

Pneumothorax

Pneumothorax is defined as the presence of air or gas in the pleural cavity, that is, in the potential space between the visceral and parietal pleura of the lung, resulting in partial or total collapse of affected lung.

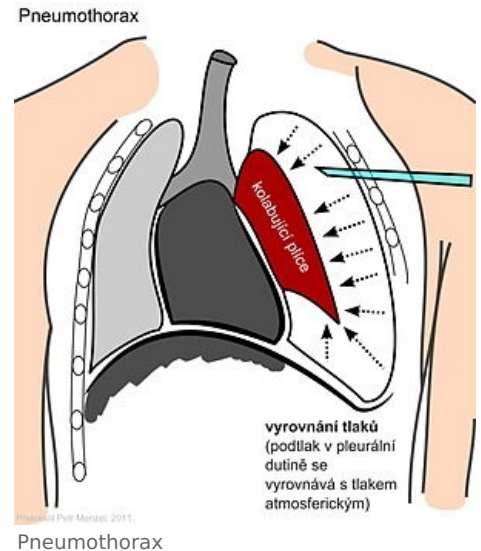
Types of Pneumothorax

1. Spontaneous or Primary Pneumothorax

This means that the pneumothorax develops for no apparent reason in an otherwise healthy person. This is the common type of pneumothorax. It is caused by rupture of a cyst or a small sac (bleb) on the surface of the lung. This is due to a tiny tear of an outer part of the lung. These are like small balloons of tissue that may develop on the edge of a lung. The wall of the bleb is not as strong as normal lung tissue and may tear. Air then escapes from the lung but gets trapped between the lung and the chest wall.

Epidemiology

- Most occur in healthy young adults (20-40 years of age) who do not have any lung disease
- It is rare in people over the age of 40.
- It is more common in healthy tall thin people
- About 2 in 10,000 young adults develop a spontaneous pneumothorax every year
- Men are affected about four times more often than women.
- It is also much more common in smokers compared with non-smokers. Cigarette smoke seems to make the wall of any bleb even weaker and more likely to tear.
- About 3 in 10 people who have a primary spontaneous pneumothorax have one or more recurrences at some time in the future. If a recurrence does occur it is usually on the same side and usually occurs within three years of the first one.



2. Secondary or Complicated Pneumothorax

Secondary pneumothorax occurs as a complication (a secondary event) of an existing lung disease. This is more likely if the lung disease weakens the edge of the lung in some way. This may then make the edge of the lung more liable to tear and allow air to escape from the lung:

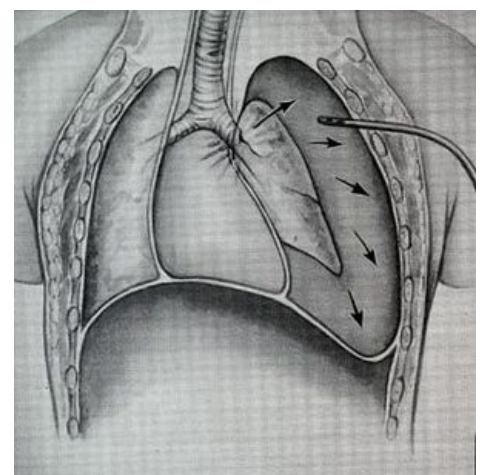
- Chronic obstructive pulmonary disease (Chronic bronchitis, Emphysema)
- Cystic fibrosis
- Lung cancer
- Asthma
- Infections of the lungs (ex. tuberculosis)
- Pulmonary Endometriosis (Catamenial Pneumothorax is an uncommon complication 1/100,000 women/year)
- It is also characteristic in patients with Marfan Syndrome

3. Traumatic Pneumothorax

Traumatic pneumothorax occurs after an injury to the chest:

- A fractured rib or ribs (Called Flail chest when more than 3 ribs are broken in more than one places)
- Any penetrating injury (gun shot or stabbing)
- Surgical invasion of the chest
- During Scuba diving
- Deliberately induced pneumothorax was used as a therapeutic method for treating Tuberculosis during early 1940's.

Fail Chest is the condition when during a thoracic trauma three or more ribs are broken at more than one place. This causes a paradoxical motion. Fail chest does not mean that the patient will also suffer from pneumothorax but eventually due to the paradoxical motion and the sharp ends of the ribs due to the trauma there is a high probability of traumatic pneumothorax.



Pneumothorax while underwater: While SCUBA (self contained underwater breathing apparatus) diving the pressure exerted on the lungs gets higher with depth (1 Atm /10meters). In a case when a diver holds his breath and he ascends the air in his lungs will expand and this will

cause first the alveoli to burst and if the pressure build up increases the lung will tear and there is a possibility of pneumothorax and collapsed lung.

Sign and Symptoms

- Dyspnea (difficulties in breathing)
- Sudden, sharp pain worsens with deep breathing or coughing
- Hypotension (decreased blood pressure)
- Cyanosis may present (bluish hue to the lips)
- Tachycardia (rapid heart beat)
- Tachypnea (increased breathing rate)

Diagnosis

- Auscultation, which reveals reduced or absent breathing sounds
- Chest x-ray, which shows the area of lung collapse. CT scan of chest can also be used and rarely ultrasound of the affected lung.
- Deep sulcus sign can be used on an x-ray to provide confirmation of a pneumothorax. (in ICU patients)

Deep sulcus sign can only be found when the patient is in the supine position since is the only case when the air will collect to the anterior part of the chest. It presents in the costophrenic angle and may have a sharp angular appearance (Star)

Treatment

Treatment of pneumothorax it depends on the scale of the pneumothorax and also if an underlying disease is present:

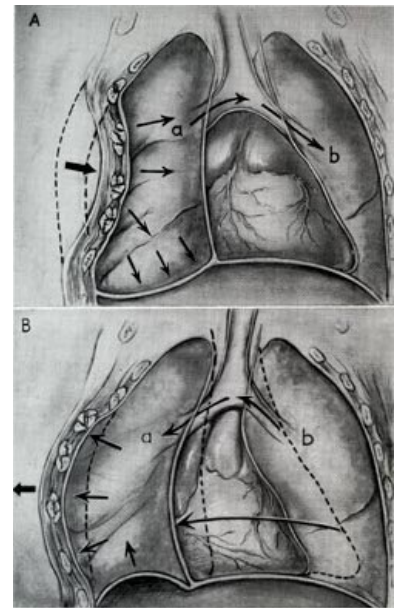
- **Small spontaneous pneumothorax**

- usually no specific treatment needed.
- Observation is recommended and after 7-10 days chest x-ray should be done.
- If pain present painkillers may be needed.

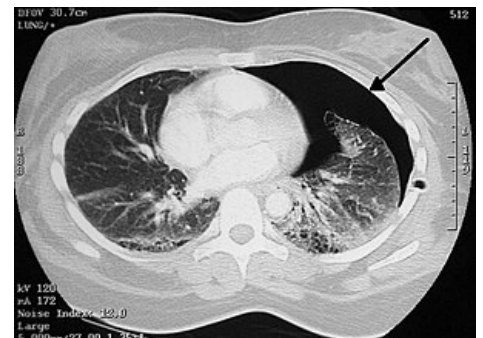
- **Recurring pneumothorax** can be healed by procedure where the part of the lung that tears and leaks air out is identified and can be removed. It can be a small bleb on the lung surface

- **Large pneumothorax** may be removed if it causes breathing difficulty. Aspirating the trapped air is sometimes needed:

- The common method of removing the air is to insert a very thin tube through the chest wall with the aid of the needle (Some local anesthetic is injected into the skin first to make the procedure painless. Lidocaine) A large syringe with a three-way tap is attached to the tube that is inserted through the chest wall. The syringe sucks then expelled. This is repeated until most of the air of the pneumothorax is removed.
- Sometimes a larger tube is inserted through the chest wall to remove a large pneumothorax. This is more commonly needed for cases of secondary spontaneous pneumothorax when there is underlying lung disease. Commonly, the tube is left place for few days to allow the lung tissue that has torn to heal.



Flail chest mechanics



Pneumothorax on CT scan

Links

Related Articles

Bibliography

- MOORE, Keith. *Clinically Oriented Anatomy*. 6th edition. 2010. ISBN 978-1-60547-652-0.

References