



Needle Aspiration of the Pneumothorax

Sandra Leibel, MD,* Akshaya Vachharajani, MD[†]

NOTE: To learn to perform a procedure, there are both cognitive and procedural steps that should be followed. These steps are explained and demonstrated in this month's Video Corner and are summarized for quick reference in the list below.



Figure 1. [Click here to view the video.](#)

STEP BY STEP: Needle Aspiration of Pneumothorax

Below are the steps to follow for this procedure.

1. Indications

Evacuation of a pneumothorax diagnosed clinically and/or radiographically.

Evacuation of a suspected pneumothorax in a neonate who has persistent bradycardia despite resuscitation according to the guidelines of the Neonatal Resuscitation Program.

Needle aspiration may be the definitive therapy or may be performed before inserting a chest tube.

2. Contraindications

If a decision to redirect from intensive to compassionate care has been made after discussions with the parents, this procedure may then be contraindicated. This decision to perform the procedure would depend on the limits of interventions set during those discussions between the parents and the health-care team.

3. Consent

No consent (written or verbal) is obtained before the procedure. The procedure is explained to parents before the

*Fellow in Neonatal Perinatal-Medicine, Washington University School of Medicine and St Louis Children's Hospital, St Louis, MO.

[†]Associate Professor of Pediatrics, Washington University School of Medicine and St Louis Children's Hospital, St Louis, MO.

procedure is performed in neonates who have a pneumothorax who are hemodynamically stable.

4. Time out (pause)

- a) Identifying the patient.
- b) Marking the site of the needle insertion.

5. Equipment

- a) Twenty-three-gauge butterfly needle.
- b) Three-way stopcock.
- c) Ten-milliliter syringe.
- d) Povidone-iodine swabsticks.
- e) Gloves.

6. Anatomy

- a) The needle is inserted in the second intercostal space.
- b) The second intercostal space is located below the second rib.
- c) The anterior end of the second rib is located at the junction of the manubrium sternum and the body of the sternum. The junction is located along the plane called angle of Louis.
- d) The layers of the chest through which the needle travels (from superficial to deep) are: skin, subcutaneous tissue, intercostal muscles, parietal pleura, air (if there is a pneumothorax), visceral pleura, and lung.

7. Preparation

- a) Explain the procedure to the parents if time and situation permit.
- b) Collect the aforementioned equipment.
- c) Review the chest radiograph to confirm the side of the pneumothorax.
- d) Confirm the side of the pneumothorax clinically if no radiograph is available (such as in the delivery room). Transillumination of the chest may diagnose the pneumothorax and should be considered.
- e) Anticipate performing the procedure on both sides of the chest if performing the procedure in a neonate who has persistent bradycardia in the delivery room. Collect two sets of equipment.
- f) Attach the three-way stopcock to the syringe and attach the 23-gauge butterfly needle to the stopcock. To maintain its sterility, do not remove the cover over the tip of the butterfly needle.
- g) Push the plunger of the syringe into the barrel of the syringe and remove any air in the syringe.
- h) Close the three-way stopcock to the butterfly needle.

8. Performing the procedure

- a) Even if performing the procedure in an emergency in a neonate who is hemodynamically unstable, time out is essential.
- b) Wash hands and wear gloves. Sterile gloves are optional.
- c) Identify the second intercostal space. First, identify the junction of the manubrium sternum with the body of the sternum. The anterior end of the second rib is located at this junction. The space below the rib is the second intercostal space.
- d) Clean and prepare the skin of the anterior chest wall over the second intercostal space (in an area ~2 inches in diameter) with povidone-iodine swabsticks or gauze pieces soaked in the solution.
- e) Using sterile drapes is optional and used in non-emergency evacuation of the pneumothorax.
- f) Remove the cover on the tip of the butterfly needle.
- g) One person inserts the tip of the butterfly needle into the skin over the second intercostal space in the mid-clavicular line above the upper border of the rib below the second intercostal space. A second person opens the three-way stopcock to the butterfly needle and applies suction to the syringe as the first person inserts the needle into the layers of the chest.
- h) The person inserting the needle stops advancing the needle into the chest when air is aspirated into the syringe.
- i) After the air is aspirated into the syringe, the stopcock is closed to the neonate and opened to the open port, and air is removed from the syringe.
- j) Turn the stopcock so that the syringe is now open to the butterfly needle and attempt aspirating air from the pleural cavity.
- k) Stop attempting to aspirate air when no air is aspirated despite applying suction to the syringe and/or blood is aspirated from the needle into the syringe.
- l) Site of insertion of the needle is different from that suggested in the sixth edition of the *Neonatal Resuscitation Program* textbook. (1)

9. Complication

- a) Unsuccessful procedure with no air aspirated (no pneumothorax or very small pneumothorax or needle not advanced deep into the chest or needle inserted at the incorrect landmark).
- b) Reaccumulation of pneumothorax.
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American Board of Pediatrics Neonatal-Perinatal Content Specifications

- Know how to prevent and manage air leaks.



Reference

1. Kattwinkel J, ed. *Neonatal Textbook*. 6th ed. Elk Grove Village, IL: American Academy of Pediatrics and American Heart Association; 2010

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