Echo Quantitation - Left sided chamber measurements

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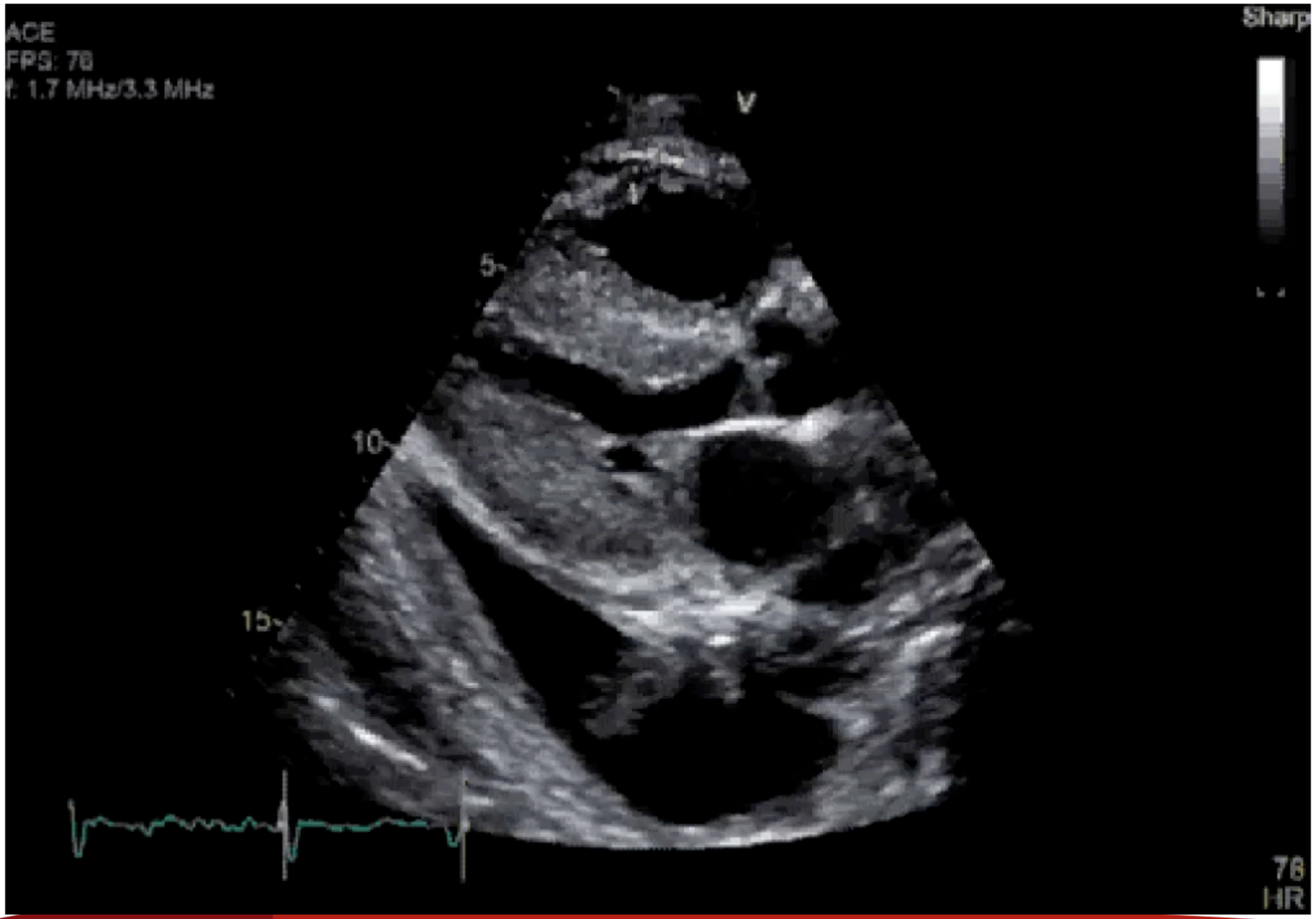
Disclosures: Caption Health, Bristol Myers Squibb (honorarium)

Wall thickness

- **Optimized view of LV**
  - Gain and compression settings
  - Septum horizontal
  - Elongated AV and aorta
- **Timing**
  - End diastole – first frame after MV closure
  - After QRS
- **Measurement**
  - Only LV part of the septum – don't include RV
  - Check yourself with PSAX

Lang et al, ASE Cardiac Chamber Quantifications Guidelines. JASE 2016

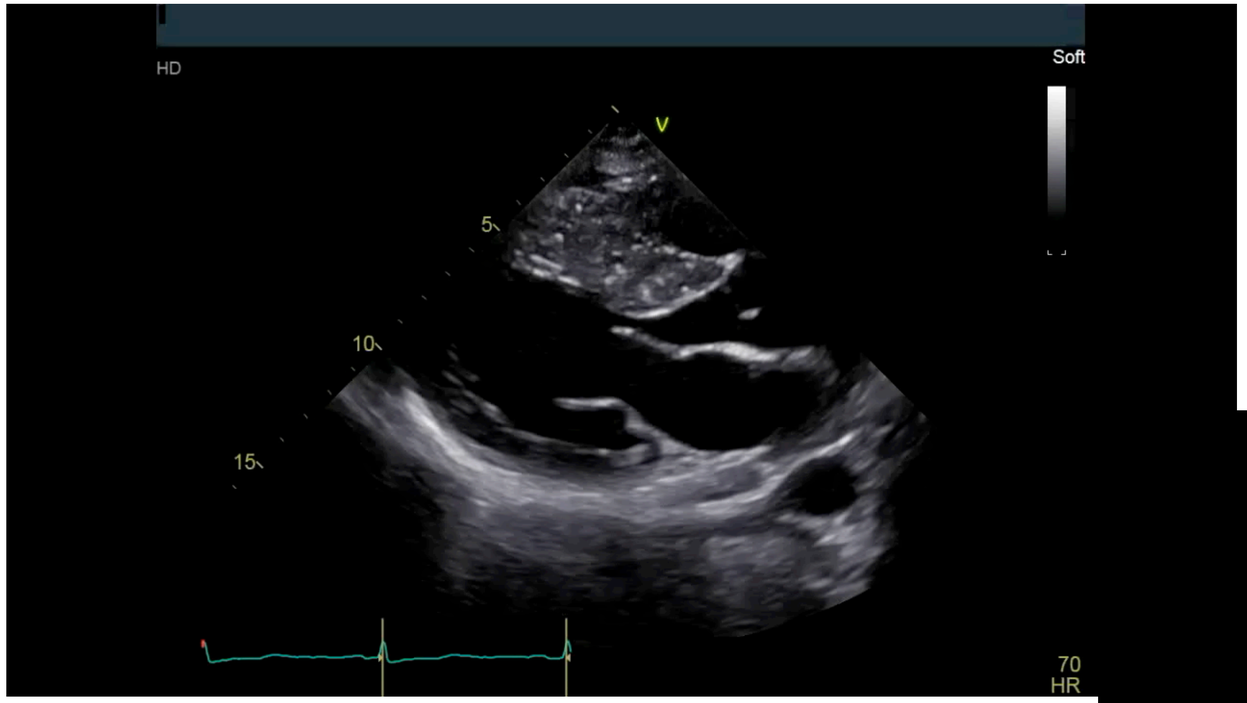
Wall thickness

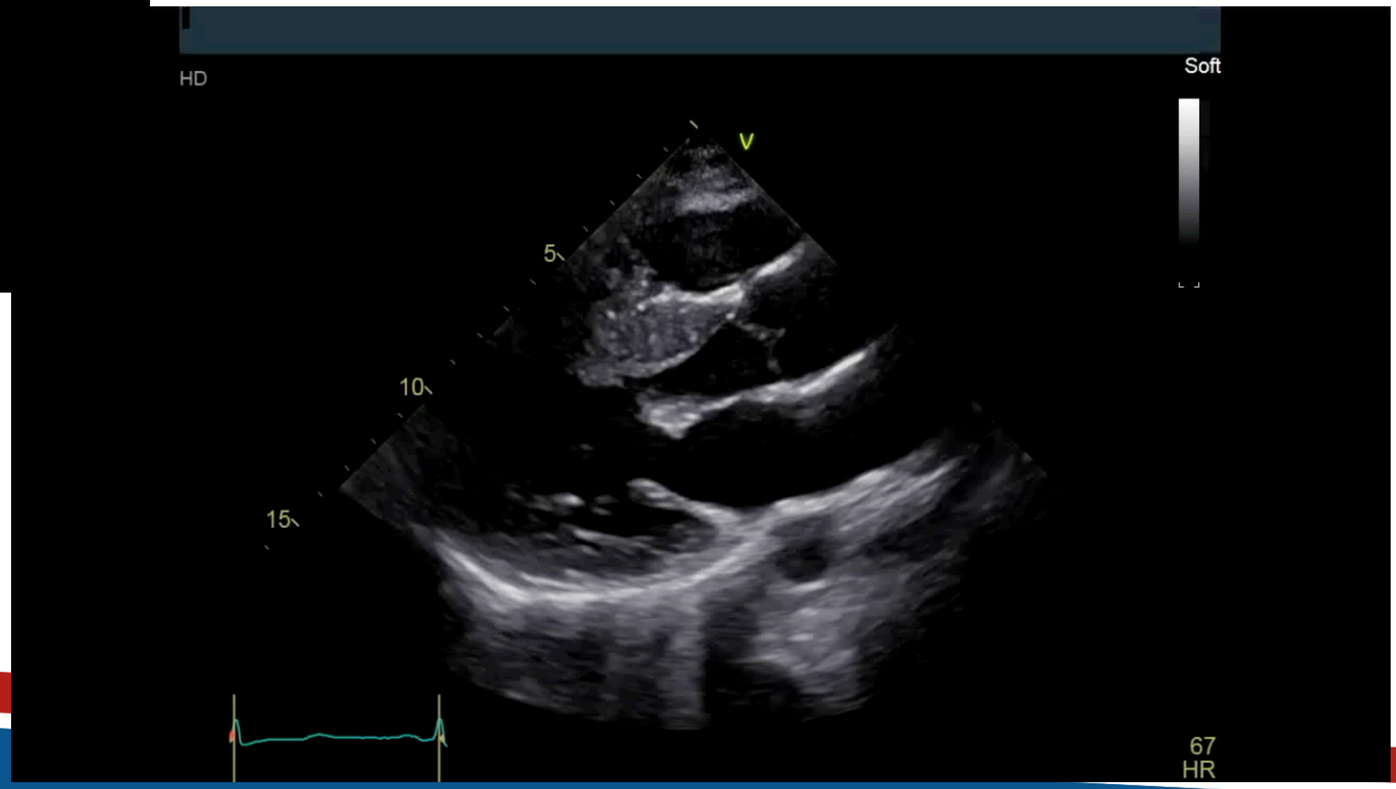


- Interventricular septum - identify where the LV ends and the RV begins
  - Remember - moderator band and RV wall thickness can be tricky!
- Use SAX, biplane imaging with on-axis images to confirm thickness

- Posterior wall - scroll through the cardiac cycle and watch movement of the chordae tendinae and papillary muscles, do not include with measurement

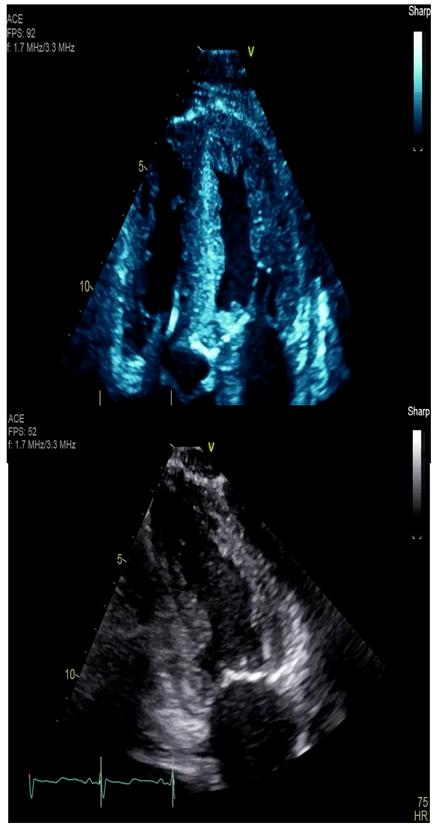
PLAX - where do we measure the septum?





What maneuver was done to go from the top image to the bottom image?

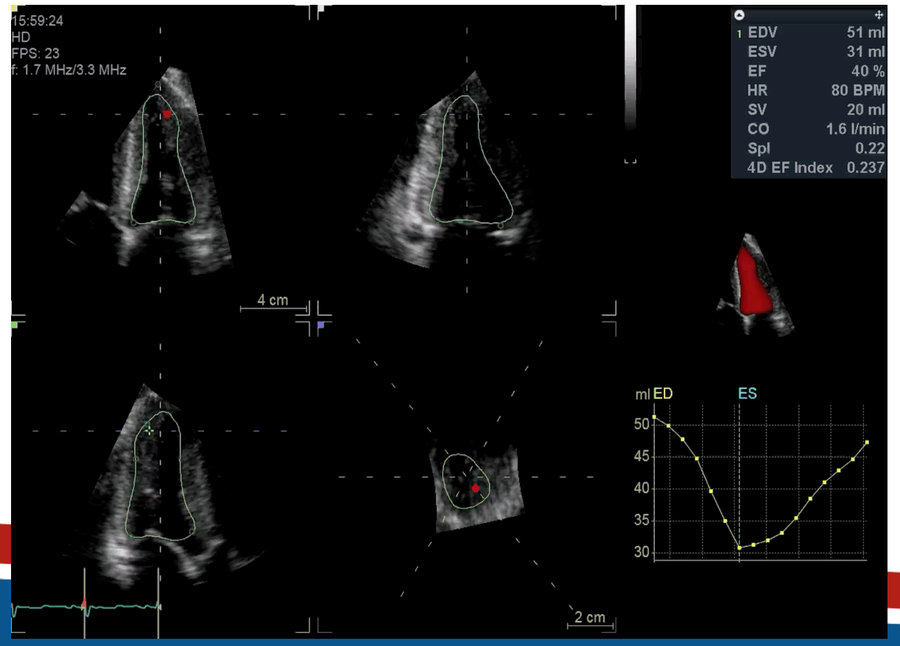
Left Ventricular Volumes



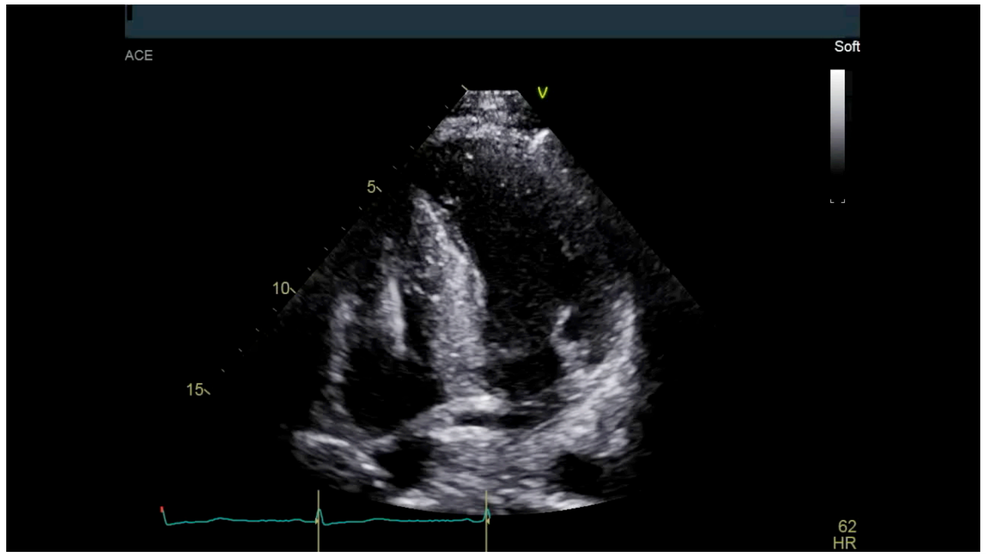
Calculated SV: 12ml
Calculated EF: 46%

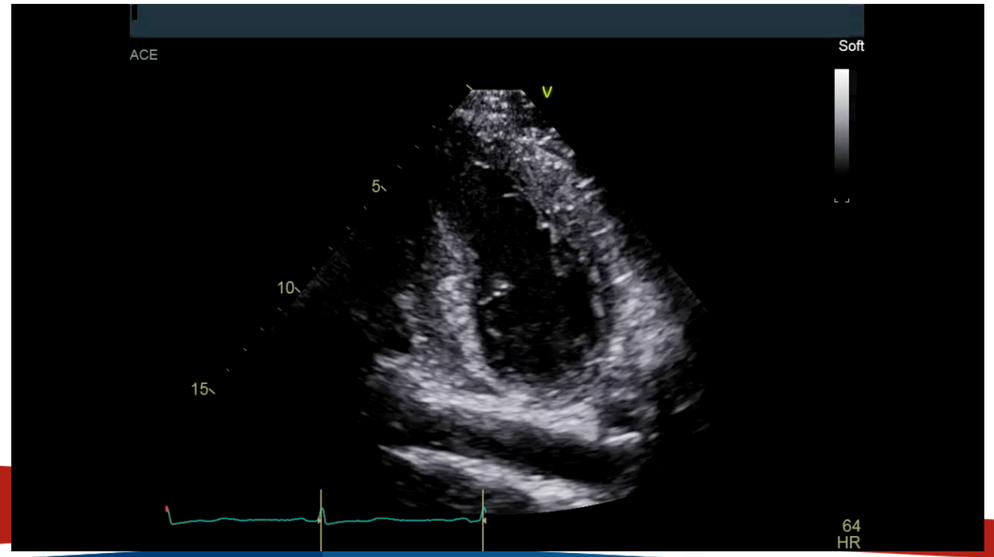
Calculated SV (biplane): 20ml
Calculated SV (LVOT): 21ml
Calculated EF: 37%

- **Foreshortening:**
  - **rounded apex and wider at the base**
  - **underestimates volumes**
  - **overestimates GLS**
- **Volumes important for clinical picture, serial echoes, 3D volumes, GLS, and LVEF**
- **Slide down a rib space and use breathing techniques**
- **Compare LVOT stroke volume to biplane or 3D SV**



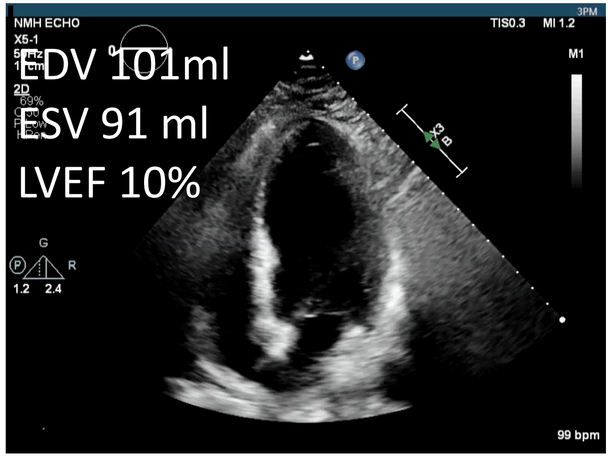
Tracing LV volumes of irregularly shaped ventricles



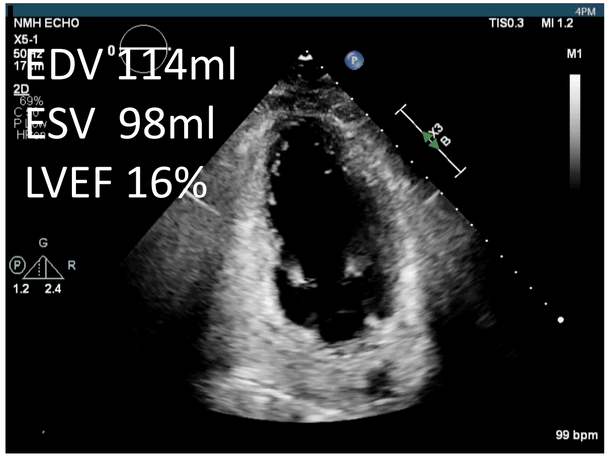


- Optimize blood pool - tissue border by adjusting gain, compression, and frequency
- Exclude papillary muscles and heavy trabeculation
- Scroll through the cardiac cycle to see where/how the myocardium thickens
- Use contrast if necessary to delineate borders (contrast volumes will be bigger - more comparable to MRI volumes)

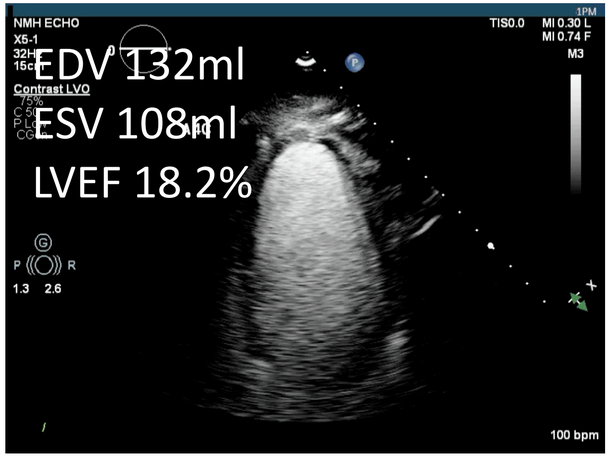
Comparing volumes



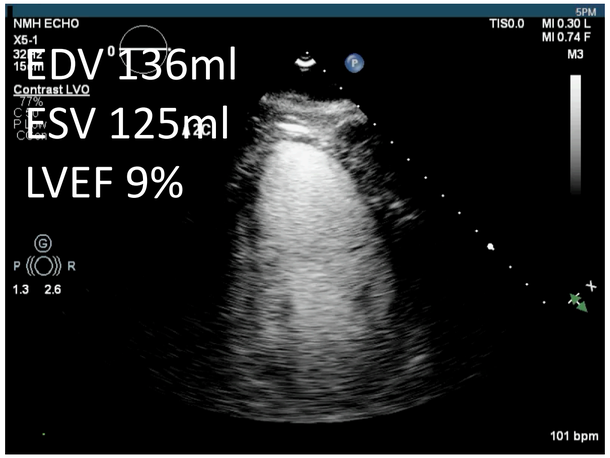
EDV 101ml
ESV 91 ml
LVEF 10%



EDV 114ml
ESV 98ml
LVEF 16%



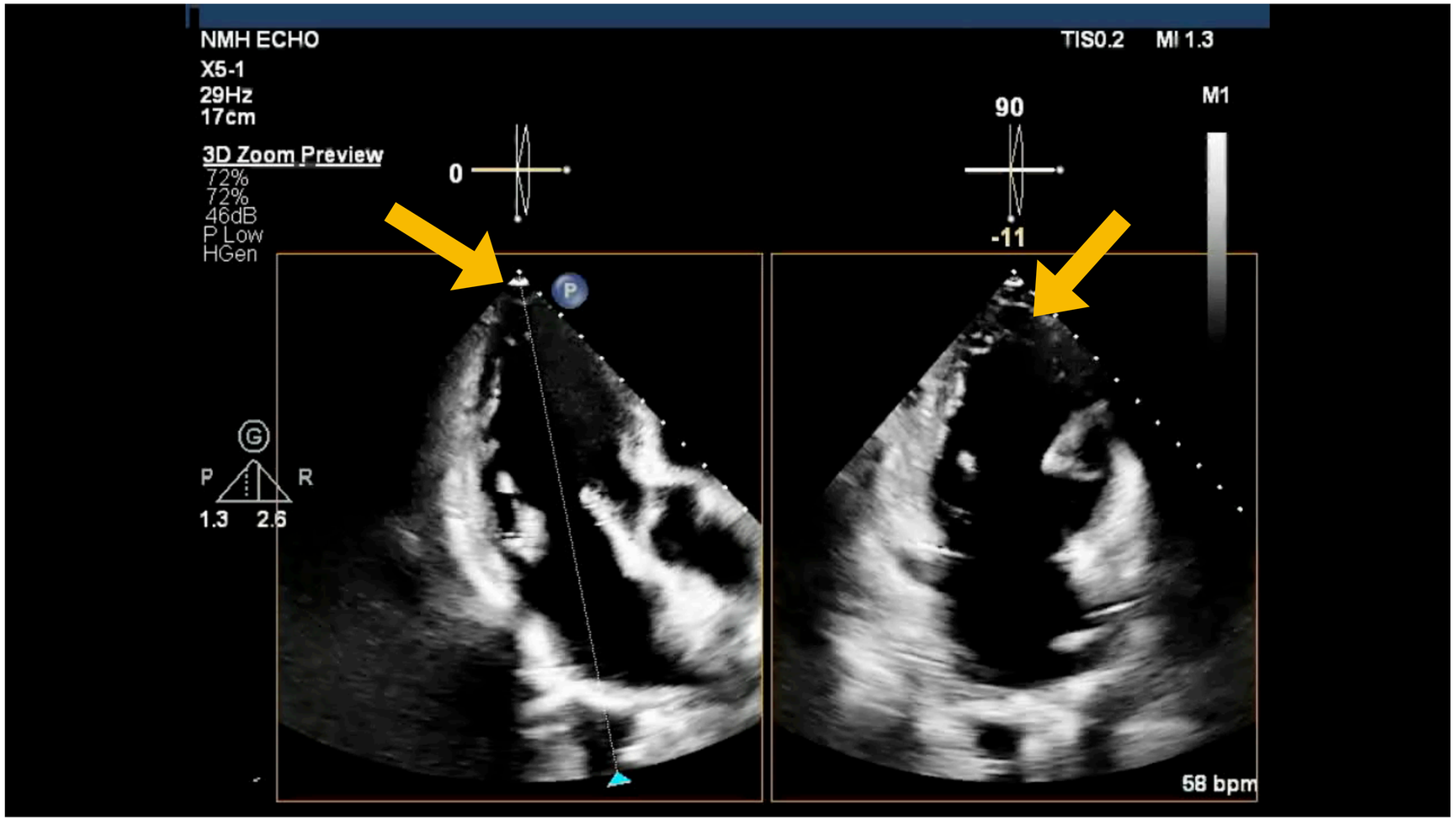
EDV 132ml
ESV 108ml
LVEF 18.2%



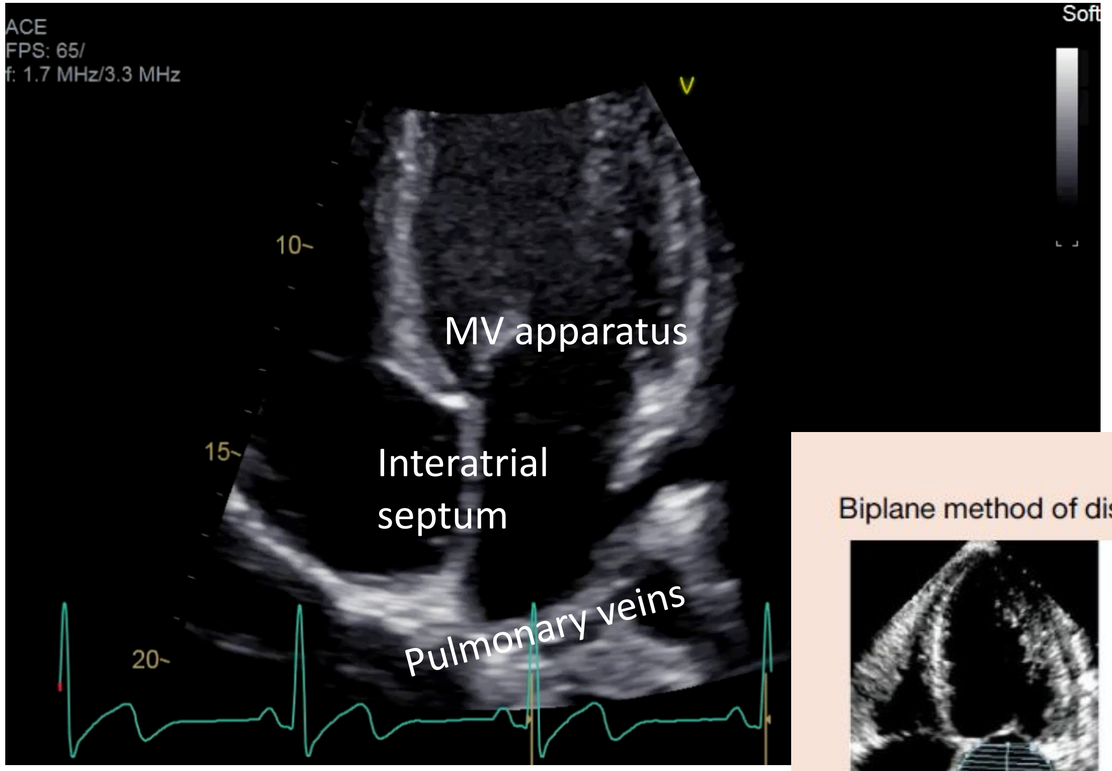
EDV 136ml
ESV 125ml
LVEF 9%

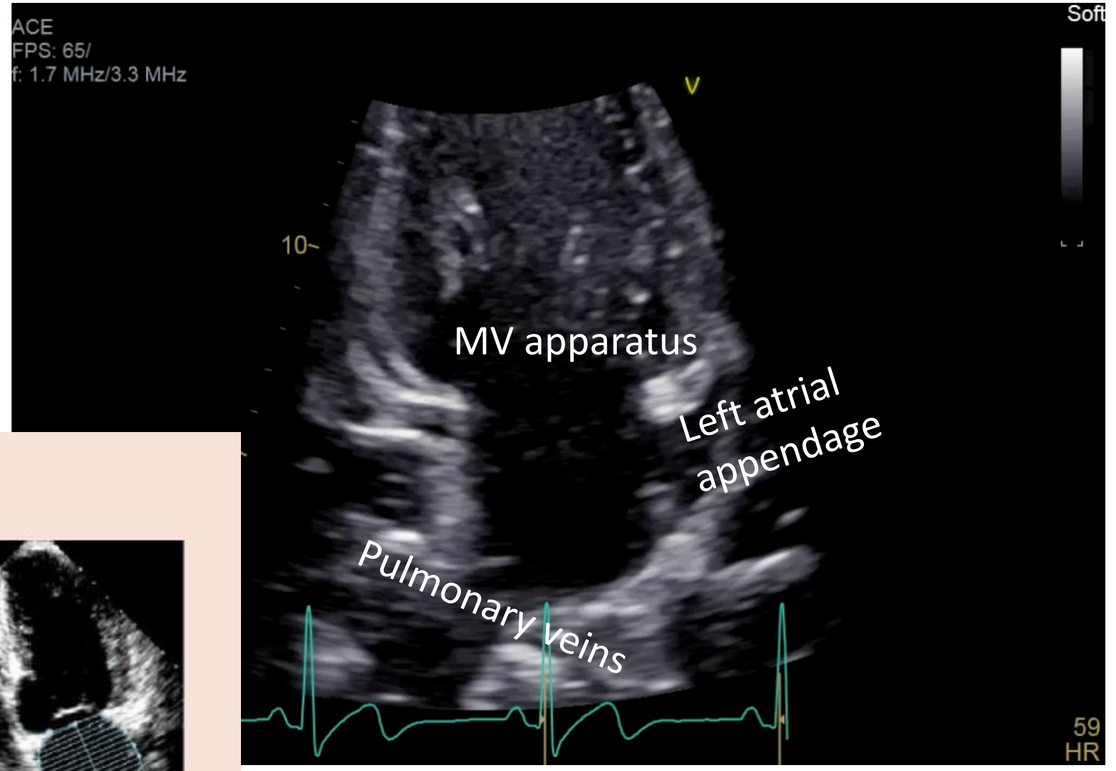
EDV 184ml
ESV 138ml
LVEF 25%

Check yourself with biplane imaging!

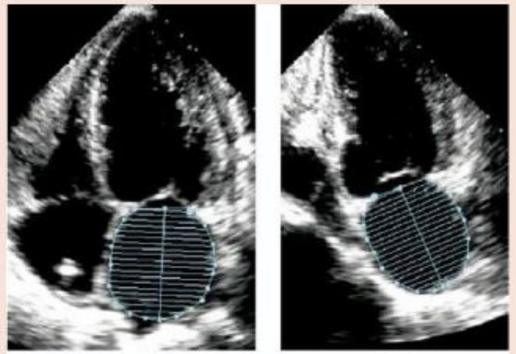


LA volume – What do we measure?

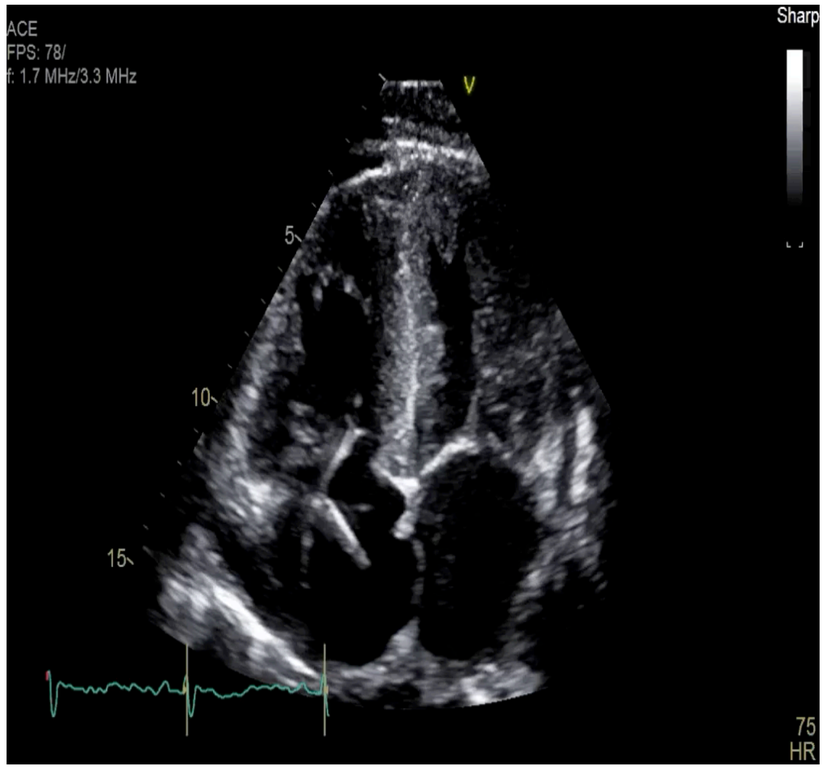




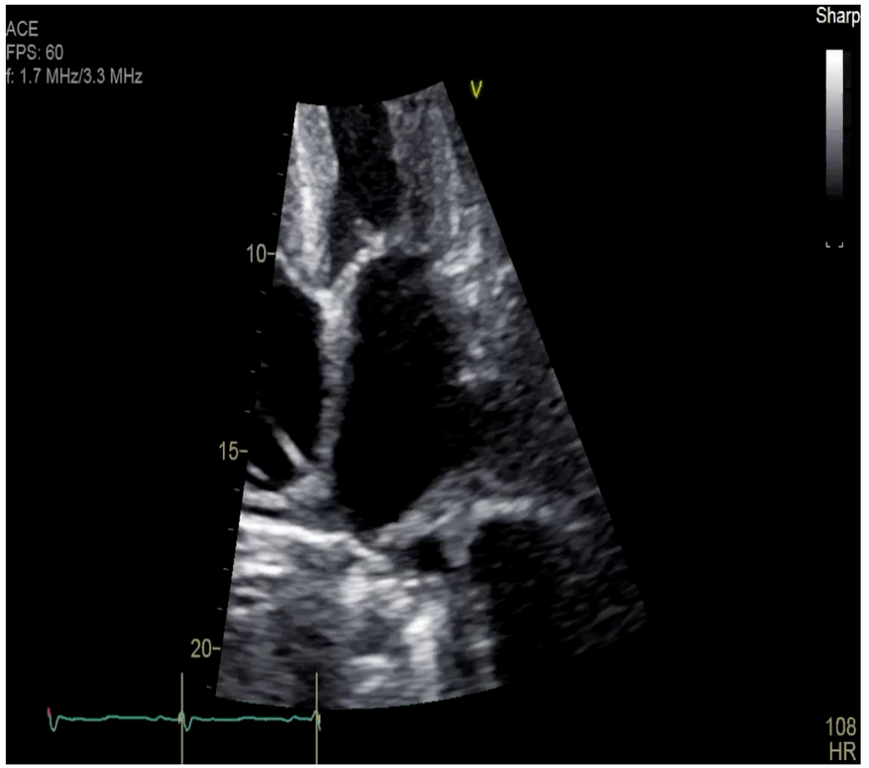
Biplane method of disks



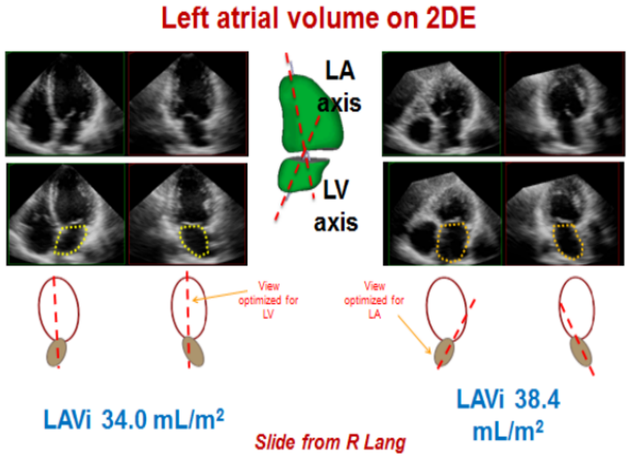
Left atrial volumes



Foreshortened Left Atrium

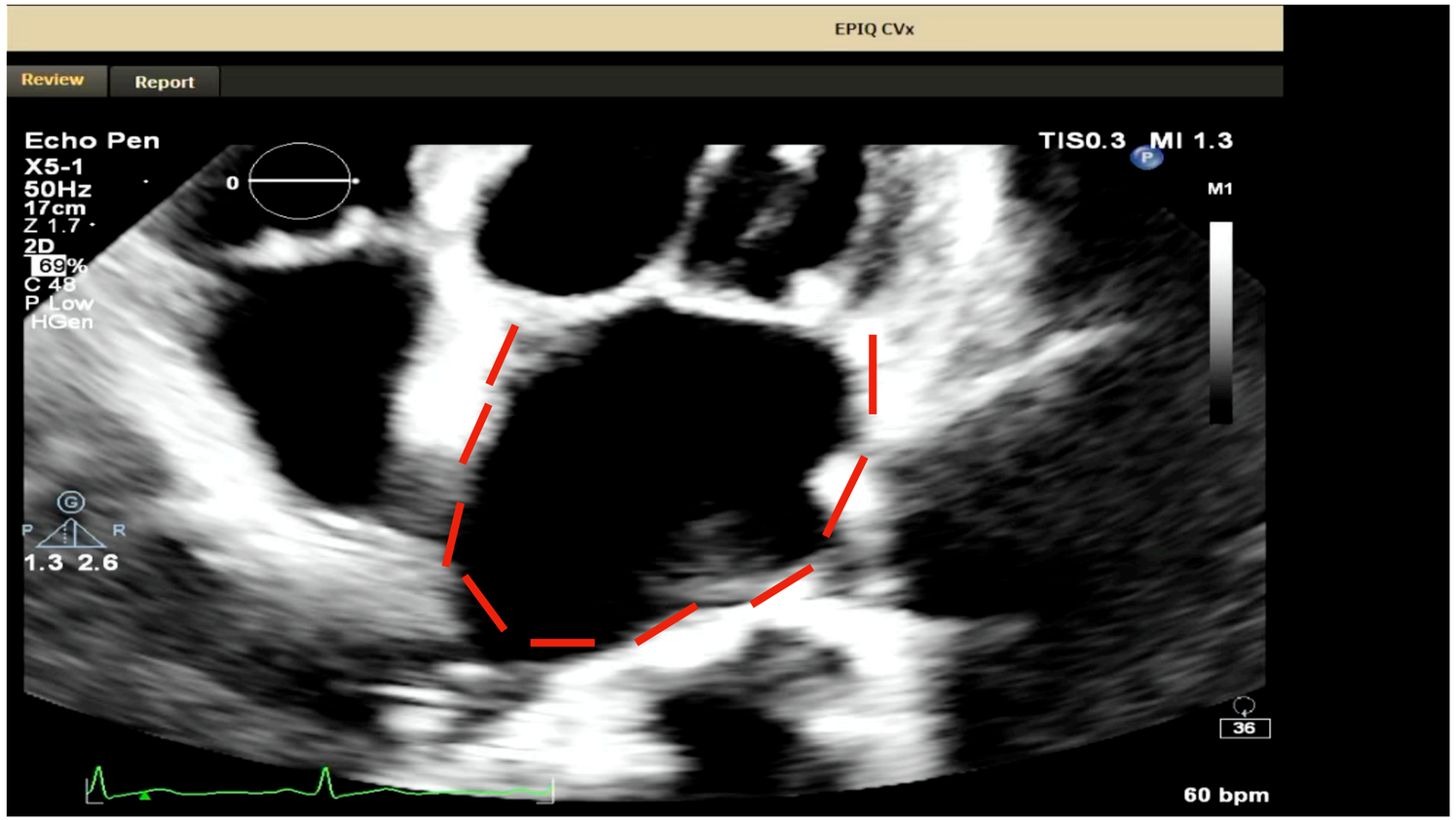


Non-foreshortened Left Atrium



These are the same optimized views used for LA strain

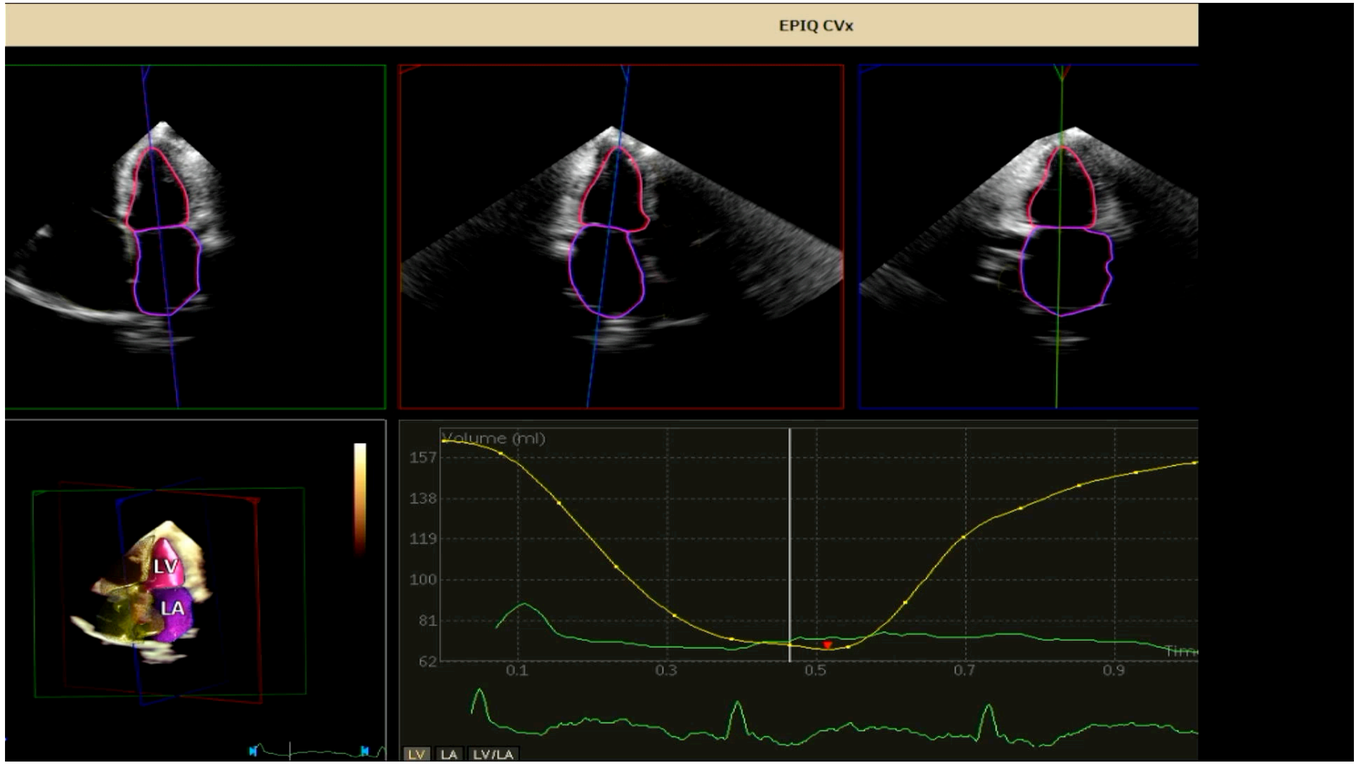
Optimizing for LA volume and strain



- LA volume and LA strain images should be the same, optimizing for a non-foreshortened view
- Zoom on left atrium
- Adjust gain and compression for a crisp blood pool - tissue interface
  - Easier for the strain to track
  - Easier to visualize border for volume

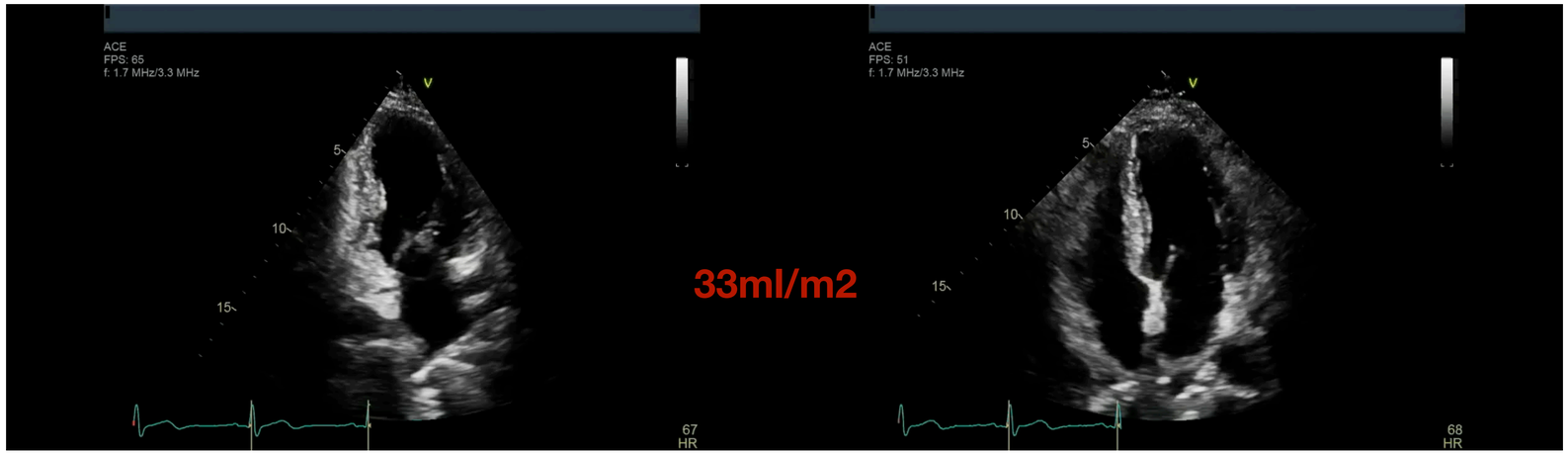
Left atrial volumes

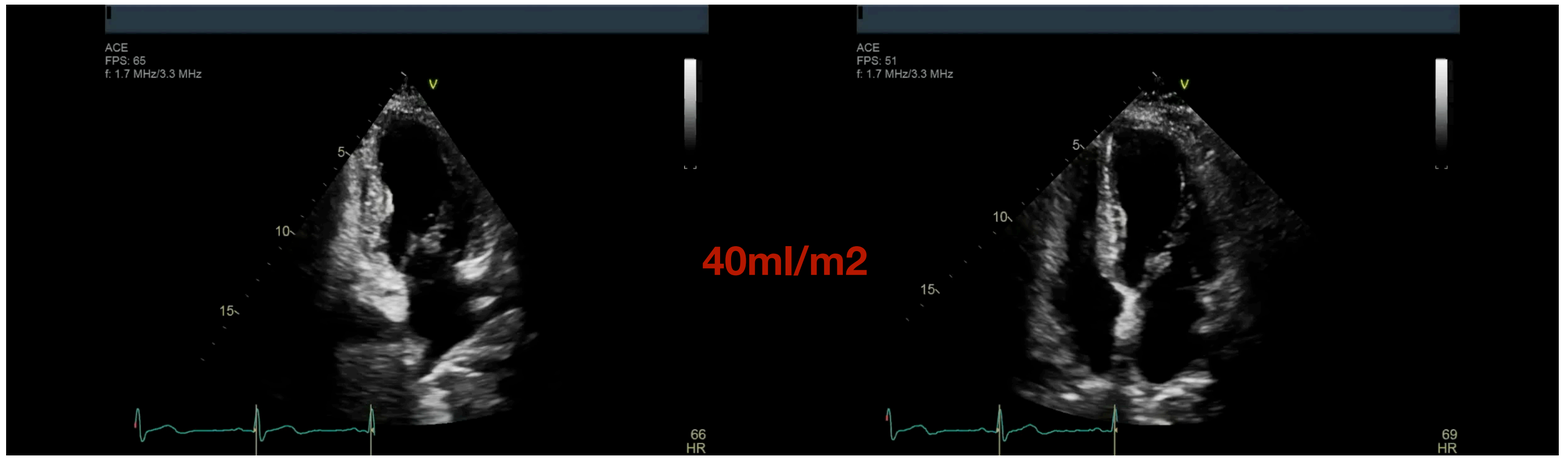
- **To optimize acquisition:**
  - AP 4 and 2 chamber views
  - Zoom on LA for more accuracy
  - Optimize non-foreshortened LA (may be different than non-foreshortened LV!)
  - Visualize left atrial structures (pulmonary veins, appendage, free wall)
  - Use 3D if applicable
- **To optimize measurement:**
  - Measure at end systole, the frame before the MV opens
  - Trace border of LA, excluding pulmonary veins and LA appendage, at level of MV annulus, not leaflets
  - Lengths should be within 5mm

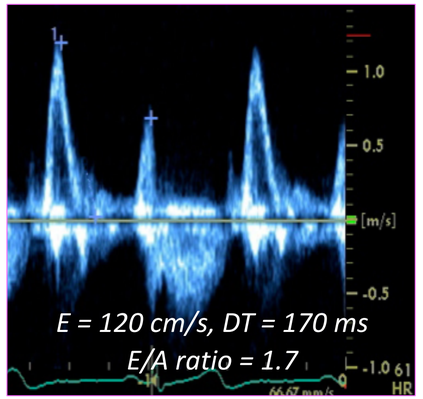


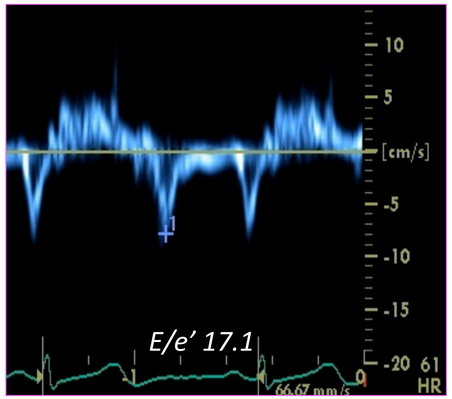
Lang et al, ASE Cardiac Chamber Quantifications Guidelines. JASE 2016

Where does LA volume matter?
62 year old female with shortness of breath



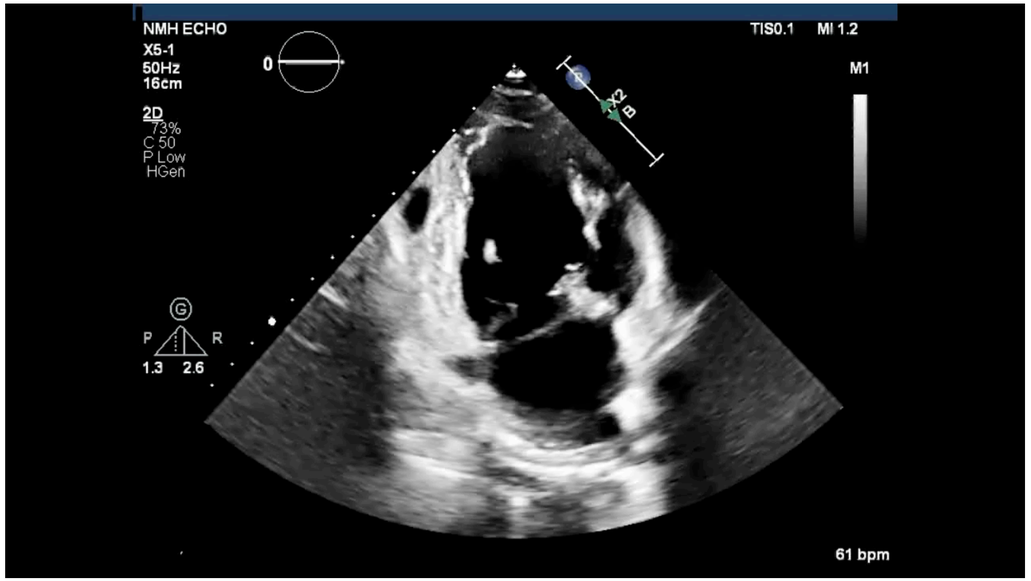


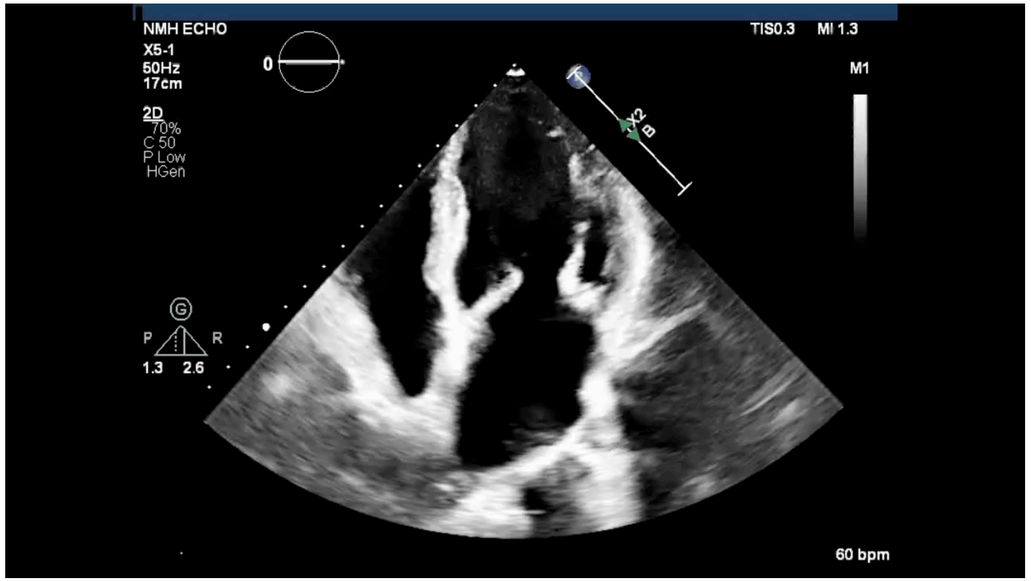


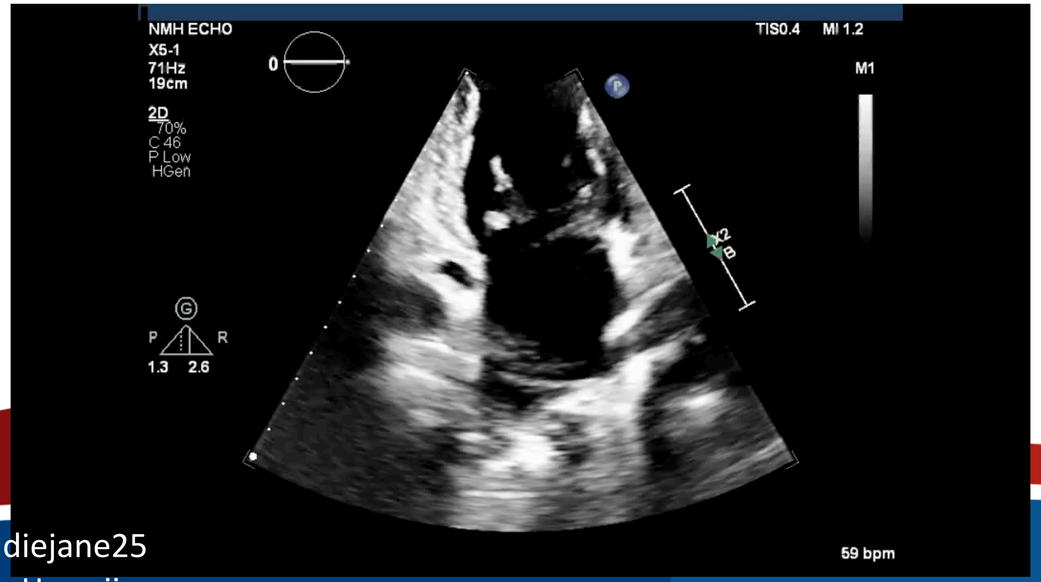


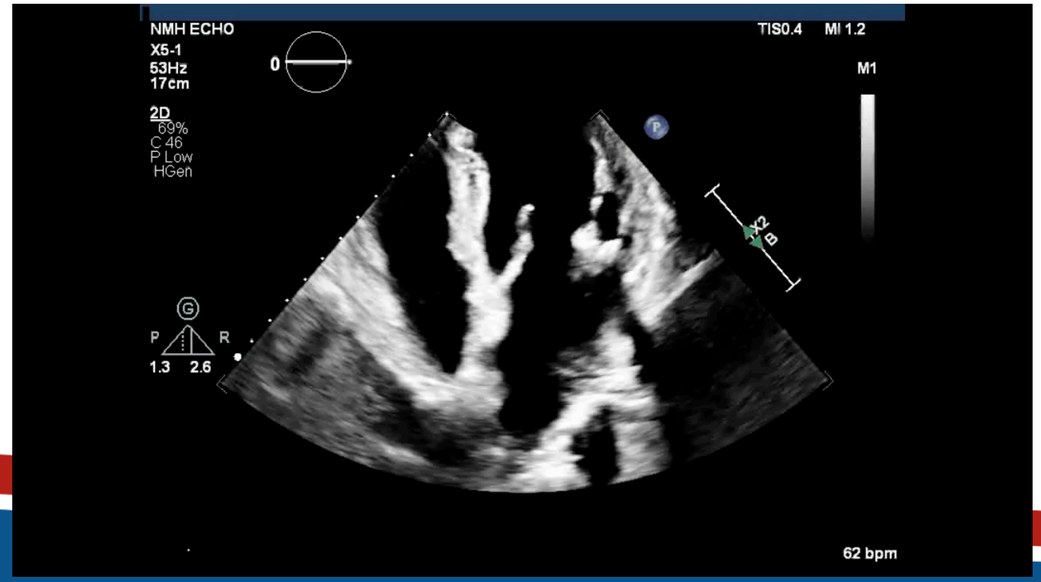
- **Incomplete TR signal**

Where does LA volume matter?
45 year old female with significant MR









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Mahalo!