

# Tension Pneumothorax and Hemothorax

(Updated 10/09/2019)

## Introduction:

1. Tension pneumothorax (TP) is the progressive build-up of air within the pleural space, usually due to a lung laceration which allows air to escape into the pleural space. Progressive build-up of pressure in the pleural space can result in lung collapse, and obstruction of venous return to the heart. This can eventually lead to circulatory instability and possible traumatic arrest.
2. Hemothorax presents similar to TP but, blood rather than air fills the pleural cavity. Injuries leading to massive hemothorax include aortic rupture, myocardial rupture, and injuries to hilar structures.
3. While needle decompression can temporarily alleviate the symptoms of pneumothorax, definitive pre-hospital treatment for both it and Hemothorax is tube thoracotomy using a large chest tube.

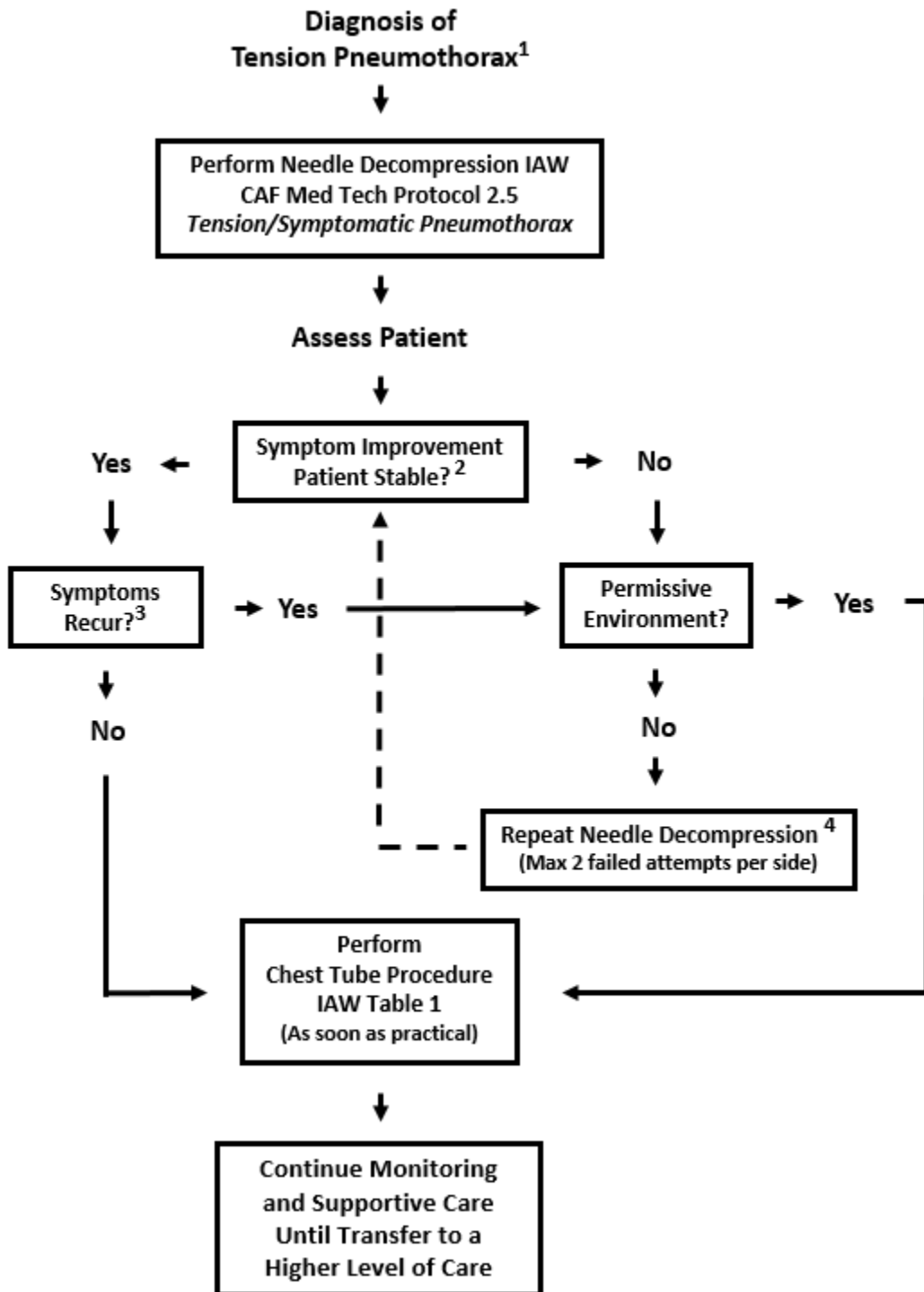
## Considerations:

In the field, chest tube insertion should be executed in a permissible environment during the sustainment phase of care.

## Management:

1. Patients with overt or suspected major trauma should initially be treated IAW the *SOMT Remote Damage Control Resuscitation Protocol*.
2. Manage tension pneumothorax and hemothorax IAW Figure 1 – “Management of Tension Pneumothorax and Hemothorax.”
3. Execute administration of a chest tube IAW Table 1.
3. Treat pain per the *SOMT Pain Protocol*.
4. If not already executed for other open wounds, when attempting chest tube insertion, initiate antibiotic prophylaxis as per the *SOMT Antibiotic Trauma Protocol*.

Figure 1 - Management of Tension Pneumothorax and Hemothorax



**Table 1 – Chest Tube Insertion Procedure**

<b>Step</b>	<b>Procedure</b>
<b>1</b>	Prep the area and drape appropriately
<b>2</b>	Landmark the site - Anterior to the mid-axillary line, at the fifth intercostal space. This spot corresponds to the bare area of the chest between the pectoralis muscle and the latissimus dorsi muscle posteriorly, at or above, the level of the nipple on the affected side.  <b>Use xylocaine 1% (approx. 10cc's; max 5mg/kg ) to anaesthetize area</b>
<b>3</b>	Make an incision along the upper border of the rib below the intercostal space. Direct the drain track over the top of the lower rib to avoid the intercostal vessels lying below each rib. The incision should easily accommodate the operator's finger.
<b>4</b>	Use a curved clamp to help develop a track by blunt dissection. Insert the clamp into exposed muscle tissue and spread to split the fibers. The track is developed with the medical technician's sterile gloved finger.
<b>5</b>	Once the track comes onto the rib, angle the clamp just over the rib and continue dissection until the pleural space is entered.
<b>6</b>	Insert a finger into the pleural cavity and explore the area for pleural adhesions as well as to confirm location. At this time the lung, diaphragm and heart may be felt, depending on position of the track.
<b>7</b>	Mount a large-bore (e.g. 32F or 28F) chest tube on the clamp and passed along the track into the pleural cavity.
<b>8</b>	Direct the tube posteriorly, in a cephalad fashion and advance until resistance is encountered. (All perforations in the tube must be in the pleural cavity).
<b>9</b>	Suture the tube in place with a silk stitch (or equivalent) and cover with an appropriate dressing.
<b>10</b>	Connect the tube to an underwater seal or Heimlich valve.

**Notes\*\*:**

1. TP should be suspected when a casualty has significant torso trauma or a primary blast injury and one of the following:

- a. Severe progressive respiratory distress
- b. Severe progressive tachypnea
- c. Absent or markedly decreased breath sounds on one side of the chest
- d. Hemoglobin oxygen saturation < 90% on pulse oximetry
- e. Shock
- f. Traumatic cardiac arrest without obviously fatal wounds.

2. The Needle Decompression (NDC) should be considered successful if:

- a. Respiratory distress improves, **or**
- b. There is an obvious hissing sound as air escapes from the chest when NDC is performed (this may be difficult to appreciate in high-noise environments), **or**
- c. Hemoglobin oxygen saturation increases to 90% or greater (note that this may take several minutes and may not happen at altitude), **or**
- d. A casualty with no vital signs has return of consciousness and/or radial pulse.

3. If the initial NDC was successful, but symptoms later recur:

- a. Perform another NDC at the same site that was used previously (Use a new needle/catheter unit for the repeat NDC).
- b. Continue to re-assess

4. If the initial NDC fails to improve the casualty's signs/symptoms from the suspected tension pneumothorax:

- a. Perform a second NDC on the same side of the chest at whichever of the two recommended sites was not previously used (Use a new needle/catheter unit for the second attempt).
- b. Consider, based on the mechanism of injury and physical findings, whether decompression of the opposite side of the chest may be needed.
- c. If no improvement in symptoms following 2 NDC attempts on a given side, discontinue NDC and consult a higher medical authority as soon as practical.
- d. Consider hemothorax, especially, if blood returns during needle aspiration. **For suspected hemothorax, insert chest tube as soon as possible.**

\*\* Adapted from *US TCCC Guidelines – Aug 2018*