Understanding Echo Lingo

Example 1: Patient X’s Transthoracic Echo Report:

Conclusions:

Four-chamber dilation. LV wall thickness is normal, eccentric left ventricular hypertrophy. Wall motion shows akinesis of the septum, and anterior wall severe hypokinesis elsewhere. No LV thrombus seen on contrast-enhanced images. Severely depressed systolic function with LVEF of 15-20%. Diastolic function not able to be assessed.

Valves are normal in structure and function. Trace AR and PR, mild MR and TR. The calculated PASP is 39mmHg with an estimated RA pressure of 15 mmHg. Trivial posterior pericardial effusion, no hemodynamic compromise. No prior study for comparison.

Brief Review:

- Echocardiography can evaluate the cardiac function and structure with images produced by ultrasound
  - Can assess chamber size, function, and wall thickness
- Procedure of choice for diagnosis and evaluation of cardiac conditions: valvular abnormalities, intracardiac thrombi, pericardial effusions, and congenital abnormalities
- Transthoracic echocardiography (TTE) vs transesophageal echocardiography (TEE)
  - TTE: ultrasound transducer is placed on the anterior chest wall → non-invasive
  - TEE: ultrasound transducer is placed in the esophagus → invasive, provides clearer, more detailed images

The Lingo:

Cardiac Remodeling:

- Manifest as changes in cardiac size, shape, and function
  - Can occur after conditions: MI, inflammatory myocardial disease, volume overload, dilated cardiomyopathy (enlarged/ weakened left ventricle)
    - Because the heart has to work harder, this causes a hypertrophic response → hypertrophy has been associated with increased interstitial fibrosis, cell death and cardiac dysfunction
  - 1. Hypertrophy: enlargement of the heart
    - Causes: volume overload (ex: HF) HTN, valvular heart disease, CAD, ischemia

- Eccentric: (TIP: eccentric – enlarged chamber)
  - No or small change in wall thickness with an increase in chamber volume
  - Mechanism: new sarcomeres are added in-series to existing sarcomeres (Recap: they are increasing in length so the chamber gets larger)
  - Common causes: ischemia

- Concentric: (TIP: concentric – looks like a concave mirror)
  - Increase in wall thickness with no change or slight reduction in chamber volume
  - Mechanism: new sarcomeres are added in-parallel to existing sarcomeres = increase in wall thickness
  - Common causes: HTN, aortic stenosis

Back to the Case: LV wall thickness is normal, eccentric left ventricular hypertrophy

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2. Left Ventricular Systolic Function (Ejection Fraction)²:

- Percentage of blood ejected with each contraction of the left ventricle
  - "Normal": LVEF > 55%
    - LVEF < 40% = HFrEF → Systolic: contractility and ejection are reduced

3. Left ventricular diastolic function

- Looking for signs of impaired LV relaxation, reduced restoring forces, and increased diastolic stiffness
- Pulmonary capillary wedge pressure (PCWP): indirect estimate of LV diastolic pressure
- Report should comment on LV filling pressure and the grade of LV diastolic function
  - LVEF > 40% = HFrEF → Diastolic: stiffening and loss or adequate relaxation
- Pulmonary arterial systolic pressure (PASP): assessment of pulmonary HTN³
  - Normal PASP <35mmHg
    - TIP: When > 35mmHg, pulmonary HTN should be considered

4. Wall Motion:

- American Society of Echocardiography standardized reporting using a 17-segment model. Scores are assigned to different segments and then added together to get total wall motion score.⁵
  - Hyperkinesia: increased movement
  - Normokinesia: normal movement
  - Hypokinesia: reduced movement
  - Akinsia: absence of movement
  - Dyskinesia: dyscronization
- Wall motion abnormalities are most commonly caused from MI or severe ischemia. This reduces the LV pump function⁵
- The image below is reported in the patient’s echo:

Figure 4¹⁵: Patient X’s Assessment of Wall Motion

- Back to the Case: Wall motion shows akinesis of the septum, and anterior wall severe hypokinesis elsewhere
5. Valves:

- Can identify: Valvular regurgitation or Vavular stenosis
  - Valvular regurgitation: presence of backward flow across a given closed cardiac valve. Regurgitation creates a volume overload state
    - Aortic regurgitation (AR)
    - Pulmonary regurgitation (PR)
    - Mitral Regurgitation (MR)
    - Tricuspid Regurgitation (TR)

6. Mass or thrombi

- Embolism from the heart or aorta can lead to TIA, stroke, or occlusion of peripheral arteries

**Recommended Guidelines:** European Association of Echocardiography and American Society of Echocardiography

**References:**


**Pictures:**

12. Maladaptive cardiac hypertrophy: Concentric and eccentric hypertrophy, compared to a normal heart. Adapted from Katz, Physiology of the Heart (3rd ed), 2001.
15. Image obtained from: https://www.google.com/search?q=echocardiography+summary+wall+motion+figures&client=safari&hl=en-us&prmd=svn&source=lnms&tbm=isch&sa=X&ved=0ahUKEwjlpzPoM_RAhVkr1QKHVxRDKsQ_AUIBygB&biw=768&bih=905#imgc=GQ6ZkhK6Wsg4M%3A

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