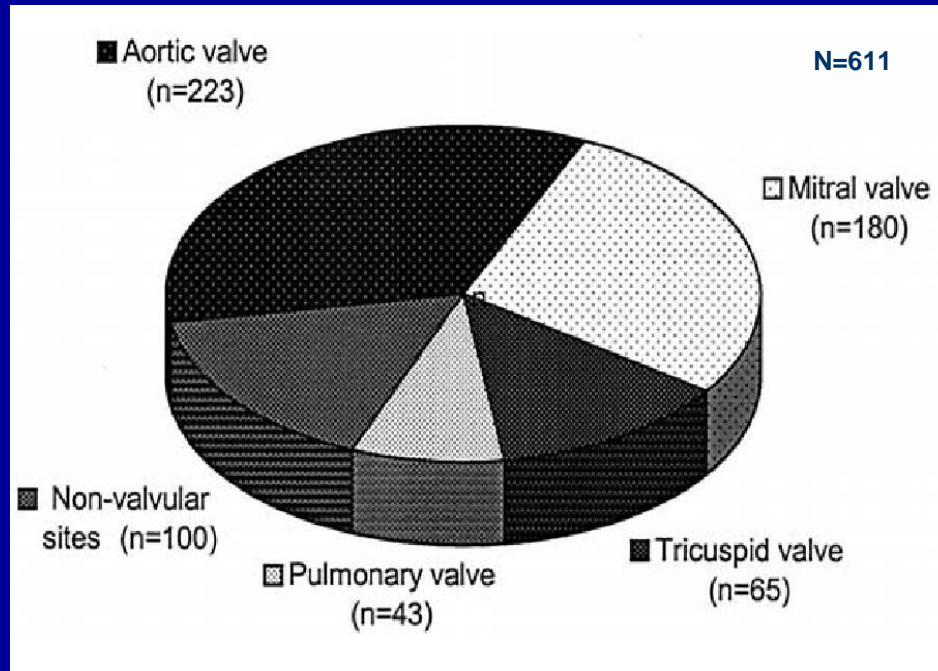


Valvular Myxoma

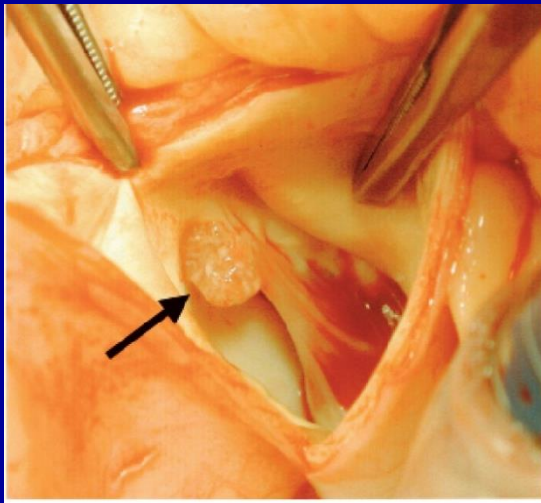


Papillary Fibroelastoma

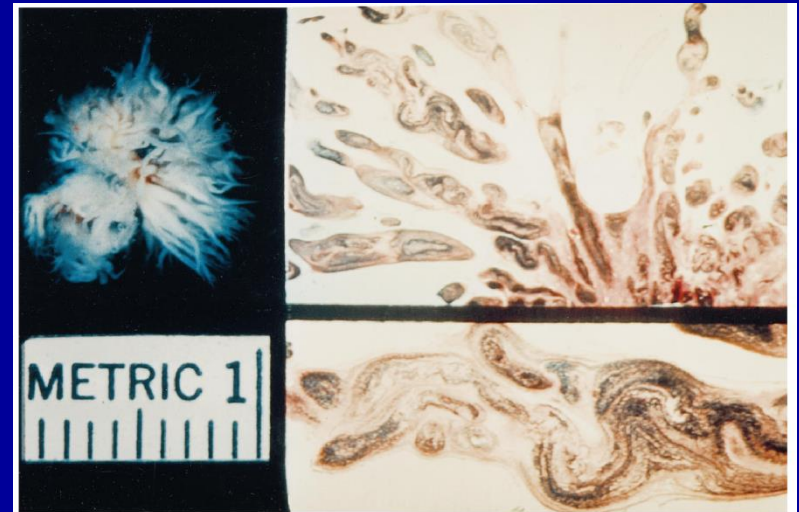
- Second most prevalent adult 1° cardiac tumor
 - Commonly involves cardiac valves
 - Aortic valve most common location
 - Both surfaces show equal prevalence
 - Other cardiac structures/chambers (15-25%)
- Majority found in left heart
- Pathology:
 - Avascular, papillary fronds, pedunculated
 - Mid-portion of the valve
 - Usually do not cause valvular dysfunction
- Significant embolic potential recognized



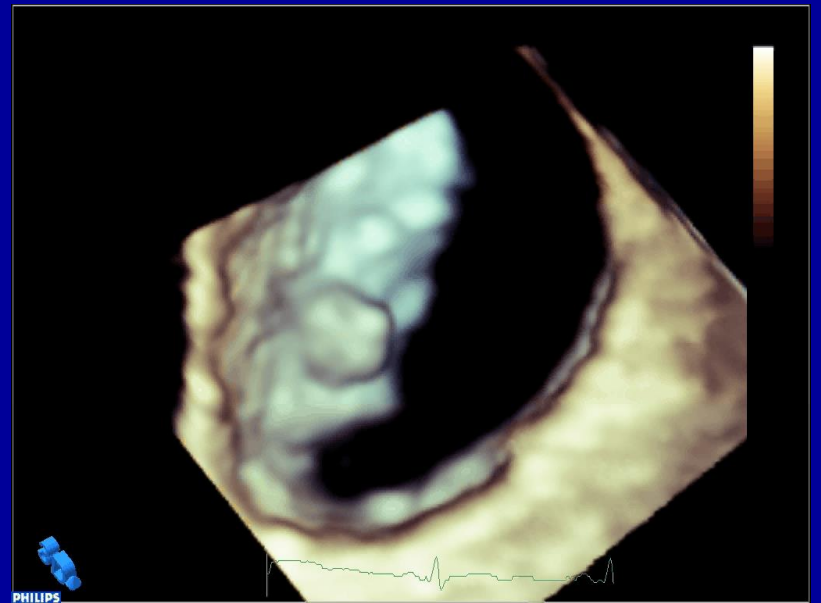
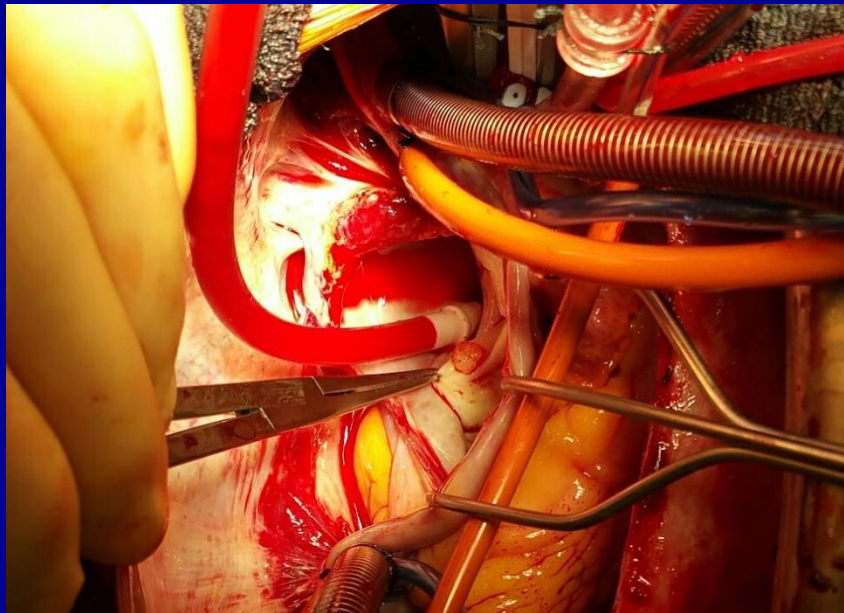
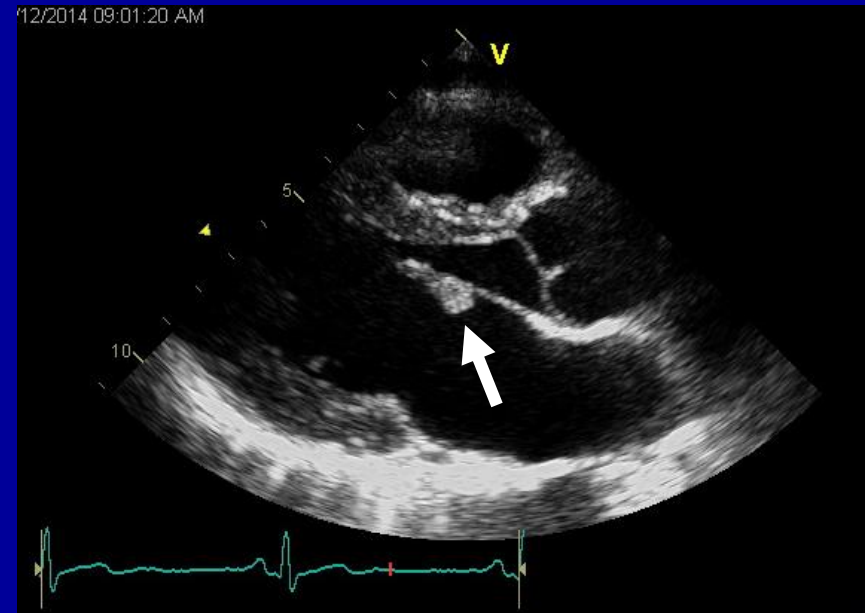
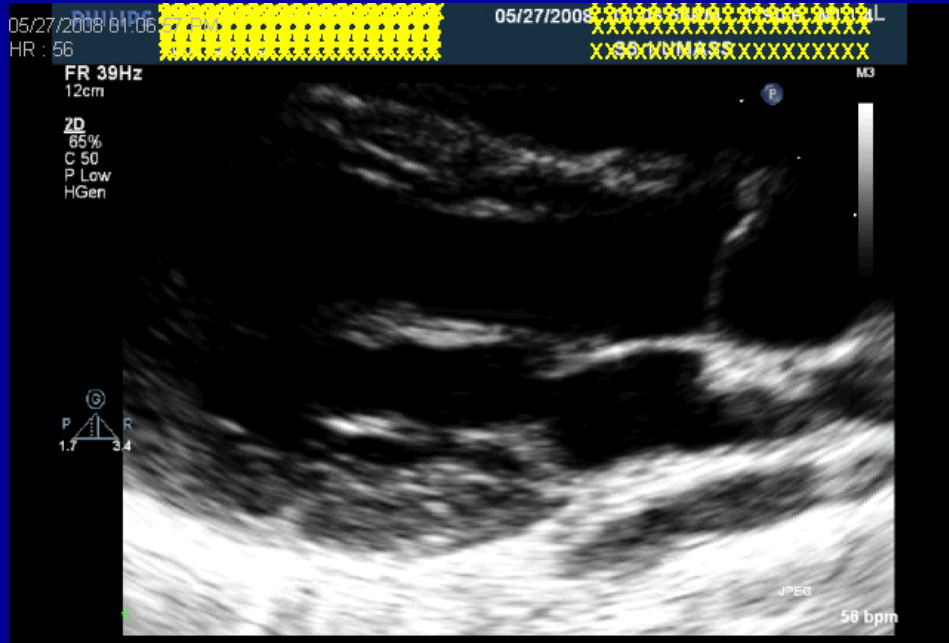
Gowda RM et al. Am Heart J 2003;146:404.

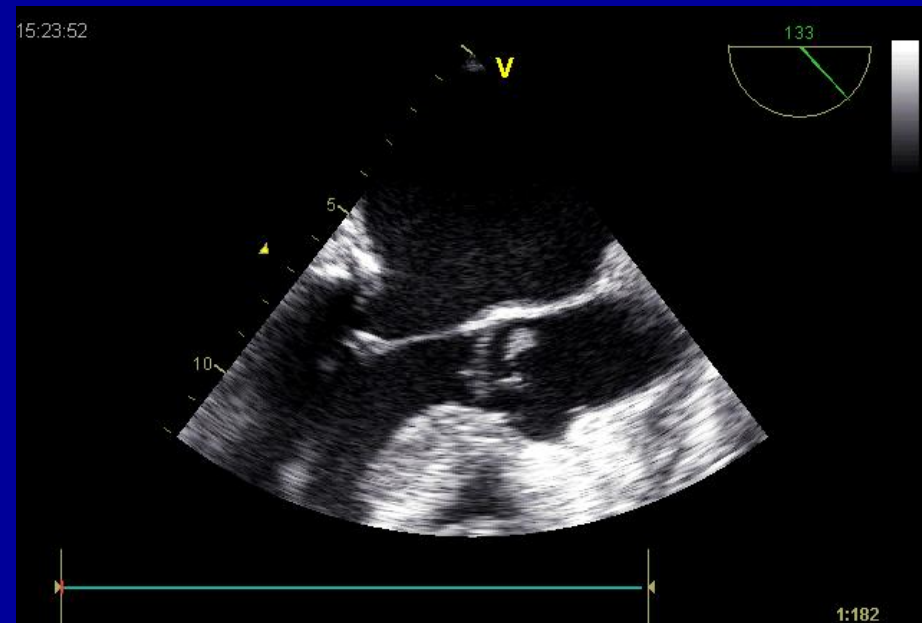


Weems WB et al. J Am Soc Echocardiogr 2002;15:382.

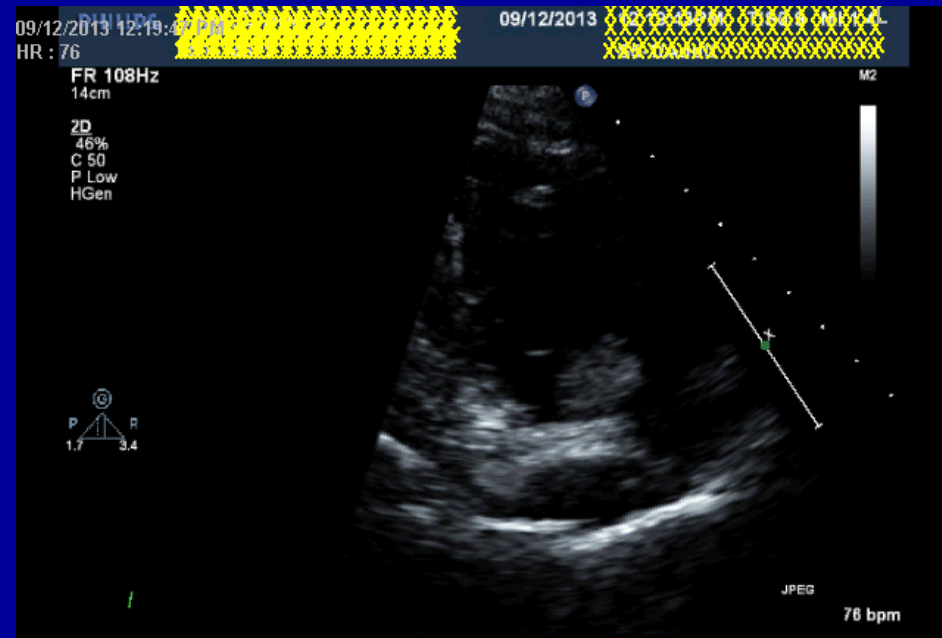


Klarich KW et al. J Am Coll Cardiol 1997;30:784.





Multiple tumors



Right-sided

Lambl's Excrescences

- Common
 - Found in 70-80% adults
- Pathology:
 - Linear, filiform fronds
 - Multiple
 - Located at closure lines
 - Ventricular surface of semilunar valves
 - Atrial surface of mitral valve
- Do not interfere with valve function

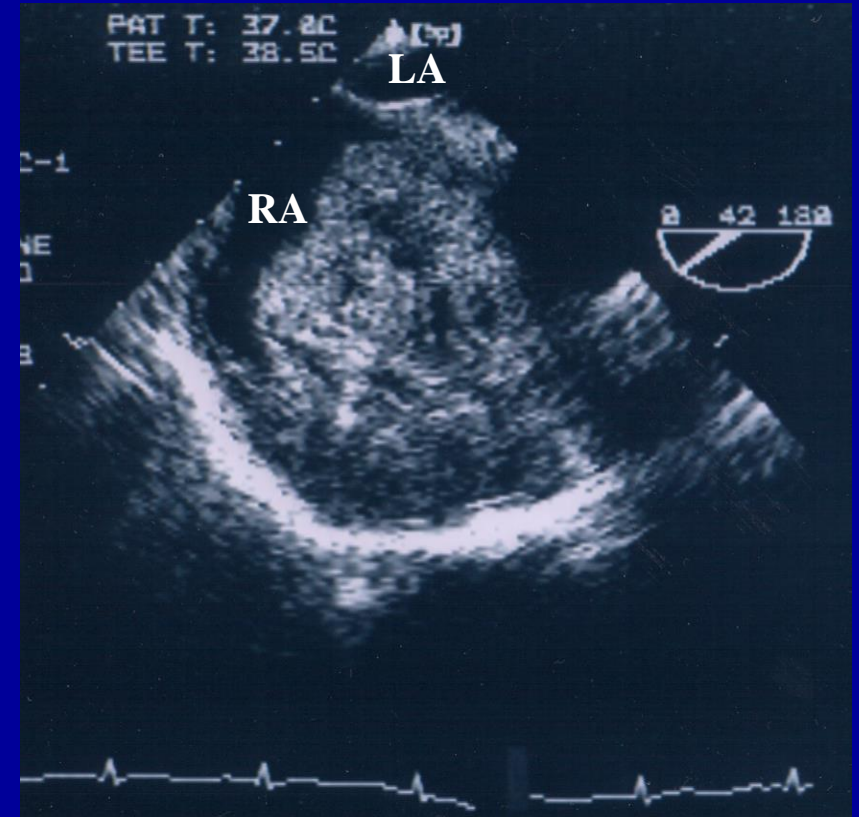
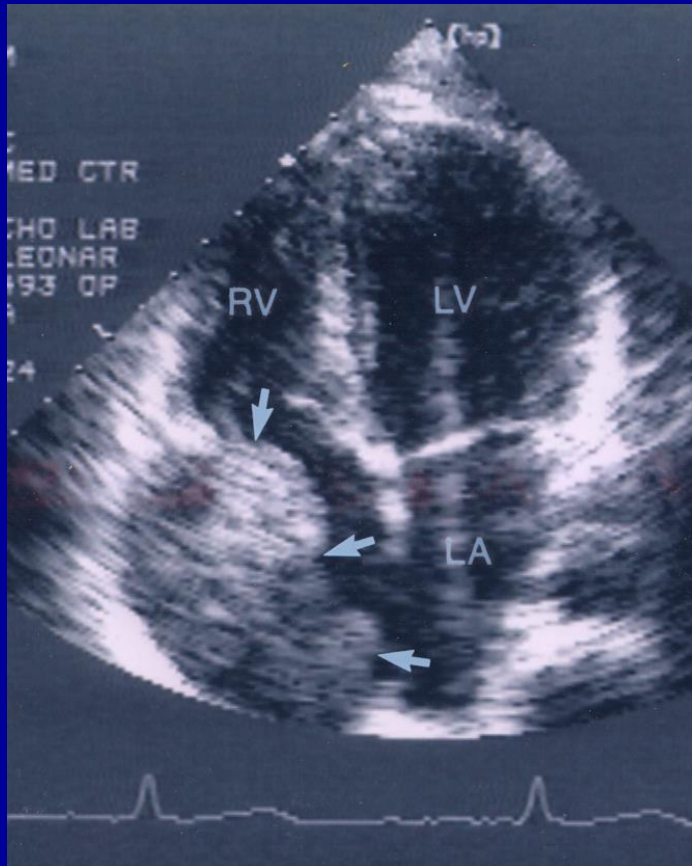
Other Benign Primary Tumors

- Rhabdomyoma
 - Most common tumor in pediatric age group
 - Muscular
 - May protrude into cavity
 - Association with tuberous sclerosis
 - Spontaneous regression
- Fibroma
- Lipoma
- Teratoma
- Angioma
- Paraganglioma
- Blood-filled cyst

Malignant Primary Cardiac Tumors

- **Sarcomas (80%)**
 - Angiosarcoma
 - *Usually found in right atrium*
 - Highly invasive
 - Lung metastases common
 - Other types (*left atrium more common*)
 - Undifferentiated sarcoma
 - Rhabdomyosarcoma
 - Fibrosarcoma
 - Leiomyosarcoma
 - Osteosarcoma (calcification)
- **Mesotheliomas (10%)**
 - Arise from pericardium
 - Rarely may involve conduction system
- **Lymphomas (3-5%)**
- **Paragangliomas**

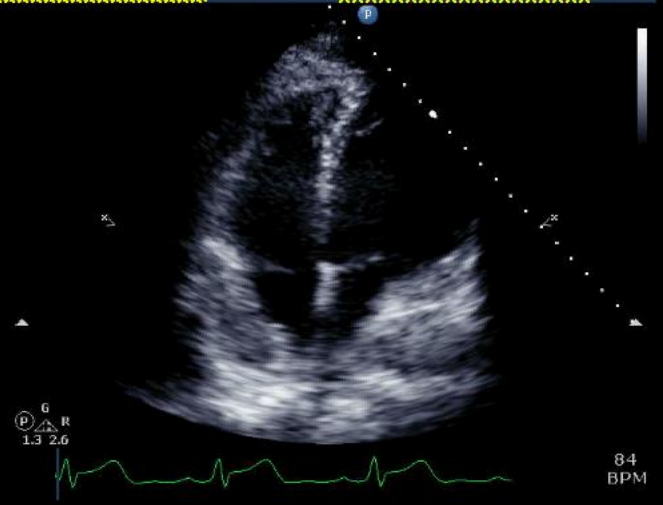
Angiosarcoma



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S5-1
25Hz
20cm

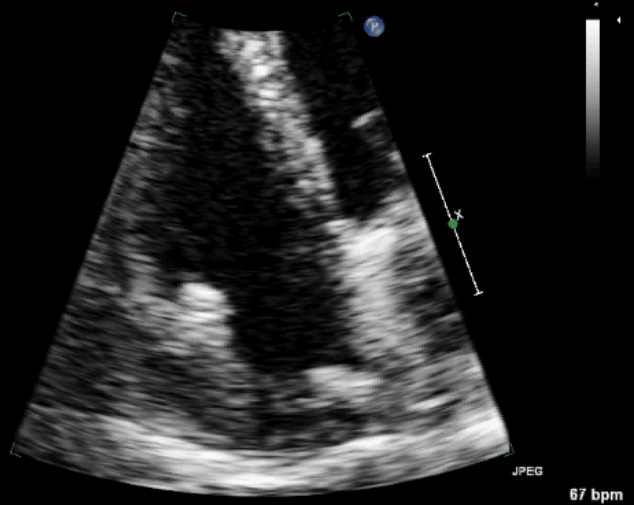
2D
HPen
Gn 40
C 47
3/4/1
75 mm/s



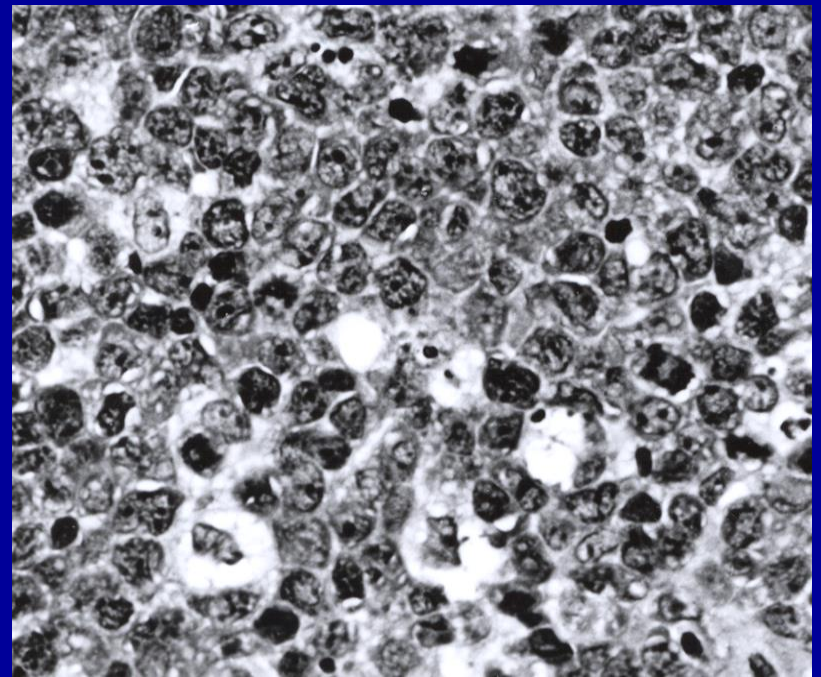
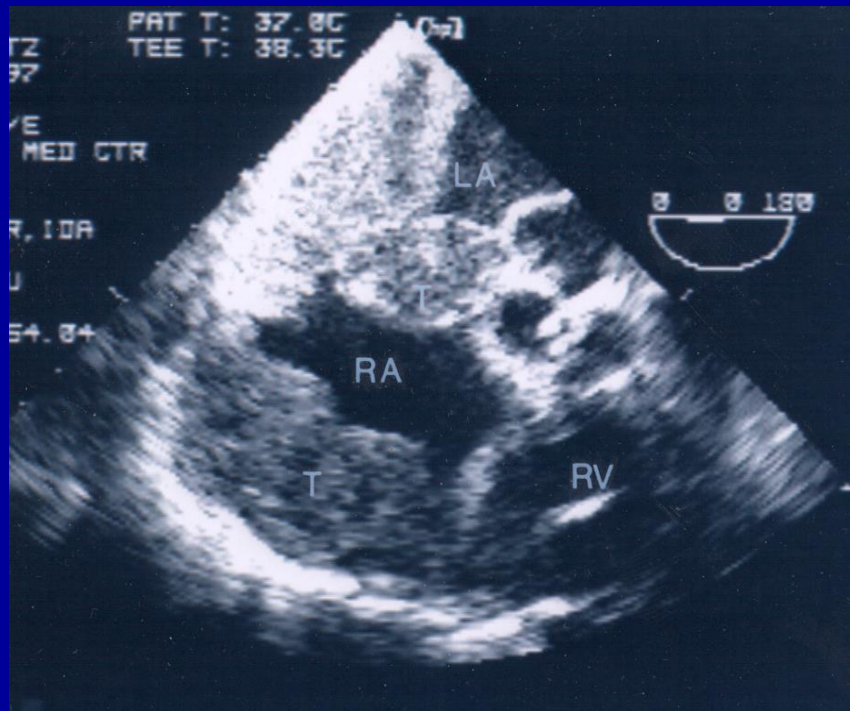
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FR 39Hz
18cm

2D
80%
C 50
P Low
HGen



Primary Cardiac Lymphoma

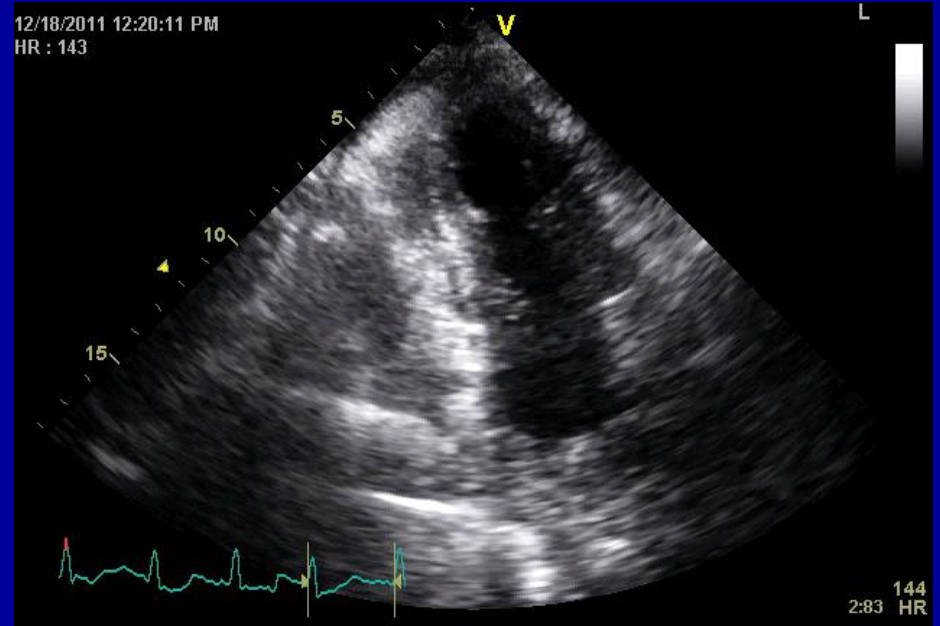


Secondary (Metastatic) Cardiac Tumors

- At least 20-to-40 times more common than primary cardiac tumors
 - 5-12% cancer patients
 - Consider with known malignancy and occurrence of new CV symptoms
- Breast and lung cancer and heme malignancy encountered most commonly
- Malignant melanoma has highest propensity for metastasis to the heart

Secondary (Metastatic) Cardiac Tumors

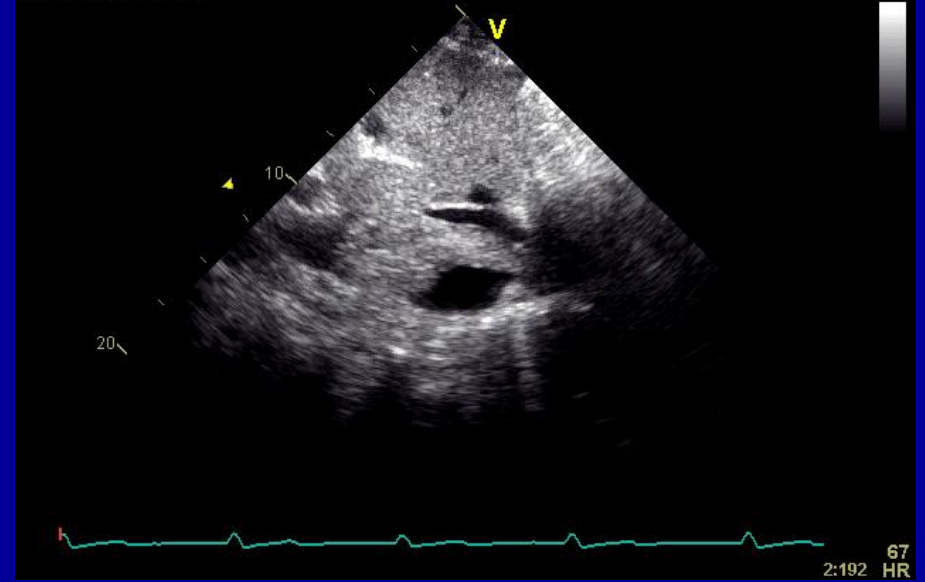
- Pericardial involvement
 - Most common
 - Pericardium > Myocardium > Endocardium
- Hematogenous/Lymphatic spread
 - Melanoma, lymphoma, breast
- Direct extension
 - Lung, breast, esophageal
- Invasion via venous structures
 - Vena cava
 - Renal, Hepatocellular, Uterine
 - Pulmonary veins
 - Lung, breast, thyroid



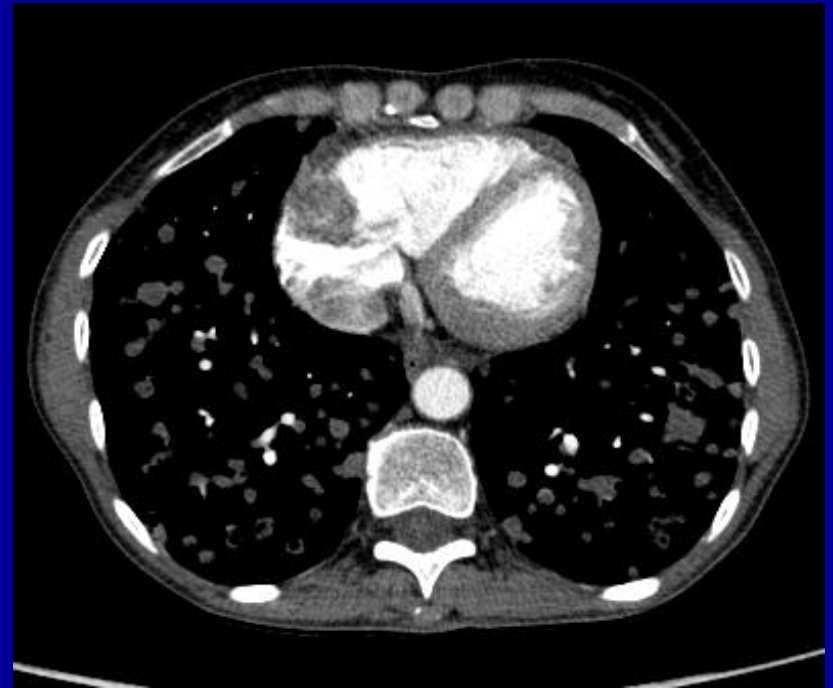
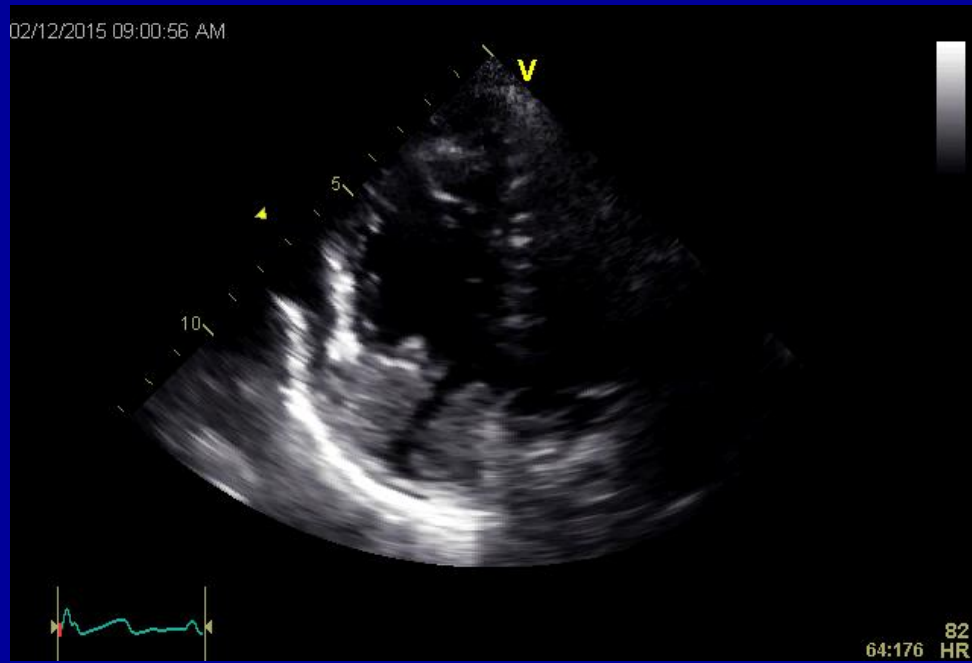
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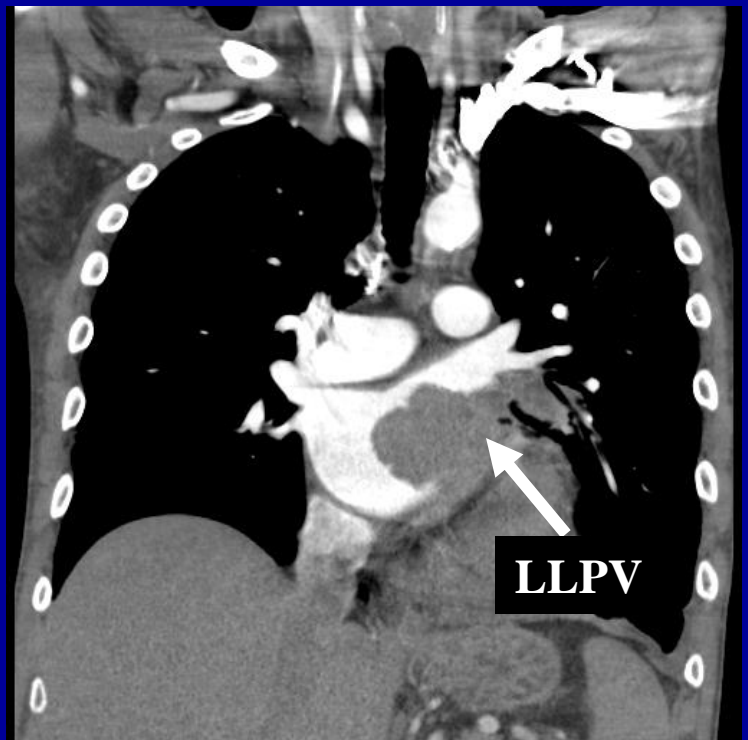
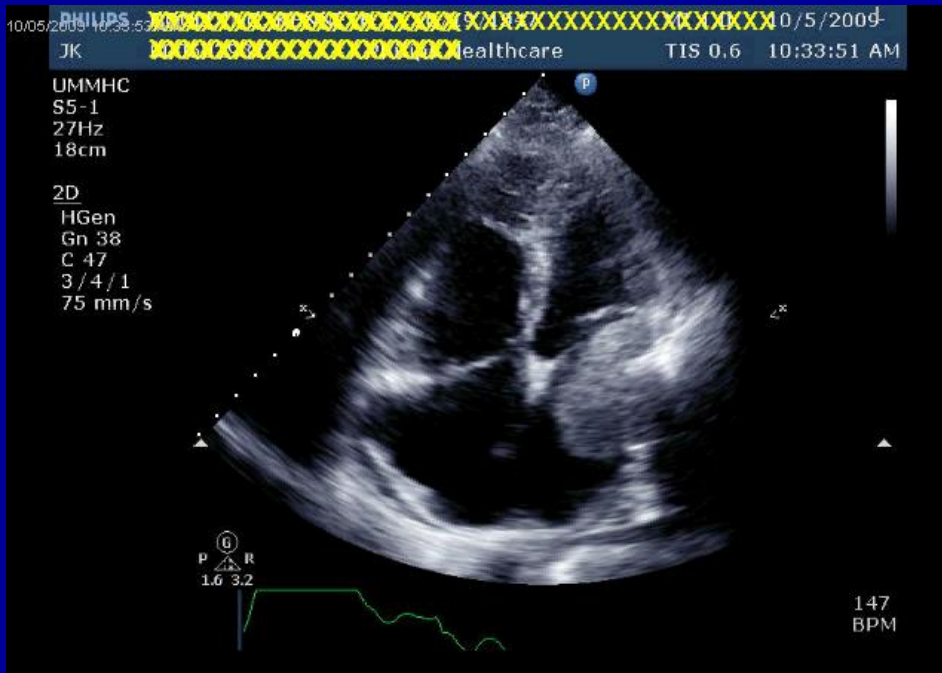
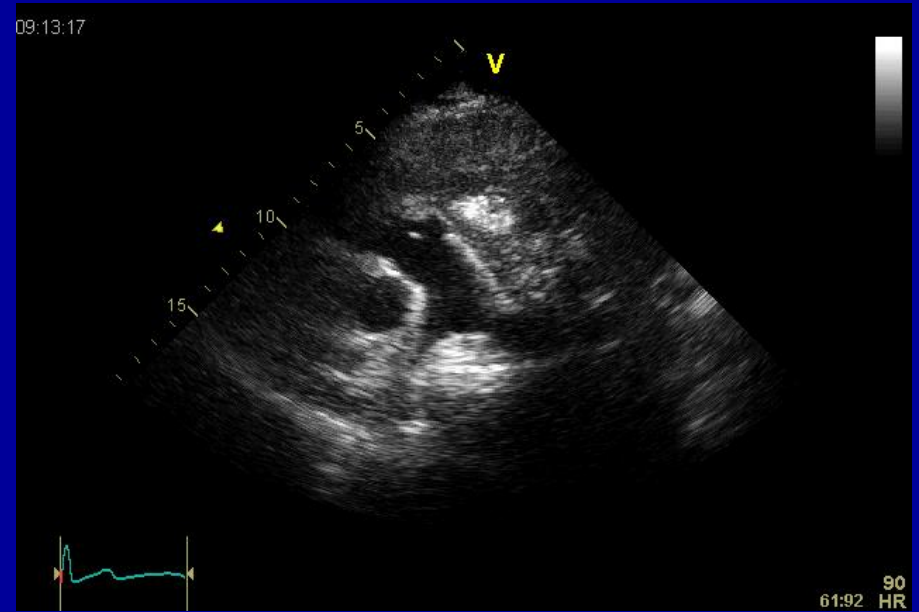
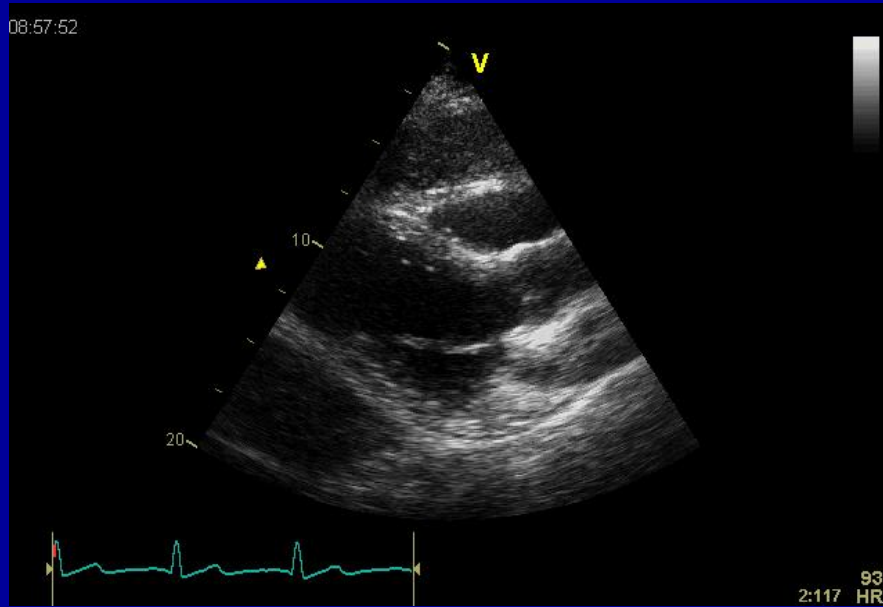
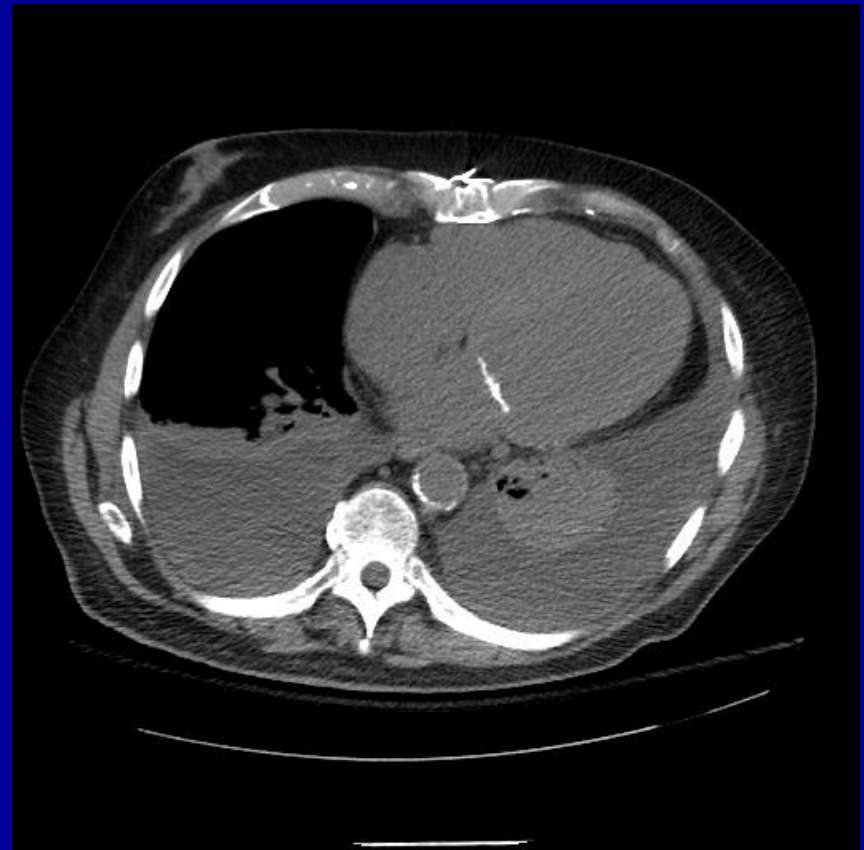
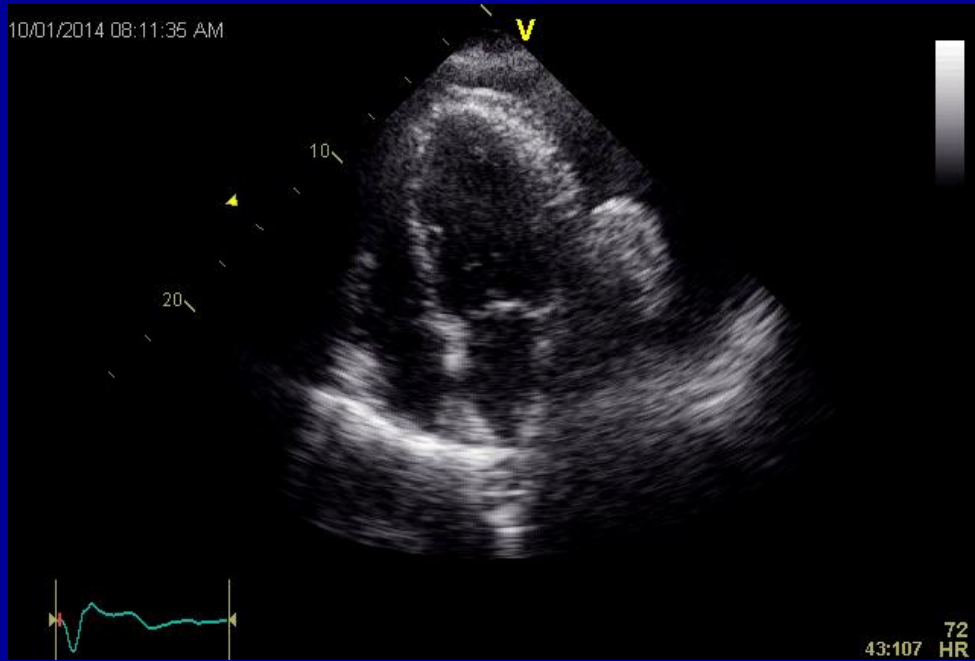


Table 2 Cardiac tumours, by site and general imaging characteristics

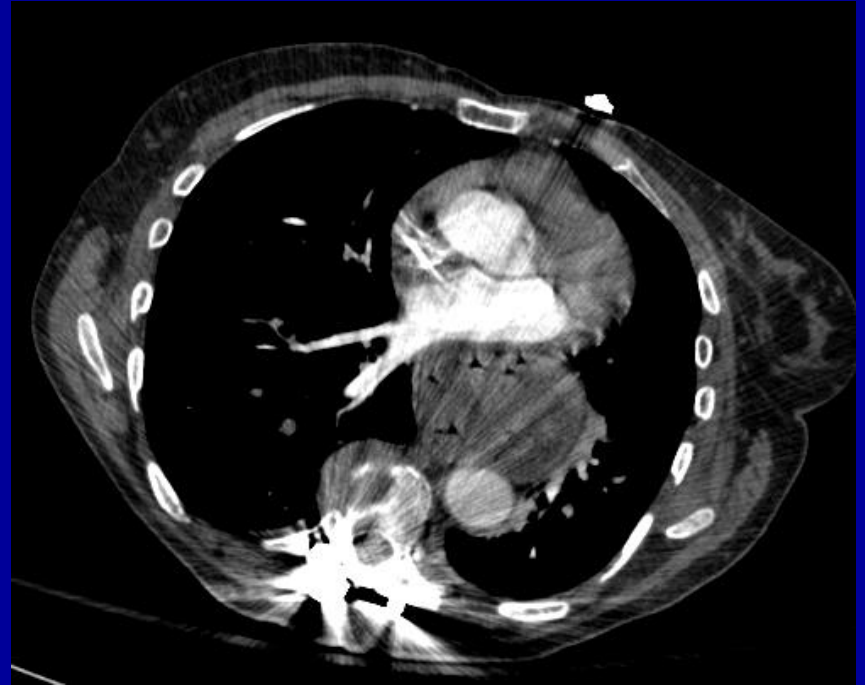
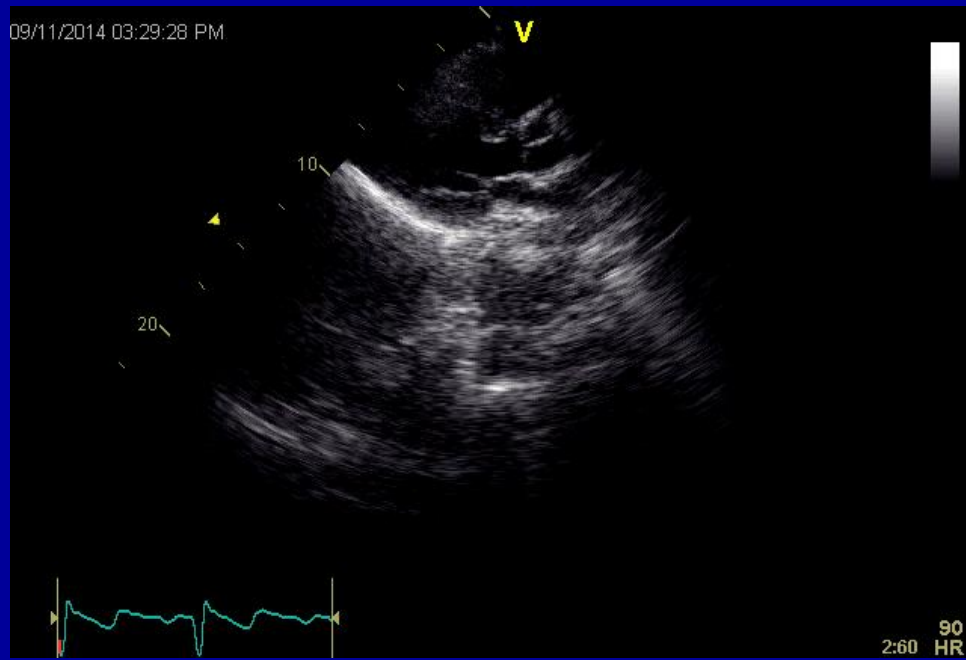
Site, imaging characteristics	Most likely	Others
Left atrium, cavitory (pedunculated or broad based attachment)	Myxoma	Sarcoma, metastasis (extension of lung primary), haemangioma, paraganglioma
Left atrium, involving wall/pericardium	Sarcoma (fibrous or myogenous differentiation)	Lymphoma, metastasis, haemangioma, paraganglioma
Right atrium (cavitory mass)	Myxoma	Idiopathic thrombus, lipomatous hypertrophy, metastasis (especially renal cell, hepatocellular carcinoma), haemangioma
Right atrium, involving wall/septum pericardium	Angiosarcoma	Lipomatous hypertrophy, lymphoma, haemangioma, paraganglioma
Valve	Papillary fibroelastoma	Myxoma, hamartoma
Ventricle (cavitory mass)	(Rare)	Sarcoma, lipoma, haemangioma, myxoma, idiopathic thrombus, metastasis (right ventricle), inflammatory myofibroblastic tumour
Ventricle, involving wall	(Rare)	Haemangioma Lipoma Lymphoma sarcoma, including rhabdomyosarcoma
Pericardium	Metastasis	Mesothelioma, lymphoma, sarcoma, (especially angiosarcoma, synovial sarcoma), haemangioma, lymphoma, solitary fibrous tumour, lipoma

Extra-cardiac Masses





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Thank you for your attention