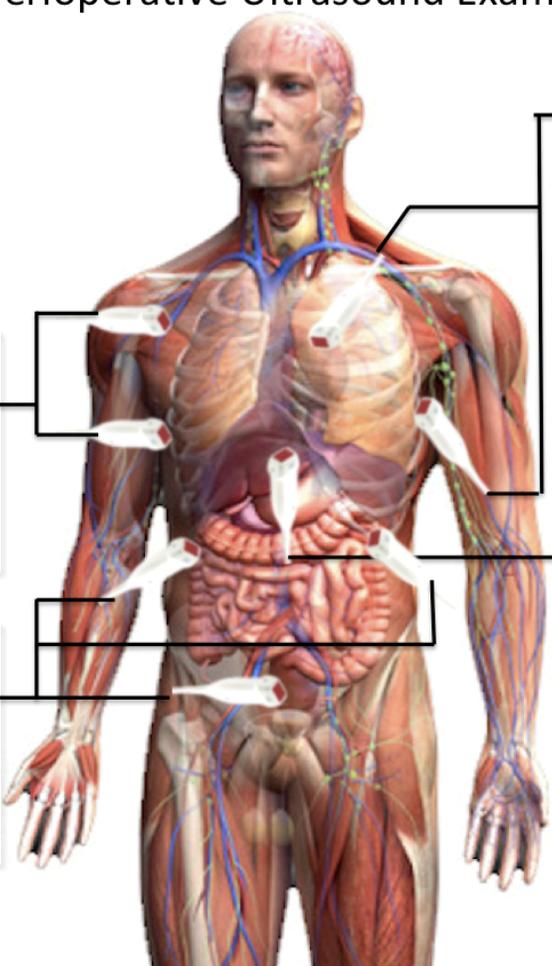


# 18

## 12 VIEW FOCUSED PERIOPERATIVE ULTRASOUND EXAM AND DATA REFERENCES

**Perioperative Ultrasound Examination**



**To optimize image:**

- Make good probe contact
- Ensure proper pt position
- Parallel to US plane ideal to measure blood flow
- Perpendicular to US plane ideal to show best picture

**Pulmonary Evaluation:**

- Pneumothorax
- Pleural Effusion
- Severe Alveolar Interstitial Disease
- **Position:** supine

**Abdominal Evaluation:**

- Evaluate free fluid in intraperitoneal space via 3 windows
- Views: RUQ, LUQ, Suprapubic
- **Position:** supine

**Cardiac Evaluation:**

- R/L ventricular function
- Pericardial Effusion
- Severe Valvular abnormalities
- **Views:** Parasternal Long Axis/ Short Axis, Apical 4 Chamber, Subxiphoid Pericardial
- **Position:** Left side down with L arm stretched out

**Hemodynamics:**

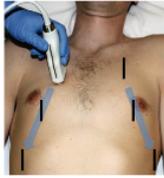
- IVC Collapsibility
- Left Ventricular End Diastolic Diameter
- VTI across aortic valve
- VTI across radial/brachial artery
- **Views:** Subxiphoid IVC, Parasternal Short Axis. Pulse Wave Doppler across radial/brachial artery

*Curriculum and Text Formulated by  
Dr. Davinder Ramsingh*

## 12 View Focused Perioperative US Exam

**LUNG:** (probe indicator perpendicular to ribs scanning along pleural line)

1. RUQ
2. RLQ
3. LUQ
4. LLQ



### CARDIAC:

1. **L PARASTERNAL LONG AXIS:** (probe indicator 3 to 4<sup>th</sup> rib space directed to 10 o'clock position)
2. **L PARASTERNAL SHORT AXIS:** (probe indicator 3 to 4<sup>th</sup> rib space directed to 2 o'clock position)
3. **APICAL 4-CHAMBER VIEW:** (probe indicator at 6<sup>th</sup> rib space midclavicular line directed to 3 o'clock position)  
\* adjust image to a 5-chamber view by decreasing probe angle with the chest (to see more anterior structures)
4. **SUBXIPHOID 90 DEGREE IVC VIEW:** (probe indicator at subxiphoid space with indicator directed to 12 o'clock position)

### Abdominal:

1. **RUQ** (probe indicator perpendicular to 10<sup>th</sup> rib space and move caudal): looking for free fluid at the hepato-renal interface (Morrison's pouch)
  2. **SUBXIPHOID PERICARDIAL VIEW** (probe indicator directed to 3 o'clock position with sig reduced angle of insonation): looking for pericardial tamponade
  3. **LUQ** (probe indicator perpendicular to 10<sup>th</sup> rib space and move caudal with probe pointing more inferiorly than RUQ)
  4. **SUPRAPUBIC** (probe indicator directed to 3 o'clock position with sig steep angle of insonation)
- Free fluid appears as poorly defined irregularly shaped hypoechoic (black) regions

IVC	% Collapse	Estimated CVP
<20	>50	5
<20	<50	10
>20	<50	15
>20	0	20

### Data References:

- Diaphragm – 9<sup>th</sup> rib space
- Lung Sliding- motion of parietal pleura along visceral pleura during respiration
- B Lines- increased echo reflective bands from the pleura line throughout the lung parenchyma, suggests decreased area of lung aeration. (> 2 B lines suggests significant disease)
- Pleural effusion-hypoechoic (black) areas above the lung hyperechoic diaphragm
- Velocity Time Integral is a measure using continuous wave or pulse wave Doppler to assess flow proximal to a cardiac valve (usually aortic) or across an artery and is related to stroke volume and can be used for fluid responsiveness (greater than 15% variability =fluid responsiveness)
- Velocity Time Integral traces also provide estimated pressures when the waveform are traced (how one sees gradients across valves)
- PA systolic pressure estimated by using continuous wave Doppler across tricuspid valve in the apical view to get peak regurgitate pressure and this valve is added to the estimated CVP.
- Normal LVIdd: > 3.5cm
- RWMA: assessed in parasternal SAX
- Fractional Area Change quantifies LV and RV contractility (similar to EF) and is quantified by measuring the following in the parasternal SAX views (Area of Chamber (RV or LV) in Diastole – Area of Chamber (RV or LV) in Systole / Area of Chamber (RV or LV) in Diastole) x 100
- Valve function: assessed in apical view using color Doppler
- Severe Regurgitation is estimated by tracing the regurgitate jet area in the apical view, area (> 10cm is severe) or measuring the vena contracta (the point in a regurgitate jet that originates from the fluid stream where the diameter of the stream is the least, > 7mm =severe)
- Tamponade: assessed in parasternal LAX and subxiphoid pericardial views
- Abdominal Free Fluid appears as “black” non-echogenic spaces between organs and will accumulate in RUQ if there is an upper abdominal injury and in suprapubic if lower abdominal injury
- Combined FAST exam can reliably detect > 200ml
- 0.7 x (supero-inferior diameter) x TS (maximum transverse diameter) x AP (maximum anteroposterior diameter)
- IVC diameter measured on end expiration (spont breathing patient) and 1cm distal to the IVC-hepatic

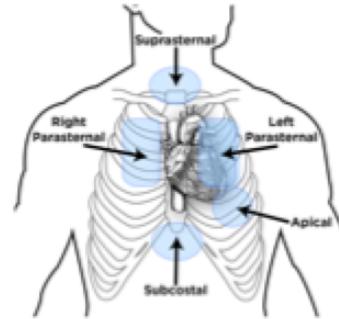
**FORESIGHT EXAMINATION:**

**CARDIAC**

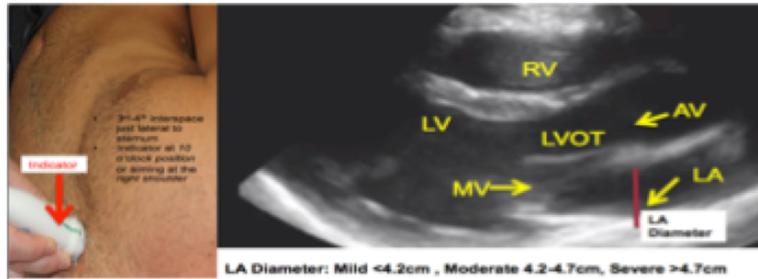
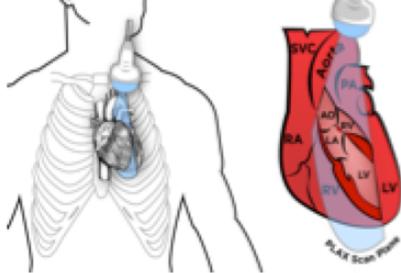
Overview:

Views:

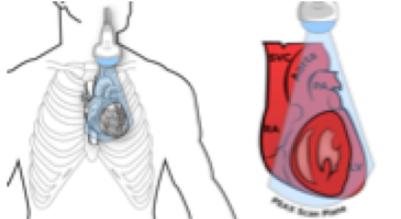
1. Left Parasternal Long Axis
2. Left Parasternal Short Axis
3. Apical 4 Chamber
4. Apical Two Chamber View
5. Apical 5 Chamber View
6. Subxiphoid View



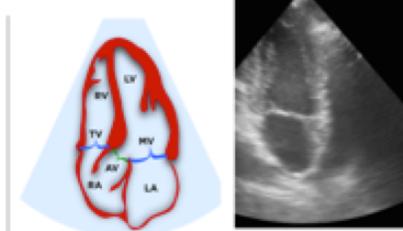
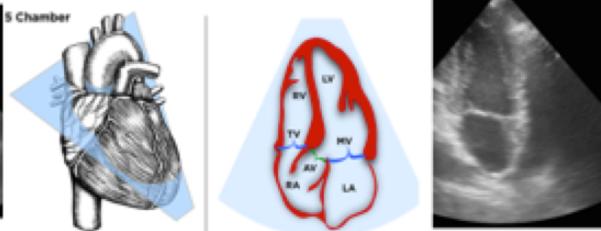
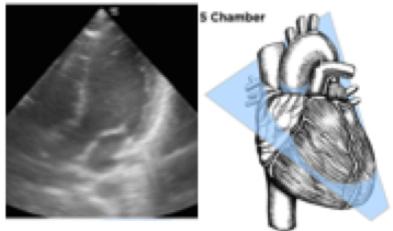
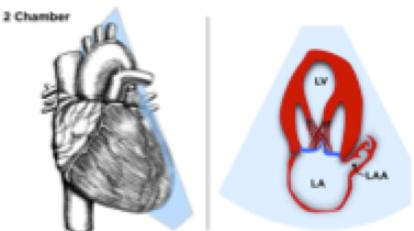
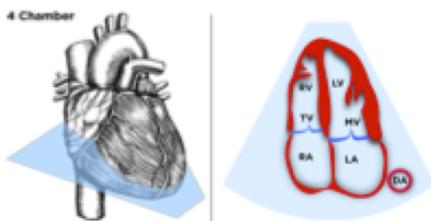
**Left Parasternal Long Axis View**



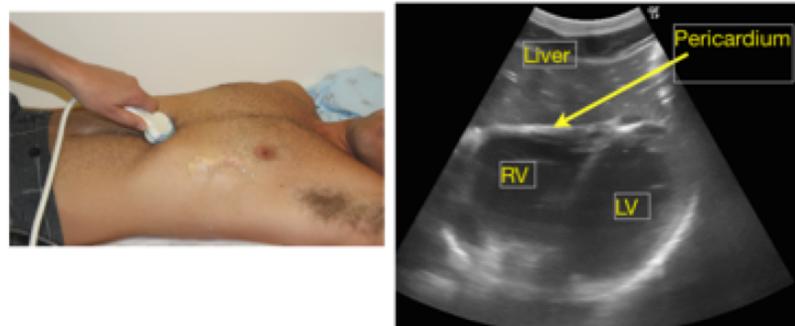
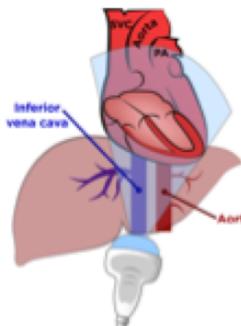
**Left Parasternal Short Axis View**



**Apical Views**



**Subxiphoid**

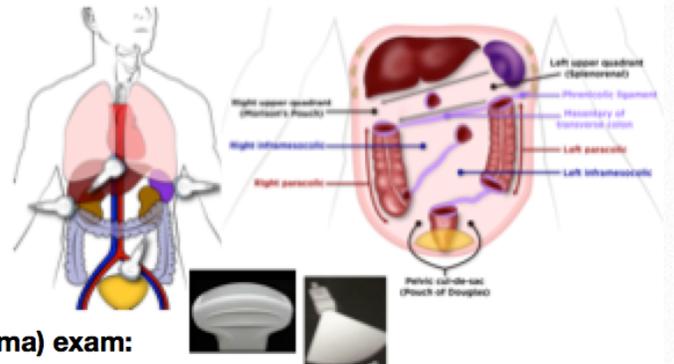


**FORESIGHT EXAMINATION:**

**Abdominal**

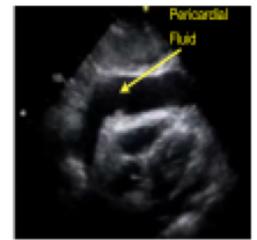
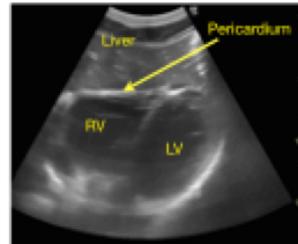
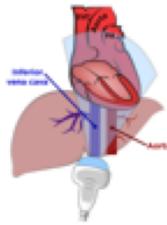
**Assessment Categories**

1. FAST (Focused Assessment with Sonography for Trauma) exam:

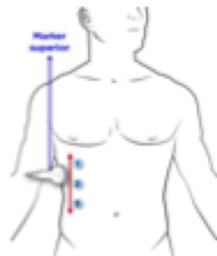


**FAST (Focused Assessment with Sonography for Trauma) exam:**

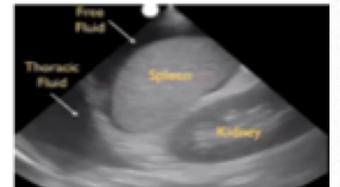
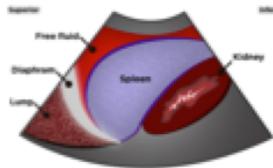
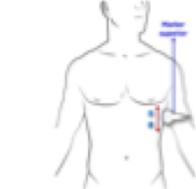
**Sub-xiphoid**



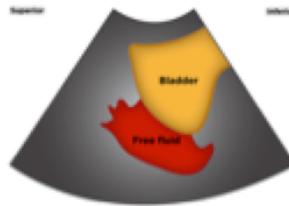
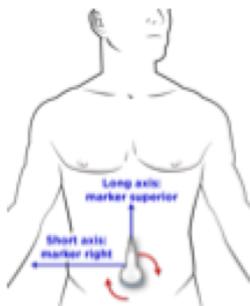
**Right Upper Quadrant View**



**Left Upper Quadrant View**



**Suprapubic View**

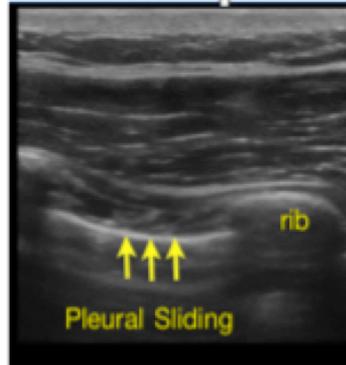


**FORESIGHT EXAMINATION:**

**Pulmonary**

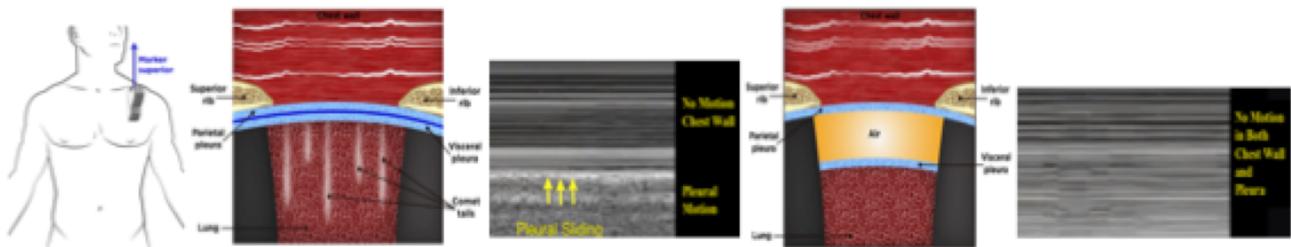
**Assessment Categories**

1. Pneumothorax
2. Pleural Effusions
3. Air Space Disease

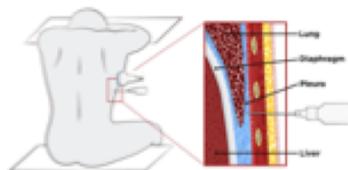
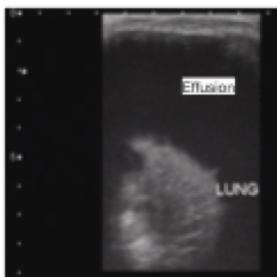


Pulmonary Examination Views

**Pneumothorax Evaluation via Pleural Lung Sliding**



**Pleural Effusion Evaluation**



**Air Space Evaluation**

