

Pneumothorax (Trapped Air in the Chest)

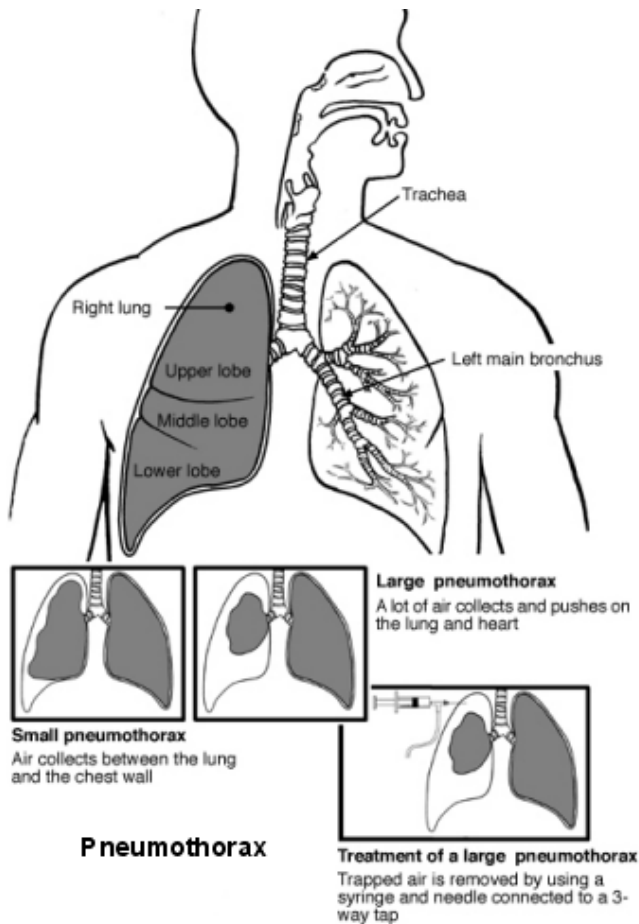
A pneumothorax (collapsed lung) describes the condition in which air has become trapped next to a lung. Many cases occur 'out of the blue', particularly in healthy young men. Some develop as a complication from a chest injury or a lung disease.

The common symptom is a sudden sharp chest pain followed by pains when you breathe in. You may become breathless. In most cases, the pneumothorax clears without needing treatment. The trapped air of a large pneumothorax may need to be removed if it causes breathing difficulty. An operation is needed in some cases.

What is a pneumothorax?

A pneumothorax occurs when air becomes trapped between a lung and the chest wall. The air usually gets there either from the lungs or from outside the body.

Our lungs are surrounded by a cavity called the pleural space. The pleural space is between the outside of the lungs and the inside of the chest wall. The pleural space normally contains a tiny amount of fluid (around 10mL) which helps the lungs to inflate and deflate as the chest wall moves in and out. In a pneumothorax, air gets into the pleural space. Air in the pleural space can cause a fully or partially collapsed lung.



Types of pneumothorax

Spontaneous pneumothorax

A spontaneous pneumothorax happens suddenly without an obvious immediate cause, such as an injury (see below). A spontaneous pneumothorax can be primary (occurring without any other lung condition) or secondary (occurring as a result of another lung condition).

Traumatic pneumothorax

A traumatic pneumothorax happens when the chest or lung is injured, allowing air to get into the pleural space. For example, a stab wound to the chest can cause a traumatic pneumothorax.

A traumatic pneumothorax can also happen as a complication of a medical procedure. For example, the procedure to insert a central venous catheter into the chest veins can sometimes accidentally cause a pneumothorax.

Tension pneumothorax

A tension pneumothorax is a severe and life-threatening type of pneumothorax. A tension pneumothorax can develop as a result of primary spontaneous, secondary spontaneous, or traumatic pneumothorax.

Tension pneumothorax causes shortness of breath that quickly becomes more and more severe. This occurs when the tear on the lung acts like a one-way valve.

In effect, each breath in (inspiration) pumps more air out of the lung; however, the valve action stops air coming back into the lung to equal the air pressure.

The volume and pressure of the pneumothorax increases. This puts pressure on the lungs and heart. **Emergency treatment is needed to release the trapped air; without urgent treatment, it can be fatal.**

Pneumothorax symptoms

- The typical symptom is a sharp, stabbing pain on one side of the chest, which suddenly develops.
- The pain is usually made worse by breathing in (inspiration).
- You may become breathless. As a rule, the larger the pneumothorax, the more breathless you become.
- You may have other symptoms if an injury or a lung disease is the cause - for example, cough or [high temperature \(fever\)](#).

A chest [X-ray](#) can confirm a pneumothorax. Other tests may be done if a lung disease is the suspected cause.

Causes of a pneumothorax

Primary spontaneous 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 thought to be due to a tiny tear of an outer part of the lung - usually near the top of the lung. It is often not clear why this occurs.

However, the tear often occurs at the site of a tiny bleb or bulla on the edge of a lung. A bleb or bulla is like a small balloon of tissue that may develop on the edge of a lung. A bulla is a large bleb.

The wall of the bleb or bulla is not as strong as normal lung tissue and may tear. Then, air escapes from the lung but gets trapped between the lung and chest wall.

Most occur in healthy young adults who do not have any lung disease. It is more common in tall thin people.

Secondary spontaneous pneumothorax

This means that the pneumothorax develops as a complication (a secondary event) of an existing lung disease.

This is more likely to occur 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.

So, for example, a pneumothorax may develop as a complication of [chronic obstructive pulmonary disease \(COPD\)](#) - especially where lung bullae have developed in this disease.

Other lung diseases that may be complicated by a pneumothorax include:

- [Pneumonia.](#)
- [Tuberculosis.](#)
- [Sarcoidosis.](#)
- [Cystic fibrosis.](#)
- [Lung cancer.](#)
- [Idiopathic pulmonary fibrosis.](#)

Other causes of pneumothorax

- An injury to the chest for example, a car crash or a stab wound.
- Surgical operations.

- [Endometriosis](#) - rarely, this can cause something called a catamenial pneumothorax.
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How common is a pneumothorax?

About 2 in 10,000 young adults in the UK develop a spontaneous pneumothorax each year. Men are affected about three times more often than women and are affected at a younger age. Men are more likely to be affected around the age of 20 years and women in their early 30s.

It is more common in men who smoke than in men who don't smoke and 9 times more common in women who smoke than in women who don't smoke. Cigarette smoke seems to make the wall of any bleb even weaker and more likely to tear.

Up to 5 in 10 people who have a primary spontaneous pneumothorax have another one or more at some time in the future. If it does occur again it is usually on the same side and it usually occurs within three years of the first one.

Complications of a pneumothorax

A pneumothorax can cause complications, such as:

- Repeated episodes of pneumothorax in the future.
- Infection in the pleural space (empyema, or pyopneumothorax).
- Fluid inside the lung itself if it re-expands too quickly (re-expansion pulmonary oedema).
- Bleeding into the pleural space (haemothorax, or haemopneumothorax).
- Tension pneumothorax; high-pressure air inside the pleural space can cause respiratory failure (inability to breathe) and ultimately a cardiac arrest (the heart stopping beating). A tension pneumothorax can be lethal if not treated urgently.

Pneumothorax treatment

No treatment

You may not need any treatment if you have a small pneumothorax. The small tear that caused the leak usually heals within a few days (sometimes as little as 1-3 days), especially in cases of primary spontaneous pneumothorax. Air then stops leaking in and out of the lung. The trapped air of the pneumothorax is gradually absorbed into the body.

A doctor [may advise an X-ray](#) in 7-10 days to check that it has gone. You may need painkillers for a few days if the pain is bad.

Removing the trapped air

This may be needed if there is a larger pneumothorax or if you have other lung or breathing problems. As a rule, a pneumothorax that makes you breathless is best removed.

The common method of removing the air is to insert a very thin tube through the chest with the aid of a needle. (Some local anaesthetic is injected into the skin first to make the procedure painless.)

A large syringe with a three-way tap is attached to the thin tube that is inserted through the chest. The syringe sucks out some air and the three-way tap is turned. The air in the syringe is then expelled into the atmosphere. This is repeated until most of the air of the pneumothorax is removed.

Sometimes a larger chest tube is inserted 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 there for a few days to allow the lung tissue that has torn to heal.

Treating repeated episodes of pneumothorax

Some people have repeated episodes of spontaneous pneumothorax. If this occurs, a procedure may be advised with the aim of preventing the condition from coming back.

For example, an operation is an option if the part of the lung that tears and air leaks out. It may be a small bleb on the lung surface, which can be removed.

Another procedure that may be advised is for an irritant powder (usually a kind of talc powder) to be put on the lung surface. This causes inflammation which then makes the lung surface stick to the inside of the chest wall.

A lung specialist will be able to give the pros and cons of the different procedures. The procedure advised may depend on your general health and on whether you have an underlying lung disease.

Preventing a pneumothorax

If you are a smoker and have had a primary spontaneous pneumothorax, you can reduce your risk of it happening again by [stopping smoking](#). Smoking tobacco, smoking cannabis, and vaping all increase the risk of a pneumothorax.

Flying, travel, and diving

It can be dangerous to fly if you have a pneumothorax. Do not fly until you have the 'all clear' from your doctor following a pneumothorax. This is usually around 7 days after a repeat X-ray has confirmed that the pneumothorax has disappeared completely.

Also, do not go to remote places where access to medical care is limited until you have the 'all clear' from a doctor.

Scuba diving increases the risk of developing a tension pneumothorax, which can be fatal. People who have had a pneumothorax before are usually advised not to go scuba diving; they need a full evaluation by a specialist in diving medicine if they still want to do so.

Further reading

- [British Thoracic Society Guideline for pleural disease](#); British Thoracic Society - BMJ (2023).
- [Schnell J, Koryllos A, Lopez-Pastorini A, et al](#); Spontaneous Pneumothorax. Dtsch Arztebl Int. 2017 Nov 3;114(44):739-744. doi: 10.3238/arztebl.2017.0739.
- [Goldman RD](#); Spontaneous pneumothorax in children. Can Fam Physician. 2020 Oct;66(10):737-738.

- [Carson-Chahhoud KV, Wakai A, van Agteren JE, et al](#); Simple aspiration versus intercostal tube drainage for primary spontaneous pneumothorax in adults. Cochrane Database Syst Rev. 2017 Sep 7;9:CD004479. doi: 10.1002/14651858.CD004479.pub3.

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