Recognizing Pneumothorax—A Case Study

Pneumothorax injuries are infrequent but can be life threatening. They are most often associated with blunt trauma of the chest. The trauma causes rib fracture, which in turn perforates the pleural wall. Thus, air or gas accumulates in the pleural cavity and causes the lung to collapse. It is critical to recognize the signs and symptoms of this condition in order to provide prompt and successful treatment in what can be a medical emergency.

Dynamics of Normal Breathing

Within the thoracic cage, each lung resides in a separate compartment, the pleural sac. Between the thoracic wall and the pleural sac is a thin layer of intrapleural fluid (Vander et al., 1985) (Figure 1).

In the normal chest the lungs remain expanded due to two counteracting pressures: alveolar (pressure within the lungs) and intrapleural (pressure of the fluid in the pleural cavity surrounding the lungs) (Vander et al., 1985). Between breaths, when no contraction of the diaphragm occurs, the pressure within the lungs is equal to atmospheric pressure while the intrapleural pressure is less than atmospheric pressure. This gradient creates a negative pressure situation that allows each

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PNEUMOTHORAX
(OPEN—THE CHEST WALL INJURY PERMITS AIR TO FLOW IN AND OUT OF THE PLEURAL SPACE ON THE AFFECTED SIDE)

TRACHEA AND MEDIASTINUM SHIFTED AWAY FROM PNEUMOTHORAX

TRAUMATIC RUPTURE OF THE CHEST WALL

PLEURAL SPACE FILLED WITH AIR

AIR HAS ENTERED THE PLEURAL SPACE AND COLLAPSED THE LUNG

HEART AND VESSELS IN THE MEDIASTINUM

NORMAL PLEURAL SPACE

INHALATION: AIR ENTERS THE INJURED SIDE, CAUSING COLLAPSE OF THE LUNG AND SHIFT OF THE MEDIASTINUM AND HEART TOWARD THE UNAFFECTED SIDE

EXHALATION: THE AIR IS PARTIALLY FORCED FROM THE AFFECTED SIDE PLEURAL SPACE AND THE MEDIASTINUM SHIFTS TOWARD THE AFFECTED SIDE

Table 1
Size Classifications of Simple Pneumothorax

<table>
<thead>
<tr>
<th>Size</th>
<th>% Pleural cavity occupied by air</th>
<th>Degree of lung collapse</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small</td>
<td>15% or less</td>
<td>Minor</td>
</tr>
<tr>
<td>Medium</td>
<td>15–60%</td>
<td>Moderate</td>
</tr>
<tr>
<td>Large</td>
<td>60% or greater</td>
<td>Severe</td>
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Types of Pneumothorax

Simple Pneumothorax

Most cases of pneumothorax are simple and closed. Generally caused by a blunt blow to the chest, 90% of all cases of traumatic closed pneumothorax observed in adults are the result of rib fractures (Zuidema et al., 1979), although closed pneumothorax following blunt chest trauma may occur without a rib fracture. The severity of pneumothorax is classified by the volume of pleural space occupied by air and the degree of pulmonary collapse (Table 1).