

Cardiac Ultrasound Cheat Sheet

Basics

Clinical Indication

- Evaluation of pts with hypotension, chest pain, & syncope of unknown origin
- Evaluation of pts with cardiac disease

Anatomy

- Apex of heart points towards left hip
- Base of heart points towards right shoulder

Technique

Basics

- Use phased array probe
- In cardiac mode probe indicator is on right side of screen
- If possible roll patient into left lateral decubitus
- There are 4 basic cardiac views

Parasternal Long View

- Probe marker towards right shoulder
- Place probe left of sternum at 2nd intercostal space
- Slide probe over 2nd to 5th intercostal space to find a good window
- Good for assessing: LV, LA, & aortic outflow tract

Parasternal Short View

- From parasternal long view turn probe 90°
- Point probe marker to left shoulder
- Good for assessing: global LV function

Apical Four Chamber View

- Probe marker towards patients left hip
- Place probe lateral & inferior to right nipple
- Angle transducer up towards base of the heart
- This is a more difficult view... be patient
- Good for assessing: all 4 chambers and their relative sizes

Subxyphoid View

- Probe marker towards patients left hip
- Place probe just inferior to xyphoid process
- Angle probe up into left chest until side of probe is flat against the abdomen

- Hold probe with your hand on top of the probe (like holding a pencil)
- Use liver as an acoustic window to better see the heart

Assessing LV Function

- Range of function: stand still to hyperdynamic ejection fraction
- Assess systolic function by endocardial border incursion and myocardial thickening
- Classification of systolic function:
 - Severely depressed (EF < 30%)
 - Mild-moderate depression (EF 30-55%)
 - Normal (EF 55-70%)
 - Hyperdynamic (EF > 70%)
- If hyperdynamic, ventricular cavity will be obliterated during systole
- Hyperdynamic LV = hypovolemia or vasodilation

Mitral Valve E Point Septal Separation

- EPSS: distance between anterior mitral valve leaflet & ventricular septum
- Measured with M mode in parasternal long view
- Place M mode spike at distal end of mitral valve leaflet (where it comes closest to septum)
- EPSS value ≤ 6 mm is normal
- EPSS ≥ 7 mm indicates poor LV function and poor ejection fraction
- Estimate ejection fraction with equation:
 $LVEF = 75.5 - 2.5 \times EPSS$

Fractional Shortening

- Fractional change in LV diameter with contraction
- Measured with M mode in parasternal long view
- Place M mode line across LV just beyond mitral valve leaflets
- Equation: (LV end diastolic diameter – LV end systolic diameter) / LV end diastolic diameter
- Normal: 30-45%
- Hyperdynamic: > 45%
- Hypodynamic: < 30%

Pericardial Effusion

- Looks like an anechoic stripe between heart and pericardial sac
- Epicardial fats pads are often mistaken for effusion
- Fat pads are anterior (not dependent areas) and mostly hypoechoic with some echoic features
- Pleural and pericardial effusions can look similar
- Pleural effusions run posterior or lateral to thoracic aortic
- Pericardial effusions run medial and anterior to thoracic aorta
- Use ultrasound guidance to drain pericardial effusions

Tamponade

- Ultrasound signs of tamponade:
 - RV free wall inversion during diastole, *the classic finding*
 - RA inversion during ventricular, *the most common and early sign*
 - Dilated IVC with minimal size variation during breathing

Right Heart Dilation

- RV should be smaller than LV
- Moderate dilation: $RV = LV$
- Severe dilation: $RV > LV$
- Use apical 4 to evaluate RV size
- Compare relative RV/LV sizes at tip of AV valves in diastole
- Causes of dilated RV: PE, RV infarct, pulmonary hypertension, and COPD