CONDITION

Tracheal rupture

A tracheal rupture is a tear in the wall of the windpipe that can let air escape into nearby tissues.

WHAT IT IS
A tear in part or all of the windpipe wall

BODY SYSTEM
Breathing system

MAIN SYMPTOMS
Breathlessness, chest or neck pain, swelling, coughing blood

WHAT CAUSES IT
Trauma, breathing-tube injury, or rarely spontaneous tearing

HOW IT IS DIAGNOSED
Chest CT and bronchoscopy

MAIN TREATMENT
Airway support, monitoring, endoscopic treatment, or surgical repair

CAN IT BE CURED?
Yes - with timely airway care and healing

IS IT AN EMERGENCY?
Yes, especially with breathing difficulty or neck swelling

LONG-TERM OUTLOOK
Often good after treatment; severe injuries can be fatal

Overview

A tracheal rupture is a tear in the wall of the trachea, commonly called the windpipe. The trachea carries air from your throat toward the two main airways entering the lungs.

The tear may affect only part of the tracheal wall or go through its full thickness. It can also extend into a main bronchus, one of the large airways leading into a lung. Doctors may use the broader term tracheobronchial injury when either area is involved.

A rupture can allow air to leak into the neck, chest, or space around a lung. This may interfere with breathing and can allow infection to develop around structures in the centre of the chest.

Tracheal rupture is uncommon. It most often follows a major injury or happens as a complication of placing a breathing tube. Rarely, severe coughing or vomiting can contribute to

a spontaneous tear.

This condition requires urgent hospital assessment. Some small, stable tears can heal without an operation, but they still need specialist monitoring. Larger or unstable injuries may require endoscopic treatment or surgery.

Symptoms

Symptoms often begin at the time of the injury or airway procedure, but they can sometimes appear hours or days later.

Possible symptoms include:

Escaped air may collect under the skin. This is called subcutaneous emphysema . The area may look swollen and feel crackly or like bubble wrap when touched.

Air can also collect in the centre of the chest, known as pneumomediastinum , or around a lung, known as pneumothorax . A pneumothorax may cause sudden breathlessness and one-sided chest pain.

In someone receiving mechanical ventilation, the first sign may be difficulty delivering enough air through the breathing tube. There may be a persistent air leak, falling oxygen levels, or rapidly increasing swelling around the neck or chest.

Not every person has obvious symptoms. A small tear may first be noticed on a scan performed after trauma or because symptoms continue after an airway procedure.

- Shortness of breath or difficulty breathing
- Chest, throat, or neck pain
- A new or worsening cough
- Coughing up blood
- A hoarse or weak voice
- Pain or difficulty when swallowing
- Noisy breathing
- Swelling of the neck, face, or upper chest

Causes and risk factors

Tracheal rupture can result from a direct injury to the neck or chest. Possible causes include

vehicle crashes, falls, crushing injuries, penetrating wounds, or a forceful blow to the front of the neck.

Another important cause is an airway procedure. A tear may occur while an endotracheal tube is being passed through the mouth into the trachea for an operation or emergency breathing support. It can also occur during a tracheostomy, which creates an opening through the neck into the trachea.

Procedure-related injury may be associated with difficult or repeated tube placement, emergency intubation, movement of the tube, or pressure from the inflatable cuff that seals the airway. A rupture can happen even when a procedure is performed appropriately.

Tissue may be easier to injure when the tracheal wall is already fragile. Factors that may contribute include previous airway surgery, radiation treatment to the chest or neck, long-term inflammation, or medicines and illnesses that weaken tissue healing. These factors do not mean that a rupture will occur.

A spontaneous rupture is much less common. It has been reported after forceful coughing or vomiting, when pressure inside the airway rises suddenly. Sometimes no single cause is identified.

Diagnosis

Breathing and circulation are assessed first. If necessary, the medical team will support the airway before completing all diagnostic tests.

A chest CT scan can show escaped air, a collapsed lung, the approximate site of injury, and damage to nearby structures. Contrast material may be used when injury to blood vessels or the oesophagus-the tube carrying food to the stomach-is suspected.

Bronchoscopy is the main test used to directly examine the injury. During this procedure, a thin flexible camera is passed into the airway. It allows the specialist to locate the tear and assess its length, depth, and relationship to the main bronchi.

A chest X-ray may show air outside the airway or a pneumothorax. However, a normal X-ray does not rule out a tracheal tear.

Further tests may be needed if there could also be an oesophageal injury. These can include a contrast swallow study or endoscopy. Blood tests help assess oxygen levels, blood loss, infection, and readiness for a procedure, but they cannot confirm the rupture by themselves.

Treatment and management

Treatment is planned by a team that may include airway, chest surgery, intensive care, respiratory, and trauma specialists. The approach is based on the tear's size and location, whether it involves the full tracheal wall, and how stable breathing is.

The immediate priority is maintaining a safe airway. A breathing tube may need to be positioned beyond the tear under bronchoscopic guidance. This requires careful planning because placing or moving a tube can enlarge the injury. A chest drain may be inserted if air has collected around a lung.

Some small or uncomplicated tears can be managed without surgery when breathing is stable, the air leak is controlled, and there is no serious infection or injury to the oesophagus. Management may involve close observation, oxygen or ventilation support, repeat imaging or bronchoscopy, and measures to reduce strain on the airway.

Antibiotics like amoxicillin or doxycycline are often considered when there is concern about contamination or infection in the chest. Their use and duration are chosen for the individual situation rather than being the same for everyone.

Surgery may be needed when:

During surgery, the tear is usually closed with stitches. Nearby muscle or other healthy tissue may be used to reinforce the repair. The operation may be performed through the neck or chest, depending on the injury's location.

An airway stent may be placed through a bronchoscope in selected cases. The stent covers the tear while it heals. This may be an option when surgery carries substantial risk or as a temporary bridge to another treatment. Stents need planned follow-up because they can move, collect mucus, or irritate the airway.

- Breathing or ventilation cannot be maintained safely
- The tear is large, deep, or worsening
- Air leakage continues despite drainage
- The oesophagus or other nearby structures are injured
- Damaged tissue is protruding into the airway
- Infection develops in the central chest
- A complete airway separation is suspected

Complications

A tracheal rupture can prevent air from reaching the lungs effectively. Severe injuries may lead to respiratory failure, meaning the body cannot get enough oxygen or remove enough carbon dioxide.

Air leaking around a lung can cause a pneumothorax. If pressure builds rapidly, it can compress the lung and affect blood flow through the chest. This is called a tension pneumothorax and requires emergency treatment.

Other possible complications include:

Later narrowing, called tracheal stenosis , may cause breathlessness, wheezing, or harsh noisy breathing. It can sometimes be mistaken for asthma. Follow-up helps identify this problem before it becomes severe.

- Infection in the lungs or central chest
- Ongoing leakage of air
- Bleeding
- Abnormal connections between the airway and oesophagus
- Scar tissue that narrows the trachea
- Weakening or collapse of part of the airway
- Voice or swallowing problems

Prevention

Not every tracheal rupture can be prevented. Emergency airway procedures and major trauma sometimes create risks that cannot be fully controlled.

Healthcare teams reduce procedure-related risk by choosing an appropriate breathing tube, checking cuff pressure, confirming the tube's position, and using specialist equipment when an airway is expected to be difficult. These are clinical safety measures rather than steps you are expected to manage yourself.

Seat belts, appropriate vehicle restraints, and protective equipment for work or sport can reduce the chance of serious neck and chest trauma. They cannot prevent every injury.

There is no reliable way to prevent a spontaneous rupture caused by a sudden pressure increase in the airway. If you have known airway damage or previous tracheal surgery, make sure this history is shared before anaesthesia or another airway procedure.

Living with it and what to expect

The first stage of recovery usually takes place in hospital. The length of stay is influenced by the injury's severity, whether surgery was needed, and whether the lungs or other structures were also damaged.

A treated tear may take several weeks to heal. During this period, coughing, throat discomfort, tiredness, or a hoarse voice may gradually improve. Recovery from major trauma or intensive care can take longer than healing of the trachea itself.

Follow-up may include bronchoscopy, CT imaging, breathing tests, or examination of a surgical wound. If a stent was used, it needs specific monitoring and usually a later procedure to remove or replace it.

Your team may temporarily limit strenuous exercise, heavy lifting, air travel, or activities that cause major pressure changes. Restrictions are based on whether the tear has sealed and whether any air remains around the lungs or in the chest.

Many people who receive timely, successful treatment return to their usual activities without a lasting airway problem. More extensive injuries can leave narrowing, weakness, voice changes, or reduced exercise tolerance. These problems may appear months later and can require further treatment.

Routine follow-up remains important even if you feel well. New breathlessness, wheezing, repeated chest infections, or noisy breathing can be signs of scar-related narrowing rather than the original tear reopening.

When to get medical help

A suspected tracheal rupture is an emergency. Call emergency services if you develop any of the following after a neck or chest injury, intubation, tracheostomy, bronchoscopy, or operation:

Do not drive yourself if breathing is difficult or symptoms are progressing.

If you are recovering from a diagnosed rupture, seek prompt medical advice for fever, increasing cough, foul or discoloured mucus, worsening swallowing pain, new wheezing, or increasing swelling. These symptoms may indicate infection, continued air leakage, or airway narrowing.

Keep routine follow-up appointments even when recovery appears to be going well. They are used to confirm healing, monitor any stent or repair, and look for later scar narrowing.

- New or rapidly worsening difficulty breathing

- Fast-growing swelling of the neck, face, or chest
- Blue, grey, or unusually pale lips or skin
- Severe chest or neck pain
- Coughing up more than a small streak of blood
- Harsh or high-pitched breathing sounds
- Fainting, confusion, or extreme drowsiness

Common questions

Can a tracheal rupture heal without surgery?

Some small, stable tears can heal without an operation. This is only considered when breathing is secure, air leakage is controlled, and there is no major associated injury or infection. Hospital monitoring and specialist follow-up are still needed.

How serious is a tracheal rupture?

It can be life-threatening if it blocks airflow, causes a tension pneumothorax, or leads to a deep chest infection. The outlook is often good when the injury is recognised early and treated successfully. Severe trauma and delayed diagnosis increase the risk of complications.

Can a breathing tube cause a tracheal rupture?

Yes. Tracheal rupture is a recognised but uncommon complication of endotracheal intubation and tracheostomy. It may be discovered during the procedure or after symptoms such as neck swelling, breathlessness, or an unexplained air leak develop.

How long does a tracheal tear take to heal?

There is no single healing time. The tracheal wall may take several weeks to heal, while recovery from surgery, ventilation, infection, or other traumatic injuries can take longer. Follow-up may continue for months to check for narrowing.

Is a tracheal rupture the same as a collapsed trachea?

No. A rupture is a tear in the airway wall. A collapsed or floppy trachea usually refers to tracheomalacia, in which weakened airway walls narrow during breathing. A severe injury can sometimes contribute to later airway weakness.

Can I exercise or fly after treatment?

Wait until your specialist team confirms that the tear has healed and that no air remains around the lungs or in the chest. The timing differs after observation, surgery, chest drainage, and

stent treatment.

Sources

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