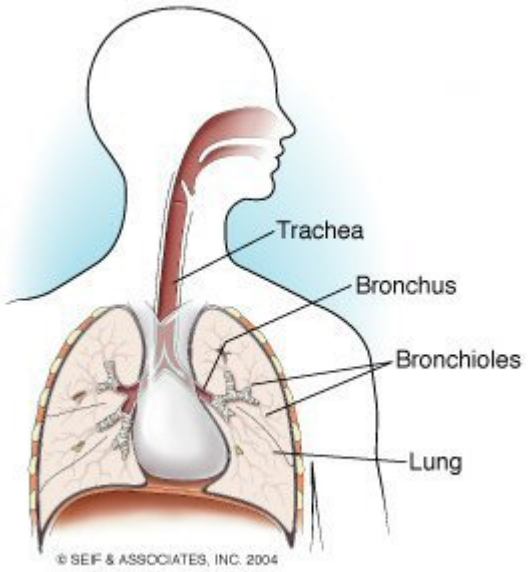
Atelectasis, Pediatric

Atelectasis involves a collapse of the small air sacs in the lungs. Atelectasis may come on suddenly (*acute*) or can happen over a long time (*chronic*). With atelectasis, there may also be a widening of the bronchi called bronchiectasis. Bronchiectasis (pronounced brong-ke-EK-ta-sis) is a disease of the lungs in which the tubes lining the lungs have changed. This makes it difficult for secretions to be expelled. This leads to infections which are difficult to treat. There is often a persistent, productive cough. Those who smoke, or children of parents who smoke, have a greater risk of developing these lung problems.



CAUSES

The most common cause of atelectasis is obstruction of a bronchus. The bronchi are the two large branches of the airway which lead directly to the lungs. Smaller airways (*bronchioles*) can also become blocked. Blockages may be caused by mucus plugs, tumors, or inhaled foreign bodies. Outside pressure from tumors, enlarged lymph nodes, or fluid (*pleural effusion*) may cause the problem. A collapse of a lung when air gets between the lung and the rib cage (*pneumothorax*) may also lead to atelectasis.

In newborns, atelectasis occurs because the lungs do not expand properly at birth. This can occur for several reasons including prematurity, low oxygen levels and blockage of the airway due to secretions at birth.

Atelectasis may be the result of:

- When an airway becomes blocked, the air in the small air sacs of the lung (*alveoli*) beyond the blockage is absorbed into the bloodstream. This causes the alveoli to collapse. After a little time, the collapsed lung tissue may fill with blood cells, serum, and mucus. This abnormal collection of material is likely to become infected.
- Acute atelectasis is a common problem after surgery. During an operation, portions of the lung may not expand as well as usual. This leads to collapse of the small air sacs. Injuries can cause a similar collapse. Medications that depress breathing (*respiration*) may also lead to atelectasis. Anything that decreases the size of breaths taken in can cause atelectasis. This could be pain, a tight bandage around the chest, muscle weakness, nerve problems, broken ribs, etc.
- Any of the causes of acute atelectasis may persist and become chronic. When they become longstanding, infection, scarring and other problems are likely to follow. When they are severe enough, shortness of breath and heart problems may follow.

SYMPTOMS

- The loss of working lung tissue leads to shortness of breath. This decreases the blood oxygen level. That makes the heart work harder and beat faster. There may a blue color to the nail beds and mucous membranes, such as the lips and mouth (*cyanosis*).
- The severity of symptoms depends on how rapidly this happens and over how much time.
- The symptoms are not as bad if the problems come on slowly over a long period of time. This is because the body has time to adapt.
- A sudden severe change can result in loss of blood pressure (*shock*) and even death.

DIAGNOSIS

Your caregiver may suspect atelectasis based on symptoms and physical findings. A chest x-ray may be done. Blood work and more specialized x-rays are sometimes required.

TREATMENT

- The main treatment for sudden atelectasis is correction of the underlying cause. A blockage that cannot be removed by coughing or by suctioning the airways often can be removed by bronchoscopy. Bronchoscopy is looking into the lung with a slender, flexible instrument. It can be used to take biopsies or to remove a foreign body.
- Antibiotics are given for infection. Chronic atelectasis often is treated with antibiotics because infection is expected.
- Sometimes affected lung parts are surgically removed. This is done if:
  - Recurring infections become disabling.
  - Bleeding is significant.
  - The problems persist despite treatment.
- If a tumor is blocking the airway, relieving the obstruction by surgery, radiation therapy, or chemotherapy may prevent the condition from progressing to pneumonia.
- Atelectasis due to problems with the inside surface of the lungs (*ineffective surfactant*) is directed at treating the low blood oxygen. This is often done with mechanical ventilation. Surfactant drugs are lifesaving for premature babies that are deficient.

Possible complications include:

- Pneumonia.
- Germs in the blood stream (*sepsis*).
- Bronchiectasis.
- Fluid accumulating in the lungs.
- Lung failure.
- Infection.

Most causes of atelectasis are easily treated and do well. Those caused by a tumor will depend on the ease of treating that tumor. In some cases it is not possible to determine the cause of atelectasis early on. So it is important to follow-up with your caregiver.

PREVENTION

- Do not subject your child to second hand smoke. This is especially necessary before or following surgery.
- Following a surgery have your child:
  - Breathe deeply.
  - Cough regularly.
  - Move around as soon as possible.
- Using breathing devices to encourage deep breathing and exercises including changing positions to help drainage of secretions may help prevent atelectasis.
- Chest deformities and neurologic conditions causing shallow breathing may benefit from mechanical devices to help breathing. One method is continuous positive airway pressure. These machines deliver oxygen through a nose or face mask. They make sure the airways do not collapse. They do this by keeping a positive pressure in the airway. These devices keep positive pressure even at the end of a breath.

SEEK IMMEDIATE MEDICAL CARE IF:

- You develop increasing problems with your breathing.
- You develop a fever over 102° F (38.9° C).
- You develop severe chest pain.
- You develop severe coughing or cough up any blood.

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