***CHILDREN’S NATIONAL MEDICAL CENTER***

***DEPARTMENT OF RADIOLOGY***

***ULTRASOUND PROTOCOL***

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**Revised : 12/01/2015 Policy: CHEST ULTRASOUND**

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1. **Indications for a pediatric chest ultrasound include but are not limited to:**
2. **Pleural effusion** – to look for presence of fluid, type/character of effusion (simple/complex-debri, septations, pleural thickening, -,) and size/distribution/loculation of pleural effusion for planning chest tube placement/TPA/VATS.
3. **Pneumonia** –consolidation/atelectasis versus necrotizing pneumonia/abscess, to help in planning for VATS, need for CT
4. Differentiating lung mass from pneumonia/abscess – CT the study of choice. US may be useful in the acute setting
5. Mediastinal mass -) – CT the study of choice. US may be useful to differentiate normal thymus from tumor/cyst in the appropriate setting
6. **Diaphragmatic paralysis vs eventration or hernia**, to help plan for plication
7. **Chest wall lesions, ribs lesions**, costochondral cartilage, other superficial palpable lesions, US may be useful to decide need for further imaging
8. **Patient Prep:**

**Review the chest radiograph** (and other prior imaging). Review reason for exam before scanning, in case CT is more appropriate.

1. **Transducer:**
2. High frequency linear transducer, - 6-15 MHz / 9 MHz, depending on - age /size.
3. Convex 9 or 5 MHz probe for depth of the effusion,- diaphragmatic motion, - chest masses.
4. **Patient Positioning:**
5. For ICU patients, -supine or semi recumbent position when possible. scan in decubitus position when possible to reach the posterior chest.
6. For all other patients, both supine and upright or semi

recumbent position.

1. The 6 standard zones - – upper and lower anterior chest, upper and

lower lateral chest, & upper and lower posterior chest.

1. **Protocol for Pleural Effusion:**

* Document location of effusion, largest pocket and maximum depth from lateral aspect - to guide chest tube placement and drainage -.
* Document static images and - cine clips of simple vs complex fluid, - septations, loculated pockets, pleural thickening and other pathology.
* Static cine clips of fluid to document - particulate movement favoring complex fluid/pus/blood.
* Absence of lung sliding is a sign of pneumothorax, save M-mode lung clips and cine clips to assess for pneumothorax.

1. **Protocol for Pneumonia:**

* To evaluate for consolidation, - document air bronchogram sign, – static and cine grayscale and color Doppler images -
* r To evaluate for underlying lung necrosis -. static and cine grayscale and color images of necrotic lung/abscess-. -
* Save cine sweeps of region of interest in -2 planes.

1. **Protocol for Diaphragmatic Motion:**

* Review indication, ensure the patient can freely breath on their own. Ask the radiology attending if they can be present for the exam.
* Breathing must be unassisted. Ask for the respiratory therapist to be present to help taking patient off ventilator-.
* - C1-5 curved transducer placed - midline subxiphoid - -. Include both hemidiaphragms in - field of view.
* Capture a 4-5 second cine clip of both domes motion -. Have nurse state when inspiration is occurring to assess for paradoxical motion. Both diaphragms should be captured during inspiration for comparison. *-*
* M mode to assess diaphragmatic excursion,. Same scale for each side.
  + Midline approach, tracing of each hemidiaphragm with the cursor placed at convexity.
  + lateral subcostal approach tracing - each dome at the maximum excursion -. (may be more difficult to obtain) -
* For eventration, document contour bulges along the domes from anterior, lateral and posterior approaches. Save cine clips of the motion of eventrated portion, as well as M mode tracings of the eventrated part of hemidiaphragm.

1. **Protocol for mediastinal or lung masses - on CXR or Rib/chest wall lesions:**

* Grayscale and color Doppler images, and cine sweeps. .
* For superficial chest wall lesions/ rib lesions, include superficial images with generous gel coating to show the surface contours of the lesion.

1. **References:**
2. <http://www.radiologic.theclinics.com/article/S0033-8389%2804%2900222-2/abstract>
3. http://sonoworld.com – Chest ultrasound lectures
4. <http://pubs.rsna.org/doi/suppl/10.1148/rg.322115127> - diaphragmatic movement disorders’ clips
5. http://www.jultrasoundmed.org/content/20/6/597.full.pdf