



## ARS question

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## Breaking it Down

- New Diagnosis
- ASD
- VSD
- Bicuspid AV/Subaortic membrane
- Coarctation
- Previously Corrected
- Look for surgical scar
- Talk to the patient
- Find a resource
- <http://achdlearningcenter.org>

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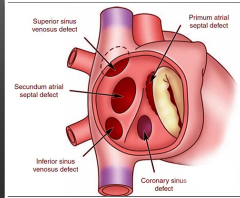
## ASD imaging

- Right heart measurements
- Location and size of ASD
- PW Doppler for hemodynamics RVOT and LVOT
- Associated defects

### Guidelines for the Echocardiographic Assessment of Atrial Septal Defect and Patent Foramen Ovale: From the American Society of Echocardiography and Society for Cardiac Angiography and Interventions

Frank E. Silverman, MD, FASE, Chair; Meryl S. Cohen, MD, FASE, Co-Chair; Laurie B. Arnold, MD, FRCR; Nitin J. Bhatnagar, MD, DM, FASE, Craig S. Fishbein, MD, FASE; Ziyad M. Hikal, MD, MEd, FRCR; Roberto M. Lang, MD, FASE; Eusebio J. Riera, MD; and Tan Wang, BSc, PhD, PhD@uiowa, Preeminentia, Portland, Oregon; Thane, Dallas, Orlando, Florida; Dubai, Qatar; and Chicago, Illinois

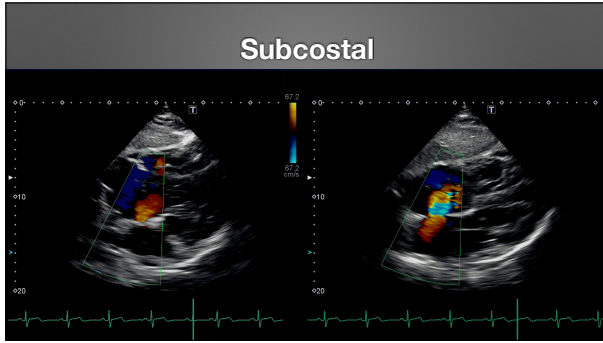
J Am Soc Echocardiogr 2015;28:910-981











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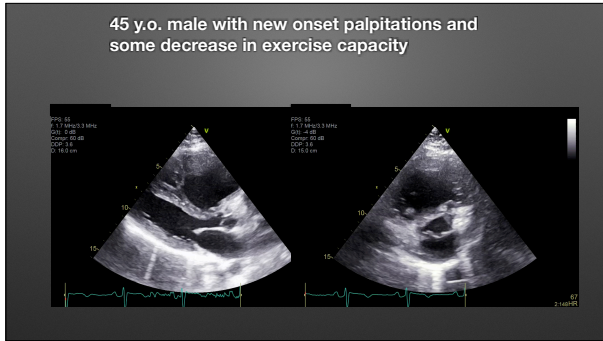
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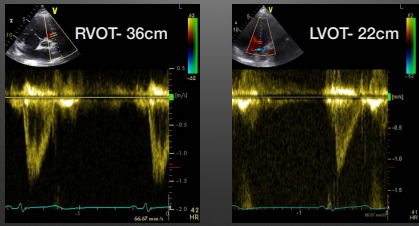
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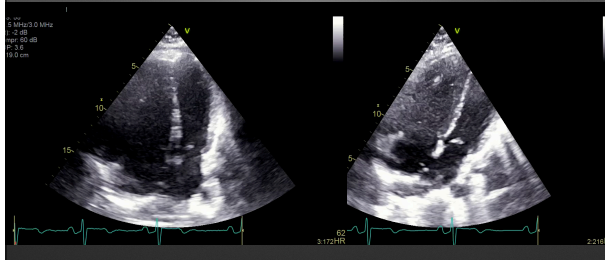
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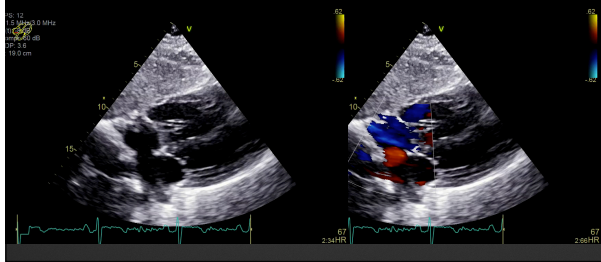
## Pulse wave Doppler



## 4 Chamber - Tilt



## Subcostal



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## Agitated Saline Injection



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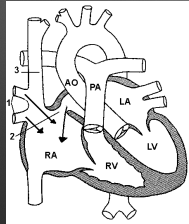
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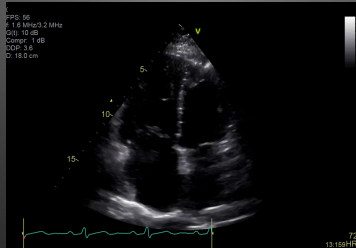
## Sinus venosum ASD



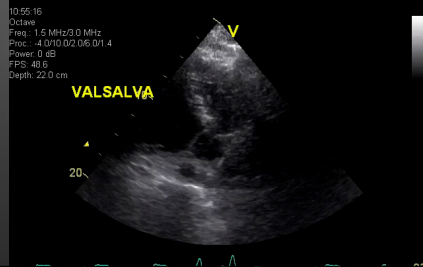
- Associated defect
- Anomalous pulmonary veins
- Negative Bubble study

Nevill Thomas ACHD library

65 y.o. female noted to have palpitations and enlarged right heart



### Agitated Saline- Negative



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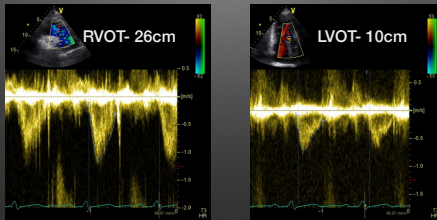
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### Pulse wave Doppler



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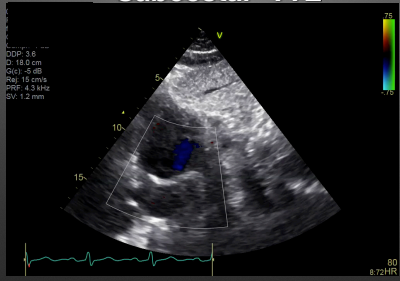
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Subcostal- TTE



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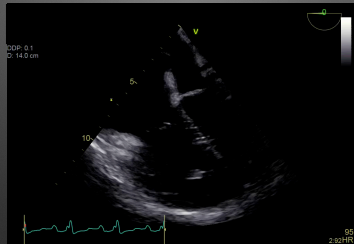
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TEE 4 Chamber



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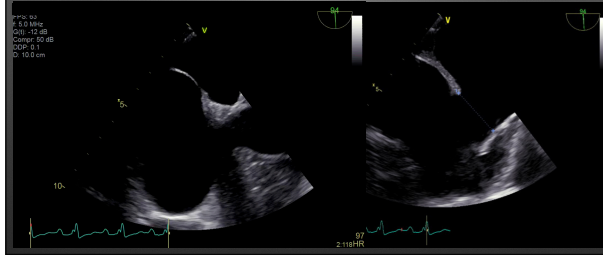
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### Bicaval 90°



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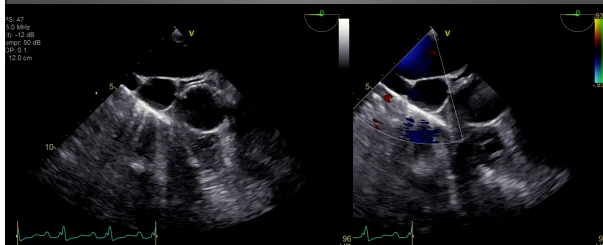
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### 0° Right UPV to SVC



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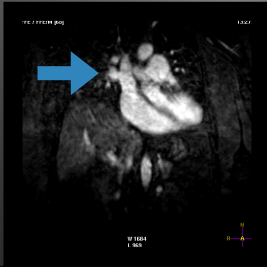
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## Cardiac MRA



- Sinus venous ASD
- Anomalous right upper pulmonary vein to SVC

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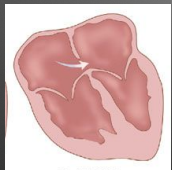
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## Primum ASD



- Associated defect
- Cleft mitral valve

Rice MJ Cardiac Malformations 2003:459

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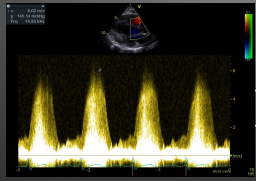
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## VSD Doppler



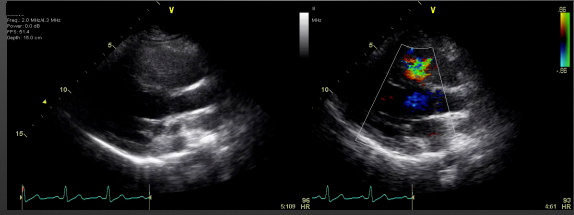
High velocity - small defect

$$RVP_{\text{systemic}} = BP_{\text{systemic}} - 4V_{\text{VSD}}^2$$

## Diagnosis and Plan

- Small perimembranous VSD
- No endocarditis prophylaxis

30 y.o. female presents with a new murmur and worsening dyspnea on exertion for the last 6 months. She had seen a cardiologist as a child for a murmur which resolved.



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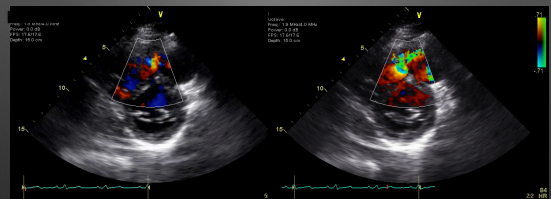
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### Two Views



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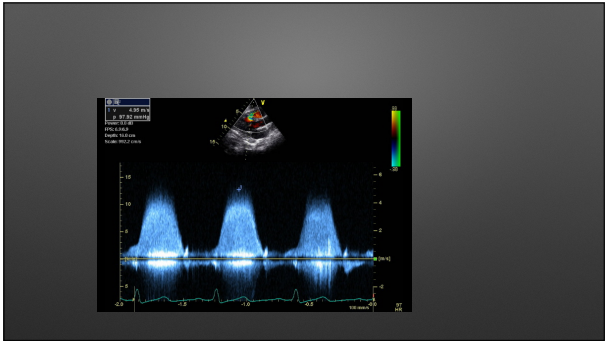
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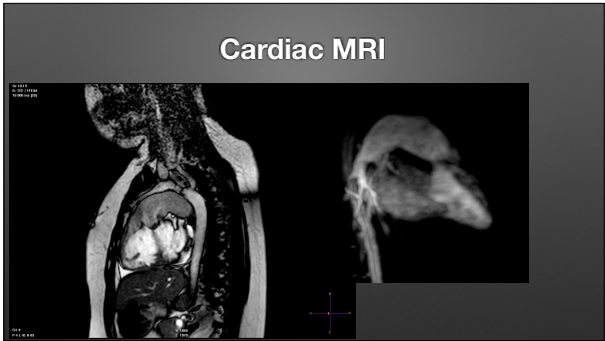
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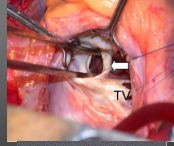
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## Double Chamber RV

- Sub-valvular RV outflow tract obstruction
- Divides the RV into 2 chambers
- Associated with VSD can develop years after spontaneous closure



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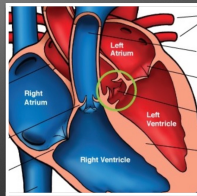
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## Subaortic Membrane

- Obstruction
- Discrete 80% of the case
- Tunnel obstruction
- Progressive/Recurrent
- up to 33%
- Associated with AI



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## Sub-aortic membrane Common Associations

- Ventricular septal defect
- Double - Chamber RV
- Bicuspid AV
- Aortic Coarctation

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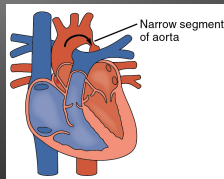
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## Coarctation

- Distal to left subclavian
- Associated
  - Bicuspid AV
  - VSD
  - PDA
  - Mitral valve abnormalities



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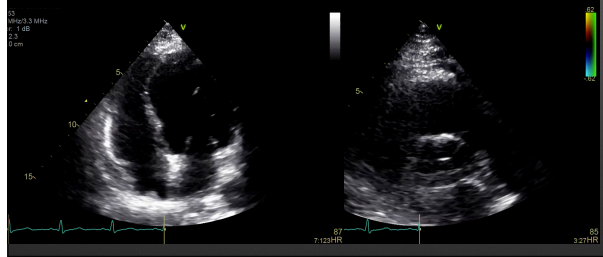
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28 y.o. F with HTN is sent to clinic for pre-pregnancy evaluation. She has had HTN since she was at least 20. No family history of HTN, no DM, no Obesity



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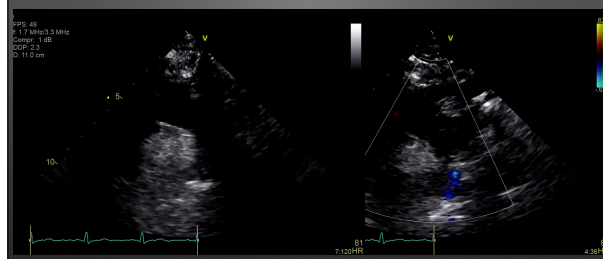
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### Aortic Arch



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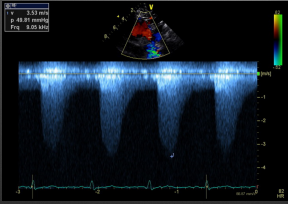
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## Aortic Arch



• Flow in systole and diastole

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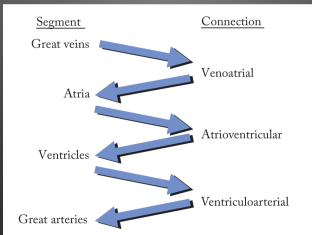
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## When you have no idea - *Anatomic Evaluation*



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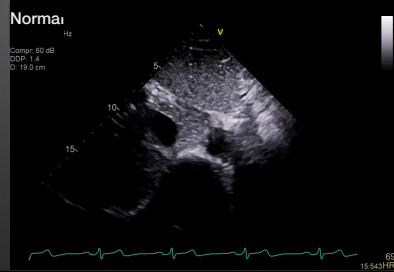
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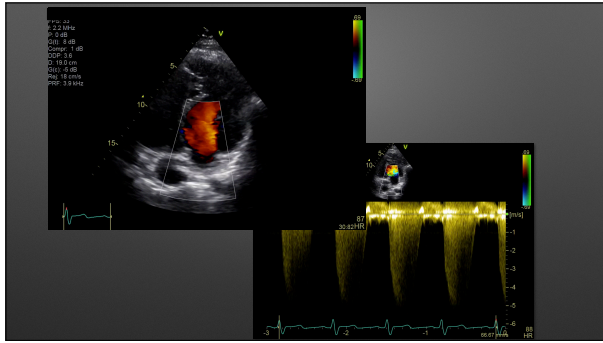
## KEY - Sweeps



## Case

- 30 y.o. female who presents secondary to referral from PCP for low sats (88-90%)
- At 17 yo evaluated for a murmur and told she had a backward heart
- Successful pregnancy with 18 month girl
- Poor exercise tolerance and palpitations





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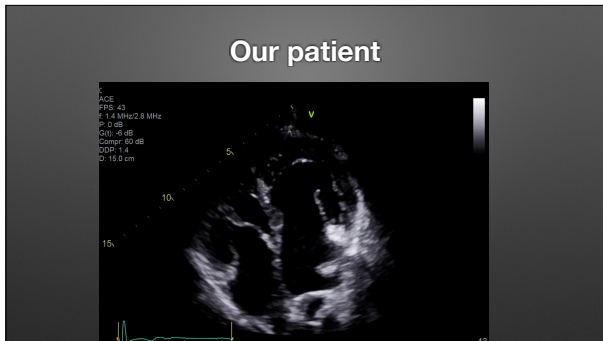
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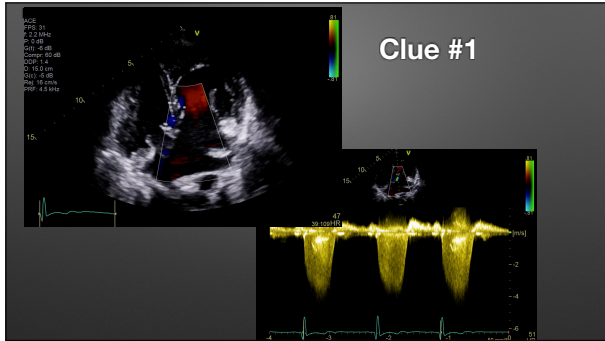
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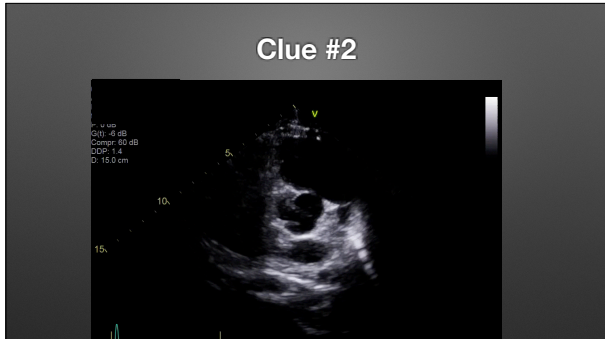
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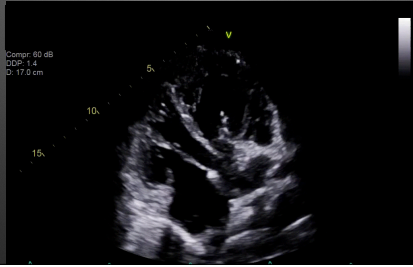
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### Clue #4



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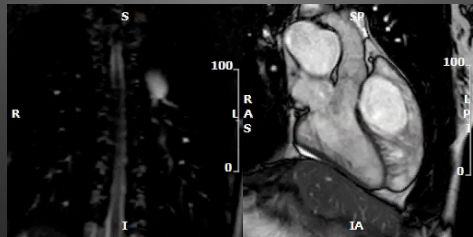
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### Cardiac MRI



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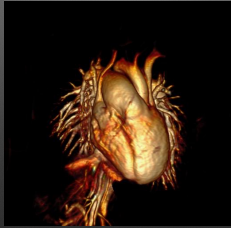
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## Cardiac MRA



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## Final Dx

- Heterotaxy Syndrome
- Common atria with ipsilateral pulmonary venous drainage
- L-ventricular loop with ventriculo-arterial concordance
- Bilateral SVC
- Interrupted IVC to hemiazygous to the LSVC
- Dilated PA with significant pulmonary hypertension

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## Summary

- Keep your eyes open
- If something does not make sense look for appropriate cardiac connections
- Take the time to find a resource

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## ARS case.

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