

Confirm Indication	Diagnostic - pleural effusion with unknown etiology Therapeutic 1. Large effusion with associated dyspnea or hypoxemia 2. Effusion at risk of complications if not drained (e.g., parapneumonic)
Contra-indications and risks	1. Less than 2cm from parietal to visceral pleura in any dimension. 2. Overlying skin infection 3. Multi-loculated effusion requiring chest tube for drainage. (<i>Diagnostic may still be indicated</i>) *Consider increased risk of bleeding with full AC, INR>2 or Plt<50K. *Consider increased risk of pneumothorax if mechanically ventilated *Consider risk of re-expansion pulmonary edema (RPE) if signs of entrapment
Obtain Consent	Explain simpler terms & confirm patient's understanding: 1. Procedural process 2. Risks & techniques to mitigate them 3. Potential benefits 4. Risks of not performing & alternatives.
Positioning	Optimize for patient comfort and accessibility of largest pocket of fluid (upright and leaning forward, lateral decubitus or semi-recumbent)
Ultrasound Evaluation & Identification of Insertion Site	Using low-frequency transducer at depth of ≥ 8cm, scan mid-scapular to mid-axillary regions to identify the largest accessible fluid pocket one intercostal space above the diaphragm: 1. identify chest wall, parietal pleura, lung, diaphragm, and liver/spleen 2. Identify and measure the greatest depth of fluid at least 9cm lateral to the spine. 3. Using high-frequency transducer, confirm supra-costal approach, measure distance (cm) from skin to parietal pleura, and use color Doppler to evaluate for aberrant sub-costal vessel 5. Mark insertion site with surgical pen or indentation over the upper margin of the rib.
Supplies	See reverse side for details
Timeout	Confirm name, DOB, procedure, location, allergies
Sterile Prep	1. Apply chlorhexidine using scrub/friction for > 30sec with circumference > drape aperture 2. Apply sterile drape with perforation over sterilized skin
Draw-up Lidocaine	1. If lidocaine cap was previously removed, clean with EtOH swab. 2. Aspirate 5-10cc of lidocaine using appropriate needle/catheter not intended for use on the patient
Anesthetize Tract	Anesthetize the tract using a 22-25g needle and form a dermal 'wheal'. 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.
Make Nick	Advance #11 scalpel to $\sim \frac{1}{2}$ the width of blade.
Catheter Insertion	1. Attach 5-10cc syringe to catheter hub, advance needle and catheter FIRMLY through the skin nick just above rib. If rib is contacted, lift (do not pivot) the needle and catheter over the rib. 2. Continue to apply pressure ONLY using syringe hand and use the other hand to guide catheter. Continuously apply negative pressure while advancing until fluid is aspirated. Then advance an additional 0.5-1cm until catheter (not just needle) is in the pleural space. 3. Anchor the arm holding the syringe to maintain position of the needle and advance catheter into the pleural space until hub is at the skin. Then remove needle.
Fluid removal and sample collection	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. 2. If indicated, send fluid for studies (>10cc for chemistries, >20cc for microbiology and additional 30cc for cytology). Then re-attach syringe 3. One-way valve system: Pull to fill the syringe then push to empty into collection bag, repeat. No one-way valve system: Alternate the catheter stopcock between being open toward the port during the 'pull' and closed during the 'push' 4. Stop fluid removal if excess resistance is detected either manually or with manometry (< -20cm H2O), <u>OR</u> for CP, SOB, or severe coughing
Catheter Extraction	1. Turn stop cock toward the patient, then briskly remove the catheter. Then apply gauze with pressure >1min before placing band-aid. 2. If clinical concern for pneumothorax, rule out with bedside ultrasound (over anterior chest while lying flat) or CXR



Procedure video

All teaching resources



Supplies		
Items		Quantity
Safe-T-Centesis or Thora/Para Kit (contents will vary by kit)		1
1. 5fr – 8fr catheter over 18g – 19g needle 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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