

<b>Confirm Indication</b>	<p><b>Diagnostic</b> - pleural effusion of unknown etiology</p> <p><b>Therapeutic</b></p> <ol style="list-style-type: none"> <li>1. Large effusion with associated dyspnea or hypoxemia</li> <li>2. Effusion at risk of complications if not drained (e.g., parapneumonic)</li> </ol>
<b>Contra-indications and risks</b>	<ol style="list-style-type: none"> <li>1. Less than 2cm from parietal to visceral pleura in any dimension</li> <li>2. Overlying skin infection</li> <li>3. Multi-loculated effusion requiring chest tube for drainage. (<i>Diagnostic may still be indicated</i>)</li> </ol> <p>*Consider increased risk of bleeding with full AC, INR&gt;2 or Plt&lt;50K. *Consider increased risk of pneumothorax if mechanically ventilated *Consider risk of re-expansion pulmonary edema (RPE) if signs of entrapment</p>
<b>Obtain Consent</b>	<p><b>Explain using simple terms &amp; confirm patient's understanding:</b></p> <ol style="list-style-type: none"> <li>1. Procedural process</li> <li>2. Risks &amp; techniques to mitigate them</li> <li>3. Potential benefits</li> <li>4. Risks of not performing &amp; alternatives</li> </ol>
<b>Positioning</b>	Optimize for patient comfort and accessibility of largest pocket of fluid (upright and leaning forward, lateral decubitus or semi-recumbent)
<b>Ultrasound Evaluation &amp; Identification of Insertion Site</b>	<p><b>Using low-frequency transducer with indicator pointing cranially, at depth of <math>\geq 8</math>cm, scan mid-scapular to mid-axillary regions to identify the largest accessible fluid pocket:</b></p> <ol style="list-style-type: none"> <li>1. Identify chest wall, parietal pleura, lung, diaphragm, and liver/spleen</li> <li>2. Identify and measure the greatest depth or 'V-point' (intersection of diaphragm and collapsed lung) at the lateral most insertion point.</li> <li>3. Measure distance (cm) from skin to parietal pleura</li> <li>4. Attempt identification of sub-costal vessel with color doppler</li> <li>5. Mark insertion site with surgical pen or indentation over the upper margin of the rib.</li> </ol>
<b>Supplies</b>	See reverse side for details
<b>Timeout</b>	Confirm name, DOB, procedure, location, allergies
<b>Sterile Prep</b>	<ol style="list-style-type: none"> <li>1. Apply chlorhexidine using scrub/friction for &gt; 30sec with circumference &gt; drape aperture</li> <li>2. Apply sterile drape with perforation over sterilized skin</li> </ol>
<b>Draw-up Lidocaine</b>	<ol style="list-style-type: none"> <li>1. If lidocaine cap was previously removed, clean with EtOH swab.</li> <li>2. Aspirate 5-10cc of lidocaine using appropriate needle/catheter not intended for use on the patient</li> </ol>
<b>Anesthetize Tract</b>	<b>Anesthetize the tract using a 22-25g needle and form a dermal 'wheal'.</b> If no fluid is aspirated, use a longer needle to continue advancing under negative pressure and anesthetizing tract, until pleural fluid is aspirated. Pull needle back slightly and deposit ~2cc just superficial to pleural interface.
<b>Make Nick</b>	Advance #11 scalpel to $\sim \frac{1}{2}$ the width of blade.
<b>Catheter Insertion</b>	<ol style="list-style-type: none"> <li>1. Attach 5-10cc syringe to catheter hub, <b>advance needle and catheter FIRMLY through the skin nick just above rib.</b> If rib is contacted, lift (do not pivot) the needle and catheter over the rib.</li> <li>2. Continue to <b>apply pressure ONLY using syringe hand</b> and use the other hand to guide catheter. Continuously apply negative pressure while advancing until fluid is aspirated. <b>Then advance an additional 0.5-1cm</b> until catheter (not just needle) is in the pleural space.</li> <li>3. Anchor the arm holding the syringe to maintain position of the needle and <b>advance catheter into the pleural space until hub</b> is at the skin. Then remove needle.</li> </ol>
<b>Fluid removal and sample collection</b>	<ol style="list-style-type: none"> <li>1. Attach IV tubing that has two one-way valves (if available) to side port of catheter. Connect 60cc syringe to short arm of IV tubing and the collection bag to the long arm. Then rotate stopcock away from patient and slowly pull to fill 60cc syringe.</li> <li>2. If indicated, <b>send fluid for studies</b> (&gt;10cc for chemistries, &gt;20cc for microbiology and additional 30cc for cytology). Then re-attach syringe</li> <li>3. <b>One-way valve system:</b> Pull to fill the syringe then push to empty into collection bag, repeat. <b>No one-way valve system:</b> Alternate the catheter stopcock between being open toward the port during the 'pull' and closed during the 'push'</li> <li>4. <b>Stop fluid removal</b> if excess resistance is detected either manually or with manometry (<math>&lt; -20</math>cm H<sub>2</sub>O), <u>OR</u> for CP, SOB, or severe coughing</li> </ol>
<b>Catheter Extraction</b>	<ol style="list-style-type: none"> <li>1. Turn stop cock toward the patient, then briskly remove the catheter. Then apply gauze with pressure &gt;1min before placing band-aid.</li> <li>2. If there is clinical concern for pneumothorax, rule out with bedside ultrasound (over anterior chest while lying flat) or with CXR</li> </ol>

Supplies		Quantity
Safe-T-Centesis or Thora/Para Kit (contents will vary by kit)		1
1. 5fr – 8fr <u>catheter</u> over 18g – 19g <u>needle</u> 2. Sterile skin prep (chlorhexidine) 3. Sterile Drape 4. Needle for drawing up solution (blunt, filter, or 18g) 5. Injection needles (25g and 21-22g) 6. 1% Lidocaine	7. 5-10cc syringe 8. 30cc syringe 9. Scalpel 10. Tubing with two one-way valves or stopcock 11. 2L drainage bag 12. Sterile 4x4 gauze	
Ultrasound with high-frequency and low-frequency transducers		1
Sterile Gloves		1-2/participant
Mask and eye protection		1/participant
Additional 30-60cc syringe for fluid collection (if indicated)		
Cap (optional)		1/participant
Sterile Gown (optional)		1/participant

#### Appropriate fluid studies based on clinical concern:

All – cell count with differential, LDH, protein.

Chylothorax – Cholesterol, triglycerides

Concern for malignancy – cytology (additional 30-60cc)

Infection – gram stain with reflexive culture and any additional specialized testing.

- \*pH needs to be on ice and ideally a blood gas syringe

#### References

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