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UPCOMING OUTREACH ACTIVITIES

- Stop The Bleed Class offered at TGH the 2nd Thursday each month at 10am and the 4th Thursday each month at 5:30pm April-June. Contact Jennifer Mefford at jmefford@tgh.org for additional information.

AEROMED APRIL OUTREACH

Sun City Landing Zone Training

Mitchell High School Prom Promise

Boy Scouts Aeromed Tour

Mosaic Wingate Safety Drill

Charlotte County EMS Quarterly Education Training

Charlotte County Telecommunications Week Luncheon

Hillsborough County Fire Rescue Landing Zone Training

Polk County Telecommunications Appreciation Week

Aeromed Competency Training Day

Water Egress Training with Tampa Police Dive Team

DeSoto County High School Mock DUI Crash Scenario

Pine View High School Hands Only CPR Training

Air transport services provided by Metro Aviation, Inc.
Tension Pneumothorax and Needle Thoracostomy

Pneumothorax is a common complication of both blunt and penetrating chest injury. In the blunt chest injury, a pneumothorax is most commonly caused by the sharp edges of broken ribs. In penetrating chest injury, a pneumothorax is most commonly caused by the penetrating object itself.

Signs and symptoms of pneumothorax include: chest pain, tachypnea, hypoxia, diminished or absent breath sounds on one side of the chest, or hyper-resonance to percussion on one side of the chest.

From the outside going in, the simplified thoracic cavity is composed of the parietal pleura, a small amount of pleural fluid, the visceral pleura, and then the lungs. A pneumothorax occurs when air escapes the lungs and fills a portion of the space between the visceral and parietal pleura. When the air is in this space it cannot participate in gas exchange and forces the total area of the lungs to become smaller and more compressed. Think of having a small bed all to yourself, but then your dog or kid jumps in bed with you. Now you have less room to stretch out and are a bit cramped.

A tension pneumothorax is immediately life threatening and must be rapidly identified and treated for the patient to survive. A tension pneumothorax occurs when the air pocket that has escaped the lungs gets bigger each time the patient inhales, but does not decrease in size when the patient exhales. In this state the pneumothorax gets bigger rapidly over a short period of time and can crush an entire lung. Although the space available for gas exchange is decreased, hypoxia does not kill these patients.

The heart and great vessels are also in the thoracic cavity and subjected to the same pressure as the lungs. The structure most sensitive to pressure is the vena cava. With a tension pneumothorax, the vena cava is compressed, forcing the heart and great vessels to compress, reducing the blood flow to the body. This can be a very serious situation if not treated rapidly.

<table>
<thead>
<tr>
<th>Location</th>
<th>Chest wall thickness (cm)</th>
<th>Failure rate with 5cm IV catheter</th>
</tr>
</thead>
<tbody>
<tr>
<td>2nd intercostal, midclavicular</td>
<td>4.3 (3.9 - 4.7)</td>
<td>38% (24-54%)</td>
</tr>
<tr>
<td>4th/5th intercostal, midaxillary</td>
<td>4.0 (2.9 - 5.1)</td>
<td>31% (10-64%)</td>
</tr>
<tr>
<td>4th/5th intercostal, anterior axillary</td>
<td>3.4 (2.8 - 4.0)</td>
<td>13% (8 - 22%)</td>
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pneumothorax, the pressure rises so quickly that the vena cava collapses upon itself and blood ceases to return to the heart. This leads to rapid cardiovascular failure and inability to perfuse the brain, kidneys, and heart tissues. If a tension pneumothorax is not corrected within minutes the patient could die. Think of sharing a small bed with your significant other. One by one your kids jump in bed with you, and soon both you and your significant other are squashed.

The initial treatment of tension pneumothorax is to stab a standard 5cm 16 or 14-gauge IV catheter into the patient’s chest at the second intercostal space in the midclavicular line. This is called a needle thoracostomy. However, recent research has shown that the standard 5cm IV catheter may not be able to reach many patients’ chest cavities at this spot.

Lann, et al conducted a meta-analysis of studies looking into this issue. The studies looked at chest wall thickness at three places where one can perform a needle decompression, and the failure rate in reaching the pleural space with a 5cm needle at those sites. The three sites were, 1) 2nd intercostal space at the midclavicular line, 2) 4th or 5th intercostal space at the midaxillary line; and 3) 4th or 5th intercostal space at the anterior axillary line. Results are shown in the table with the 95% confidence intervals in parentheses. The results clearly show the best chance of successful needle thoracostomy is at the 4th/5th intercostal space at the anterior axillary line. It is worth going through simulation or mental rehearsal to practice finding this spot quickly under stress. This meta-analysis gives us data that is practice changing in the initial treatment of tension pneumothorax. As with any procedure, know what equipment you stock and where to find it.


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