CONDITION

Atelectasis

Learn what atelectasis is, why part of a lung may not fully expand, how it is diagnosed, and which breathing treatments and warning signs matter.

WHAT IT IS
Part or all of a lung not fully expanded

BODY SYSTEM
Lungs and breathing

MAIN SYMPTOMS
Shortness of breath, cough, chest discomfort, low oxygen

WHAT CAUSES IT
Airway blockage, external compression, shallow breathing

HOW IT IS DIAGNOSED
Chest X-ray or CT scan

MAIN TREATMENT
Breathing exercises, airway clearance, underlying-cause treatment

CAN IT BE CURED?
Sometimes, when airflow and expansion return

IS IT AN EMERGENCY?
Sometimes, with severe or rapidly worsening breathing difficulty

LONG-TERM OUTLOOK
Often improves without lasting damage, but extensive cases may cause respiratory failure

Overview

Atelectasis means that part or all of a lung is not fully expanded. The tiny air sacs in the affected area, called alveoli, contain less air than usual or have collapsed. This reduces the amount of lung available to move oxygen into the blood.

Atelectasis is not the same as a collapsed lung caused by air leaking into the space around the lung. That condition is called pneumothorax. However, a pneumothorax can press on the lung and cause atelectasis.

Atelectasis is common during and after surgery, especially when general anesthesia, pain, or bed rest leads to shallow breathing. It can also develop when mucus, a foreign object, or a growth blocks an airway. Fluid, air, or another problem outside the lung may compress it.

A small area of atelectasis may cause no symptoms and may resolve once a person takes deeper breaths or the cause is treated. A larger area can lower blood oxygen and make breathing difficult. The effect depends on how much lung is involved, how quickly the problem developed, and whether the person has another heart or lung condition.

Atelectasis matters because an area that is not expanding properly may clear mucus less effectively. In some situations, this can contribute to infection or continued breathing problems. Finding and treating the underlying cause is therefore an important part of care.

Symptoms

Small areas of atelectasis often do not cause noticeable symptoms. The condition may be found on a chest X-ray performed for another reason.

When symptoms occur, they may include:

Symptoms may be hard to separate from the effects of surgery, pain medicines, pneumonia, asthma, or another illness. A clinician may need to assess the full situation rather than relying on symptoms alone.

Seek prompt medical advice for new or worsening breathlessness, fever, increasing cough, thick or discolored mucus, new chest discomfort, or oxygen readings below the range given by your care team.

Call emergency services for severe or rapidly worsening difficulty breathing, blue or gray lips or face, confusion, fainting, or severe chest pain. These symptoms can have several causes and need immediate assessment.

- Shortness of breath or faster breathing
- A cough, sometimes with mucus
- Chest discomfort
- A feeling that it is difficult to take a full breath
- Lower-than-usual oxygen levels
- Fever if a lung infection is also present

Causes and risk factors

Atelectasis develops when air cannot reach part of the lung or when pressure prevents that area from expanding.

Airway blockage is one possible cause. Thick mucus can plug an airway, particularly after surgery or in people who have difficulty coughing. Less commonly, an inhaled object, airway narrowing, or a tumor may block airflow. The air already present beyond the blockage is gradually absorbed into the blood, allowing the air sacs to lose volume.

Pressure from outside the lung can also compress lung tissue. Possible causes include fluid around the lung, known as a pleural effusion; air around the lung, known as a pneumothorax; bleeding in the chest; or a large mass. Marked abdominal swelling can also limit movement of the diaphragm, the main muscle used for breathing.

Surgery and general anesthesia are frequent settings for atelectasis. Anesthesia changes normal breathing patterns and can reduce lung volume. A breathing tube, mucus, pain, sedating medicines, and remaining in bed may add to the risk. Abdominal and chest operations can make deep breathing or coughing uncomfortable.

Reduced surfactant is another mechanism. Surfactant is a substance that helps keep the lung's tiny air sacs open. It may be reduced or work poorly in conditions such as acute respiratory distress syndrome. Premature babies can also lack enough surfactant, although neonatal atelectasis requires specialized care and differs from the usual adult postoperative form.

Factors that may make atelectasis more likely include:

Having a risk factor does not mean that atelectasis will develop. Preventive care is based on a person's procedure, health, mobility, and ability to breathe deeply and clear secretions.

- Recent surgery or prolonged immobility
- Pain that limits deep breathing
- Sedation or reduced alertness
- Weak coughing or difficulty clearing mucus
- Smoking or chronic lung disease
- Neuromuscular conditions that weaken breathing muscles
- Obesity, particularly around the time of surgery
- An airway narrowed by a foreign object, scarring, or a growth

Diagnosis

A clinician begins by asking about symptoms, recent surgery, choking episodes, lung conditions, medicines, and how quickly the problem developed. During the examination, the

clinician may listen for reduced breath sounds or crackling sounds and check breathing rate, heart rate, temperature, and blood oxygen.

A chest X-ray is often the first imaging test. It may show loss of volume in part of the lung, changes in the position of nearby structures, or another cause such as a pleural effusion. Atelectasis and pneumonia can sometimes look similar, and both can be present at the same time.

A CT scan provides more detailed images. It may be used when the X-ray does not explain the findings, when atelectasis persists, or when an airway blockage or mass is suspected.

Other tests depend on the circumstances:

Imaging findings alone do not always reveal why the lung is underexpanded. The diagnosis is interpreted together with symptoms, examination findings, and recent medical events.

- Pulse oximetry uses a sensor, often placed on a finger, to estimate blood oxygen.
- Blood tests may help evaluate infection or other illness.
- Bronchoscopy uses a thin, flexible camera passed into the airways. It can identify and sometimes remove a mucus plug or foreign object. It may also allow tissue or fluid samples to be collected.
- Ultrasound may help detect fluid or air around the lung, particularly at the bedside.

Treatment and management

Treatment depends on the size and cause of the atelectasis, the person's oxygen level, and any underlying illness. A small postoperative area may improve with movement and deeper breathing. Atelectasis caused by an obstructed airway or pressure around the lung may require a procedure.

For atelectasis related to shallow breathing or retained mucus, the care plan may include:

An incentive spirometer is a handheld device that provides visual feedback during a slow, deep breath. Some surgical teams include it in a broader plan involving coughing, mobility, and pain control. Evidence does not support relying on incentive spirometry alone to prevent postoperative lung complications. Patients should use the device only as instructed and should not force repeated breaths to the point of dizziness.

Airway-clearance techniques may help when mucus is contributing to the problem. These can include directed coughing, breathing exercises, chest physiotherapy, suctioning, or devices that create pressure or vibration during exhalation. The best method depends on whether secretions are present and whether the person can cough effectively. Routine

airway-clearance treatment is not useful for every patient.

Supplemental oxygen may be given when blood oxygen is low. Oxygen supports the body while the underlying problem is addressed, but it does not by itself reopen an obstructed airway.

If breathing remains inadequate, noninvasive positive-pressure support may be considered. This uses a tight-fitting mask to provide pressurized air. More severe breathing failure may require a breathing tube and mechanical ventilation. These measures are generally used in monitored medical settings.

A clinician may perform bronchoscopy when a mucus plug, inhaled object, or another blockage is suspected and less invasive measures are not enough. A foreign object usually needs to be removed. A tumor or fixed airway narrowing may require evaluation by lung, cancer, or surgical specialists.

When fluid, air, or blood outside the lung is causing compression, treating that problem may allow the lung to expand. Management may involve drainage, a chest tube, or another procedure, depending on the cause and amount.

Antibiotics like amoxicillin or doxycycline do not treat atelectasis itself. They may be used if there is evidence of a bacterial infection such as pneumonia. Medicines that thin or open the airways may be helpful in selected people with thick secretions or an airway condition, but they are not required for every case.

Stopping smoking supports healing and improves mucus clearance. Before planned surgery, patients can ask how to prepare, manage chronic lung disease, control pain, and become active safely afterward.

- Sitting upright and changing position regularly
- Walking or increasing activity when medically safe
- Taking slow, deep breaths and coughing as instructed
- Supporting a surgical incision with a pillow while coughing
- Receiving adequate pain control to allow deeper breathing
- Working with a respiratory therapist or physical therapist

Complications

Many cases improve without lasting lung damage once normal airflow and expansion return. Complications are more likely when a large area is involved, the cause is not corrected, or

significant heart or lung disease is already present.

Possible complications include:

Atelectasis can sometimes be a sign of an underlying blockage. Persistent or unexplained findings deserve follow-up even when symptoms are mild.

- Low blood oxygen: Less expanded lung tissue is available to transfer oxygen into the blood.
- Pneumonia: Mucus may collect in poorly ventilated areas, although atelectasis does not always lead to infection.
- Respiratory failure: Extensive atelectasis can make the lungs unable to provide enough oxygen or remove enough carbon dioxide.
- Persistent lung changes: Long-standing obstruction or repeated episodes may contribute to scarring or widening and damage of the airways, called bronchiectasis.

Follow up

Follow-up depends on the cause and clinical setting. After surgery, the care team may monitor oxygen levels, breathing, mobility, cough strength, and pain control. Improvement may be judged by symptoms and examination rather than repeated imaging in every case.

A follow-up chest X-ray or CT scan may be recommended when atelectasis was extensive, does not improve as expected, keeps returning in the same area, or has no clear cause. Further evaluation may be particularly important when an airway obstruction is possible.

At home, follow the activity, breathing-exercise, wound-care, and equipment instructions provided by the care team. Contact a clinician if breathlessness is not improving, exercise tolerance declines, fever develops, mucus increases, or symptoms return after initially getting better.

Routine follow-up is appropriate for reviewing recovery, test results, smoking cessation, or management of an underlying lung condition. Severe breathing difficulty, blue or gray discoloration, confusion, fainting, or severe chest pain requires emergency care rather than waiting for a scheduled appointment.

Sources

- U.S. National Library of Medicine. "Atelectasis." MedlinePlus Medical Encyclopedia . National Institutes of Health.
- Merck Manual Professional Edition. "Atelectasis." Pulmonary Disorders: Bronchiectasis and Atelectasis .
- Duggan M, Kavanagh BP. Pulmonary atelectasis: a pathogenic perioperative entity. Anesthesiology . 2005;102(4):838-854. doi:10.1097/00000542-200504000-00021.
- Hedenstierna G, Edmark L. Mechanisms of atelectasis in the perioperative period. Best Practice & Research Clinical Anaesthesiology . 2010;24(2):157-169. doi:10.1016/j.bpa.2009.12.002.
- Restrepo RD, Wettstein R, Wittnebel L, Tracy M. Incentive spirometry: 2011. Respiratory Care . 2011;56(10):1600-1604. doi:10.4187/respcare.01471.
- Strickland SL, Rubin BK, Drescher GS, et al. AARC clinical practice guideline: effectiveness of nonpharmacologic airway clearance therapies in hospitalized patients. Respiratory Care . 2013;58(12):2187-2193. doi:10.4187/respcare.02925.