

Medical Control Guideline: NEEDLE THORACOSTOMY

PRINCIPLES:

1. Needle thoracostomy is an uncommon procedure that may provide life-saving treatment of a tension pneumothorax during prehospital care and transport.
2. Risk of tension pneumothorax increases significantly after initiation of positive pressure ventilation (e.g., bag-mask ventilation, placement of advanced airway), which can convert a simple pneumothorax into a tension pneumothorax.
3. Needle thoracostomy should be performed, if indicated as outlined in Guidelines 2.1 below, prior to Base contact on any of the following patients:
 - PEA cardiac arrest with multisystem blunt trauma
 - Penetrating trauma which includes the thorax and abdomen or who have evidence of chest trauma with profound shock and signs of tension pneumothorax.
4. PEA cardiac arrest maybe due to tension pneumothorax after positive pressure ventilation.
5. ALS and Paramedic Assessment Units shall carry an 8cm (3.0 – 3.5 inches) 14G commercial needle decompression device for the performance of emergency needle thoracostomy.
6. The procedure for needle thoracostomy in a pediatric patient is unchanged from that of adults. It is expected that a shorter distance will need to be traversed to enter the pleural space in children due to the thinner chest wall.
7. Maintenance of skills requires regular in-service training on recognition and treatment of tension pneumothorax. It is strongly recommended that this training be completed in a simulation environment, rather than through slide-based or didactic learning.

GUIDELINES:

1. Manage patient with traumatic injuries as per *TP 1243/1243-P, Traumatic Arrest* and/or *TP 1244/1244-P, Traumatic Injury*.
2. Consider tension pneumothorax in the following patients.
 - 2.1. Trauma patients with obvious chest trauma (e.g., open chest wounds, evidence of crush or flail segment) or with mechanism consistent with chest trauma who demonstrate:
 - a. Decreased or absent breath sounds on affected side, **and**
 - b. SBP < 90mmHg (adult), < 70mmHg (child and infant), **and**
 - c. One or more of the following:

- i. Altered mental status
 - ii. Severe respiratory distress, with RR > 30 breaths per minute or < 10 breaths per minute
 - iii. Severe hypoxia, with < 90% oxygen saturation
 - iv. Cool, pale, moist skin
- 2.2. Traumatic full arrest with PEA rhythm (bilateral needle thoracostomy should be performed if evidence of chest wall trauma)
- 2.3. Trauma patients requiring positive-pressure ventilation who develop hypoxia or severe hypotension (SBP < 90mmHg), without alternate cause, after initiation of positive pressure ventilation
- 2.4. PEA cardiac arrest that develops after initiating positive pressure ventilation
3. Immediately place all patients with suspected pneumothorax on high flow oxygen by non-rebreather mask.
4. If the patient is awake and alert, explain medical condition and rationale for the procedure to the patient.
5. Prepare skin of chest with alcohol or chlorhexidine prior to skin puncture.
6. Insert the needle-catheter perpendicular to chest just above the 3rd rib at the mid-clavicular line (second intercostal space) or just above the 5th or 6th rib (fourth or fifth intercostal space) just anterior to the midaxillary line per training. Only place in sites for which paramedic has undergone specific training.
7. Attach a syringe to the thoracostomy needle for the procedure, if possible. Advance needle perpendicular to the chest wall while withdrawing on syringe until air is easily aspirated into the syringe (confirming penetration of lung pleura). Advance needle an additional 5 mm, then advance catheter over the needle further before withdrawing needle and disconnecting the syringe. For pediatric patients, insert no more than half the length of the needle or 1.5 inches (3.8 cm) as this is adequate in children under 15 years to enter the pleural space.
8. Secure catheter to skin with tape or commercial device. Do not place a one-way valve on the catheter hub.
9. If the patient has an open or sucking chest wound, cover the wound with a commercially available vented chest seal or vented (3-sided) occlusive dressing. Placement of a vented dressing can prevent conversion of an open pneumothorax to a tension pneumothorax. However, tension pneumothorax may still develop in the presence of a vented dressing and should be treated with needle thoracostomy. Furthermore, needle thoracostomy in a patient with evidence of tension pneumothorax should not be delayed for placement of dressing.
10. If a patient does not improve after needle thoracostomy, or improves but later decompensates, and there is concern for catheter dislodgement or obstruction, needle thoracostomy may be repeated on the same side or at an alternate location.