Pneumothorax

Pneumothorax is when air enters the pleural space, leading to a partial or complete collapse of the lung. The negative atmospheric pressure in the pleural space is lost as air rushes in causing all or part of the lung to collapse. This medical emergency requires the provider and nurse to act quickly to relieve the respiratory distress and prevent further complications.



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Mechanism

Air Enters Pleural Space

Air Filling Pleural Space between lungs and chest wall

There are different types of pneumothorax. However, they all have the same mechanism. Air or fluid enters the pleural space causing a loss in pleural space pressure resulting in the lung collapsing. A pneumothorax can be classified into either open or closed. Open pneumothorax occurs from a puncture that causes trauma to the chest wall resulting in atmospheric air entering the pleural space. This is also known as a “sucking chest wound.” Closed pneumothorax can be the result of a rib fracture that lacerates the pleural wall, spontaneous rupture of a pulmonary bleb (blister-like formations on the visceral pleura), or from air entering the pleural space, but cannot escape (known as tension pneumothorax, typically from mechanical ventilation).

Assessment

Sudden Dyspnea

Disc-P-lungs

The severity of the dyspnea can vary depending on the size of the pneumothorax. As the affected lobe(s) collapses, there are fewer alveoli that can participate in gas exchange. This results in the patient having rapid shallow breaths, feeling short of breath and becoming hypoxic.

Absent or Restricted Movement on Affected Side

Restricted Movement on Affected Side

Absent or Restricted Movement on Affected Side is common with traumatic pneumothorax. Broken ribs can limit chest wall movement, known as flail chest. The patient may be splinting one side in an effort to not take a deep breath.

Decreased or Absent Breath Sounds on Affected Side

Down-arrow Muffled-lungs with Soundwaves toward Affected Side

The extent of the pneumothorax will determine how much air flow will occur through the lung. Breath sounds will not be heard in the lobe(s) that are fully collapsed. Take note that some patients already present with diminished lung sounds because of their anatomy.

Chest Pain

Chest Pain-bolt

Chest pain can occur in all types of pneumothorax, however, pain with a pulmonary contusion is the most common. The increase in air pressure on the chest wall makes it uncomfortable and painful for the patient to take a deep breath. This is sometimes called pleuritic chest pain, which increases in intensity with each breath.

Tracheal Deviation

Trachea Deviating

The air pressure that builds up from air not being able to escape the pleural space pushes against the trachea. On assessment the trachea will appear shifting away from the affected area.

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Vital Sign Changes

Delta Vitals Sign

Hypotension and tachycardia are common occurrences in patients that have developed a pneumothorax. Due to the increase in arterial pulmonary pressure from the collapsed lung, a decrease in blood pressure is observed. To compensate for this hypotensive state, the heart rate increases in order to maximize cardiac output and increase oxygenation.

Crepitus

Carpenters

Occurs in open pneumothorax. Air can become trapped in the subcutaneous tissue (also known as subcutaneous emphysema) resulting in crepitus. Sometimes described as feeling like rice crispy treats under the skin.

Considerations

High Fowler's Position With Oxygen

High Fowl lifting into High Fowler's Position with O2-tank

It is important to keep the head of the bed elevated and place the patient in a position of comfort. Keeping the patient in a high Fowler’s position puts less pressure on the lungs. Depending on the extent of the pneumothorax, oxygen needs will vary. Monitor oxygen saturation and vital signs closely for any changes.

Prepare For Chest Tube Placement

Chest Tube

A chest tube will be used to pull air and any fluid out of the pleural space. This allows for the lung to re-expand and attach back to the chest wall.

Educate High Risk Patients

Diploma for High Risk Patient

Educate high risk patients about the risk of developing a pneumothorax. Invasive procedures such as a thoracentesis or lung surgical procedure can result in the pleural space being compromised. Chronic lung illnesses like Cystic Fibrosis, COPD, Emphysema, lung cancer, or patients requiring mechanical ventilation are also at risk for developing a spontaneous or tension pneumothorax.

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