

# Needle Decompression

**Indication:** For thoracic decompression of a patient with:

- Suspected pneumothorax AND tension physiology (evidence of obstructive shock),
- [Traumatic cardiac arrest](#).

## GENERAL CONSIDERATIONS:

- Majority of pneumothoraces don't develop tension physiology. **Needle decompression (ND) is NOT the treatment for a simple pneumothorax.** ND is a temporary measure to relieve high intrathoracic pressures that are causing obstructive shock (e.g. hypotension, refractory hypoxia).
- If patient initially improves after ND and then deteriorates again, repeated ND may be required.
- **Positive pressure ventilation may precipitate or worsen tension pneumothorax.**
- In patients with a thick chest wall (e.g. large pectoralis muscles, central obesity, large breasts), ND is more likely to be effective from an axillary approach.
- Needles longer than 7cm can reach the heart and other organs. Providers should **only advance the needle far enough to enter the thoracic cavity, and then thread the catheter** into this space (similar technique to placing an IV).

### Cautions with axillary approach:

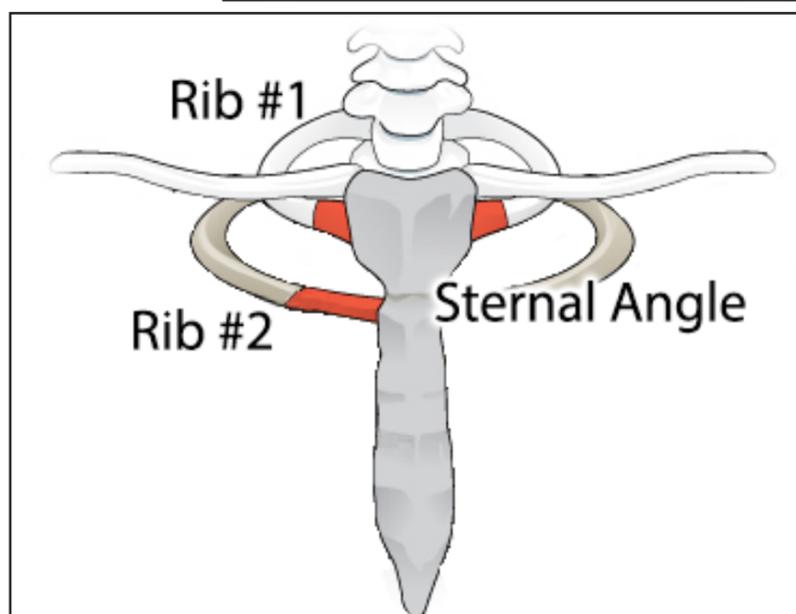
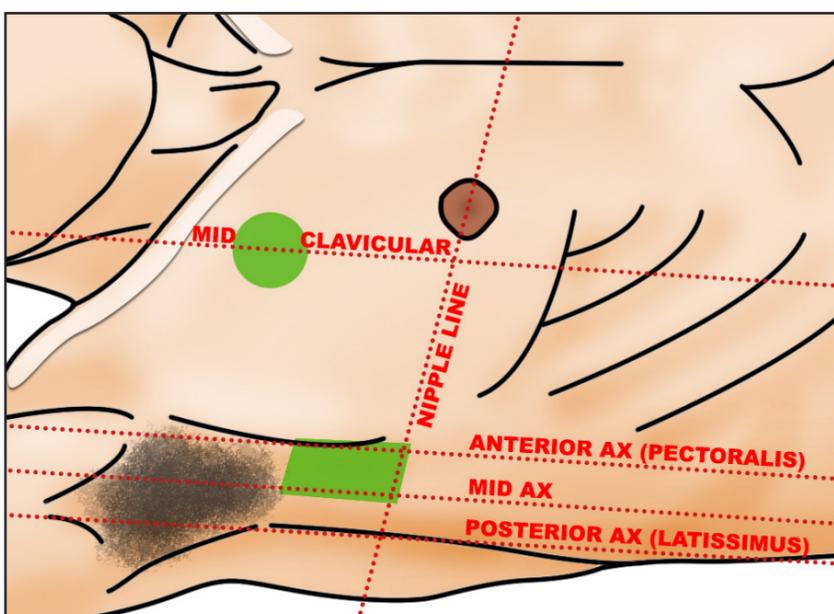
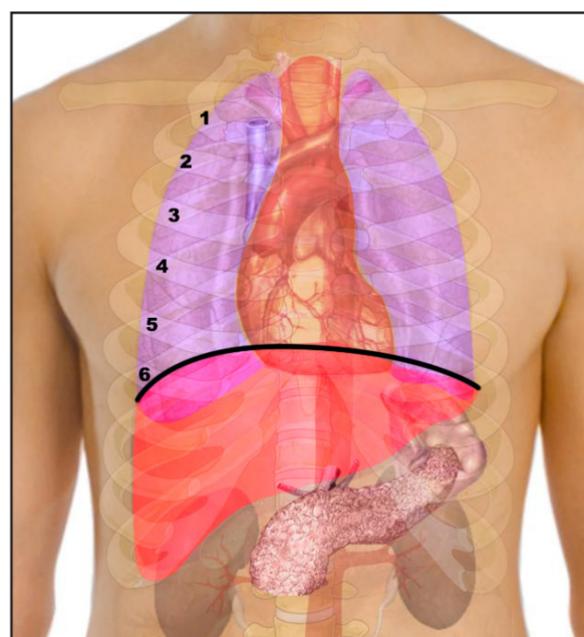
- **The liver** rises into the thoracic cage on the right side, sometimes as high as the 5th intercostal space. **The heart** is present on the left side. Take caution not to insert the catheter too low on the chest wall.
- Ensure that the needle is directed at a 90 degree angle to the chest wall. In obese patients the needle may not enter the thoracic cavity if it is directed through the subcutaneous tissue.

### Cautions with anterior approach:

- When anterior needles are misplaced, they are most frequently too medial (too close to the sternum) or too inferior (too close to the heart, when on the left). This creates a risk of injury to the **mediastinum (including the aorta)** as well as to **the heart** itself.

## IMPORTANT ANATOMY:

- Ribs may be felt better closer to the sternum. **The second rib attaches at the angle of the sternum (see picture below).** This is a reliable way to find the second rib.
- The clavicle extends from the sternum to the shoulder. The best way to find the midpoint is to place a hand across the entire clavicle with little finger on the sternal end and thumb on the shoulder, or vice versa.
- **The average adult nipple line (or inframammary fold in women) is around the 4th intercostal space.**
- Usually, adult axillary hair does not grow beyond the 4th intercostal space. It is generally safe to perform an axillary decompression at the place **where the growth of axillary hair stops.**
- Note the cautions above regarding the liver, heart, and mediastinal structures (e.g. aorta).
- The anterior axillary line is defined by the lateral border of the **pectoralis muscle.**



## PROCEDURE:

1. Consider and **address potential causes of hemorrhagic shock.** Confirm that the patient has **clinical evidence of tension physiology** in addition to suspected pneumothorax.
2. Place the patient on 100% oxygen.
3. Select an appropriate needle:
  - All Ages: 14ga or larger, minimum 3.5"
4. **STOP and identify anatomic landmarks for insertion. The anterior axillary location is the preferred approach.**
  - Anterior: 2nd intercostal, mid-clavicular
  - Axillary: 4th-5th intercostal, mid-axillary OR anterior-axillary (see picture above).  
**NOTE:** If using the axillary site, raise the patient's arm above their head to expose and enlarge the intercostal space.
5. Cleanse the skin with an antiseptic swab.
6. Insert the needle at a 90-degree angle to the skin and advance smoothly until a "pop" and decrease in resistance is felt. **Without advancing the needle farther, attempt to thread the catheter.** The catheter should thread easily if the needle is in the intrathoracic space.  
**NOTE:** The needle should be advanced over the top of the rib to avoid the neurovascular bundle on the inferior surface (see picture).
7. Discard the needle in a sharps container.
8. The classic rush of air is not always audible. If desired, a saline-filled syringe can be attached to the catheter to see if air can be aspirated. This may help confirm placement. Do not flush anything through the catheter.