

STANDARDIZED PROCEDURE

THORACENTESIS (Adult)

I. Definition

A thoracentesis is a surgical puncture of the chest wall to aspirate fluid or air from the pleural cavity. A pleural effusion is an abnormal accumulation of fluid in the pleural space.

II. Background Information

A. Setting:

The setting (inpatient vs outpatient) and population (adults vs pediatrics) for the Advanced Health Practitioner (AHP) is determined by the approval of the privileges requested on the AHP Privilege Request Form. If the procedure is being done on a Pediatric patient, make sure Child Life Services is involved and use age appropriate language and age appropriate developmental needs with care of children, as appropriate to the situation.

B. Supervision:

The necessity of the procedure will be determined by the AHP in verbal collaboration with the attending physician or his/her designee. Direct supervision will not be necessary once competency is determined, as provided for in this procedure. At that time, general or indirect supervision is acceptable.

Designee is defined as another attending physician who works directly with the supervising physician and is authorized to supervise the AHP.

The AHP will notify the physician immediately upon being involved in any emergency or resuscitative events or under the following circumstances:

1. Patient decompensation or intolerance to the procedure
2. Bleeding that is not resolved
3. Outcome of the procedure other than expected

C. Indications: To determine the cause of pleural effusion and to remove pleural fluid therapeutically in the event of respiratory distress.

D. Precautions/Contraindications:

1. Thrombocytopenia, platelets < 50,000
2. Clotting abnormalities (Prothrombin time (PT), partial thromboplastin time prolongation >1.5 times normal), or anticoagulation therapy
3. Severe cough or hiccups (uncontrolled)

III. Materials

1. Sterile gloves,
2. Prepared thoracentesis tray or:
 - a. Stopcock
 - b. Blood transfer set
 - c. 18-20 gauge 2" angiocatheter
 - d. 4X4 gauze pads, 5 ml syringe with 25- 27 gauge 5/8" needle & 22 gauge needle
3. 1% lidocaine
4. Chlorhexadine solution
5. Hemostat

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6. 1 liter evacuated containers
7. (2) specimen containers
8. Sterile drapes
9. Sterile occlusive dressing

IV. Thoracentesis Procedure

A. Pre-treatment evaluation

1. Subjective:
 - a. History of malignancy, pancytopenia, anticoagulant use, pleural effusion.
 - b. Signs and symptoms: Small pleural effusions are usually asymptomatic. Large pleural effusions may cause dyspnea, pleuritic chest pain, and dry cough.
2. Objective:
 - a. Patient evaluation: General appearance, vital signs, fever, pulse oximetry.
 - b. Physical exam: Physical findings are general absent if less than 200-300ml of pleural fluid is present. Findings consistent with the presence of a larger pleural effusion include dullness to percussion, and the decreased whisper or breath sounds. In large pleural effusions that compress the lung, accentuation of breath sounds and egophony may be noted just above the effusion. A pleural friction rub indicates pleuritis. A massive pleural effusion may cause contra-lateral shift of the trachea and bulging of the intercostal spaces.
 - c. Diagnostics:

Chest x-ray; PA and lateral. Pleural fluid cause blunting of the costophrenic angles on chest x-ray. Blunting usually indicates that at least 300 ml of fluid is present. If <300 ml fluid is suspected or if the fluid appears to be loculated, a lateral decubitus film is helpful. Thoracentesis generally can be done safely if there is at least 10 mm fluid measurable on a decubitus chest x-ray.

Flouroscopy or CT scan may be useful before thoracentesis if the fluid collection is < 10 mm thick or not freely moveable on the lateral decubitus x-ray view.

Current CBC with platelets and differential, serum LDH, albumin, glucose, PT/PTT, chemistries as clinically indicated.

B. Patient Preparation

1. Explain the purpose, risks/benefits, and steps of the procedure.
 - a. Risks:
 - Pneumothorax, including tension pneumothorax
 - Hemothorax, bleeding
 - Hemorrhage
 - Vasovagal episode
 - Infection (empyema)

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- Unilateral pulmonary edema
- Laceration of intra-abdominal viscera (puncture of liver or spleen).
- Subcutaneous emphysema
- Air embolism
- Pulmonary laceration

- b. Benefits
 - Yield information which may be lifesaving or significantly alter treatment
 - Relief of respiratory distress.
2. Obtain consent from the patient or appropriate legal designee.
3. Check platelet count and/or presence of coagulopathy. Consult with attending physician if platelet count is < 50,000, or there is known coagulopathy as to whether platelet transfusion or other intervention is needed prior to thoracentesis.
4. The patient does not need to restrict food or fluids.
5. Explain that he/she will receive a local anesthetic to minimize pain during the procedure.
6. Check patient history for hypersensitivity to the local anesthetic, and Chlorhexadine.

C. Procedure:

1. Position patient in the sitting position with arms and head resting supported on a bedside adjustable table. If unable to sit, the patient should lie at the edge of the bed on the affected side with the ipsilateral arm over the head and the midaxillary line accessible for the insertion of the needle. Elevating the head of the bed to 30 degrees may help.
2. The usual site for insertion of the thoracentesis needle is the posteriolateral aspect of the back over the diaphragm, but under the fluid level. Confirm site by counting the ribs based on chest x-ray and percussing out the fluid level. Mark the top of the dullness by washable ink mark or indenting the skin.
3. Select the thoracentesis site in an interspace below the point of dullness to percussion in the midposterior line (posterior insertion) or midaxillary line (lateral insertion).
4. Sterile technique should be used including gloves, Chlorhexadine prep and drapes.
5. Anesthetize the skin over the insertion site with 1% lidocaine using the 5 ml syringe with 25 or 27-gauge needle. Next anesthetize the superior surface of the rib and the pleura. The needle is inserted over the top of rib (superior margin) to avoid the intercostals nerves and blood vessels that run on the underside of the rib (the intercostals nerve and the blood supply are located near the inferior margin). As the needle is inserted, aspirate back on the syringe to check for pleural fluid. Once fluid returns, note the depth of the needle and mark it with a hemostat. This gives an approximate depth for insertion of the angiocatheter or thoracentesis needle. Remove the anesthetizing needle.

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6. Use a hemostat to measure the same depth on the thoracentesis needle or angiocath as the first needle. While exerting steady pressure on the patient's back with the nondominant hand, use a hemostat to measure the 15- to 18- gauge thoracentesis needle to the same depth as the first needle. While exerting steady pressure on the patient's back with the nondominant hand, insert the needle through the anesthetized area with the thoracentesis needle. Advance the needle until it encounters the superior aspect of the rib. Continue advancing the needle over the top of the rib and through the pleura, maintaining constant gentle suction on the syringe. Make sure you march over the top of the rib to avoid the neurovascular bundle that runs below the rib.
7. Attach the three way stopcock and tubing, and aspirate the amount needed. Turn the stopcock and evacuate the fluid through the tubing.
8. Remove the necessary amount of pleural fluid (usually 100 mL for diagnostic studies), but generally not remove more than 1500 mL of fluid at any one time because of increased risk of pleural edema or hypotension. A pneumothorax from needle laceration of the visceral pleura is more likely to occur if an effusion is completely drained.
9. When draining of fluid is completed, have the patient take a deep breath and hum, and gently remove the needle. This maneuver increases intrathoracic pressure and decreases the chance of pneumothorax. Cover the insertion site with a sterile occlusive dressing.

D. Post Procedure

1. Obtain an upright portable (expiratory) chest x-ray to evaluate the fluid level and to rule out pneumothorax.
2. For specimen handling, fill the tubes with the required amount of pleural fluid. Check that each tube is properly labeled by checking two patient identifiers- full name, date of birth and/or medical record number.
3. Pleural fluid should be sent for appropriate lab tests and may include pH, specific gravity, cell count and differential, protein, LDH, albumin, and glucose, culture and gram stain, acid-fast cultures and smears, fungal cultures and smears, viral culture. If a neoplasm is suspected, send for cytology (generally requires 1 L of fluid in a cytology bottle). Send for amylase if you suspect an effusion is secondary to pancreatitis, and Sudan stain and triglycerides if a chylothorax is suspected.
4. Provide post-procedural analgesics as needed.

E. Follow-up

Instruct patient to call MD on-call or the clinic for any chest pain, increased cough, shortness of breath, or signs/symptoms of infection.

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V. Documentation

A. Documentation is in the electronic medical record

1. Documentation of the pretreatment evaluation and any abnormal physical findings.
2. Record the time out, indication for the procedure, procedure, type and size of needle used, EBL, the outcome, characteristics of fluid and amount, what labs were sent, how the patient tolerated the procedure, medications (drug, dose, route, & time) given, complications, and the plan in the note, as well as any teaching and discharge instructions.

B. All abnormal findings are reviewed with supervising physician.

VI. Competency Assessment

A. Initial Competence

1. The AHP will be instructed on the efficacy and the indications of this therapy and demonstrate understanding of such.
2. The AHP will demonstrate knowledge of the following:
 - a. Medical indication and contraindications of this therapy.
 - b. Risks and benefits of the procedure
 - c. Related anatomy and physiology
 - d. Consent process (if applicable)
 - e. Steps in performing the procedure
 - f. Documentation of the procedure
 - g. Ability to interpret results and implications in management.
3. AHP will observe the supervising physician perform each procedure three times and perform the procedure **three** times under supervision.
4. Supervising physician will document AHP's competency prior to performing procedure without supervision.
5. The AHP will ensure the completion of competency sign-off documents and provide a copy for filing in their personnel file and a copy to the medical staff office for their credentialing file.

B. Continued proficiency

1. The AHP will demonstrate competence by successful completion of the initial competency.
2. Each candidate will be initially proctored and signed off by an attending physician. AHP must perform this procedure at least **three** times per year. In cases where this minimum is not met, the attending must again sign off the procedure for the AHP. The

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- AHP will be signed off after demonstrating 100% accuracy in completing the procedure.
3. Demonstration of continued proficiency shall be monitored through the annual evaluation.
 4. A clinical practice outcomes log is to be submitted with each renewal of credentials. It will include the number of procedures performed per year and any adverse outcomes. If an adverse outcome occurred, a copy of the procedure note will be submitted.

VII. RESPONSIBILITY

Questions about this procedure should be directed to the Chief Nursing and Patient Care Services Officer at 353-4380.

VIII. HISTORY OF PROCEDURE

Revised October 2012 by Subcommittee of the Committee for Interdisciplinary Practice
Reviewed October 2012 by the Committee on Interdisciplinary Practice
Prior revision October 2008
Approved 2012 by the Executive Medical Board and the Governance Advisory Council.

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