Cardiac and Pulmonary Ultrasound

Date: Thursday, October 31, 2019
Time: 8:30–11:30 AM
Location: ONLINE and SMALL GROUP LABORATORY

Watch:
- Subxiphoid Cardiac View Ultrasound Scanning Protocol: [https://youtu.be/zcFFTKteaUQ](https://youtu.be/zcFFTKteaUQ)
- Pulmonary Ultrasound Scanning Protocol: [www.youtube.com/watch?v=dQTTVQ60WsI](https://www.youtube.com/watch?v=dQTTVQ60WsI)

**LEARNING OBJECTIVES**
- Correlate anatomic structures identified during live-dissection with findings on ultrasound
- Demonstrate the ability to describe normal ultrasound anatomy in the heart and lung
- Select the appropriate transducer and optimizing image capture by adjusting function keys
- Describe artifacts encountered during the pulmonary ultrasound examination

**HANDS-ON OBJECTIVES**
- Identify cardiac structures (Subxiphoid View)
  - Liver
  - Right atrium
  - Right ventricle
  - Left atrium
  - Left ventricle
  - Mitral valve
  - Tricuspid valve
  - Pericardium
- Identify pulmonary structures
  - Rib
  - Rib shadow
  - Pleural line
  - Lung slide
  - Sea-shore sign (in M-mode)
CARDIAC ULTRASOUND

Gross Anatomy

Ultrasound Anatomy

Cardiac Ultrasound Scanning Protocol:
- In EM/general convention the probe indicator is to patient’s right with the screen indicator dot to the Left.
- In Cardiology convention the probe indicator is to patient’s left with the screen dot to the Right.
- Subxiphoid view: [https://youtu.be/zcFFTKeaUQ](https://youtu.be/zcFFTKeaUQ)
  - **Please note that the video describes how to orient the probe marker in cardiology convention, as the screen marker is on the right**

Probe Selection:
- Phased array (cardiac probe)
- Curvilinear

Patient Positioning and Preparation:
- Supine
- Tip: Having the patient bend his/her knees may assist with image acquisition

1. Technique for subxiphoid view:
Place probe beneath and slightly right of the xiphoid process.
The probe indicator is to be directed to the patient’s right side (if the screen marker is on the left in general/EM convention).
Hold the transducer like a computer mouse with your index/middle fingers on top. Aim the probe towards the patient’s head or left shoulder with the probe nearly flattened and parallel to the abdominal surface.
Tips:
  o Use the liver as an acoustic window to avoid poor image quality due to air in the stomach and bowel gas.
  o Also, the heart sometimes can be visualized better by having the patient take a deep breath in and holding it, which brings the heart downward closer to the probe.

Image Credit: http://www.sonoguide.com/cardiac
Structures to Identify:

- Liver
- Right atrium
- Right ventricle
- Left atrium
- Left ventricle
- Mitral valve
- Tricuspid valve
- Pericardium

Image Credit: https://www.emergencyultrasoundteaching.com
PULMONARY ULTRASOUND

Gross Anatomy

Ultrasound Anatomy

- Pulmonary Ultrasound Scanning Protocol:  www.youtube.com/watch?v=dQTTVQ60WsI

Probe Selection:  Variety of probes used
  - Linear
  - Phased array
  - Curvilinear

Patient Positioning and Preparation:
  - Supine
1. **Technique:**
   - Place probe oriented longitudinally (with indicator towards patient’s head) in 2nd to 3rd intercostal space, mid-clavicular line.
   - Additional views can be obtained in other intercostal spaces and anterior axillary line.

   ![Probe Placement-Long Axis View](source)

   ![Probe Placement-Long Axis View](source)

   Source: [https://www.youtube.com/watch?v=Xx dexx1HtHo](https://www.youtube.com/watch?v=Xx dexx1HtHo)

   - Normal lung function on ultrasound will reveal the presence of lung sliding, which indicates gliding of the visceral against the parietal pleura.
Confirmation of the pleural line is visualization of ribs (hyperechoic rim) flanking each side with associated rib shadow (artifact: “posterior acoustic shadowing”).
- In M-mode or “motion mode,” movement of tissue at the designated line over time.
- M-mode can alternatively be used to detect lung sliding, which would reveal a “sea-shore sign” – the subcutaneous tissue towards the top of the screen produces horizontal straight lines and below the pleural line will appear wavy like sand on the beach.

Credit: [http://www.hindawi.com/journals/crira/2014/906127/fig2/](http://www.hindawi.com/journals/crira/2014/906127/fig2/)


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- Pleural line
- Lung slide
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