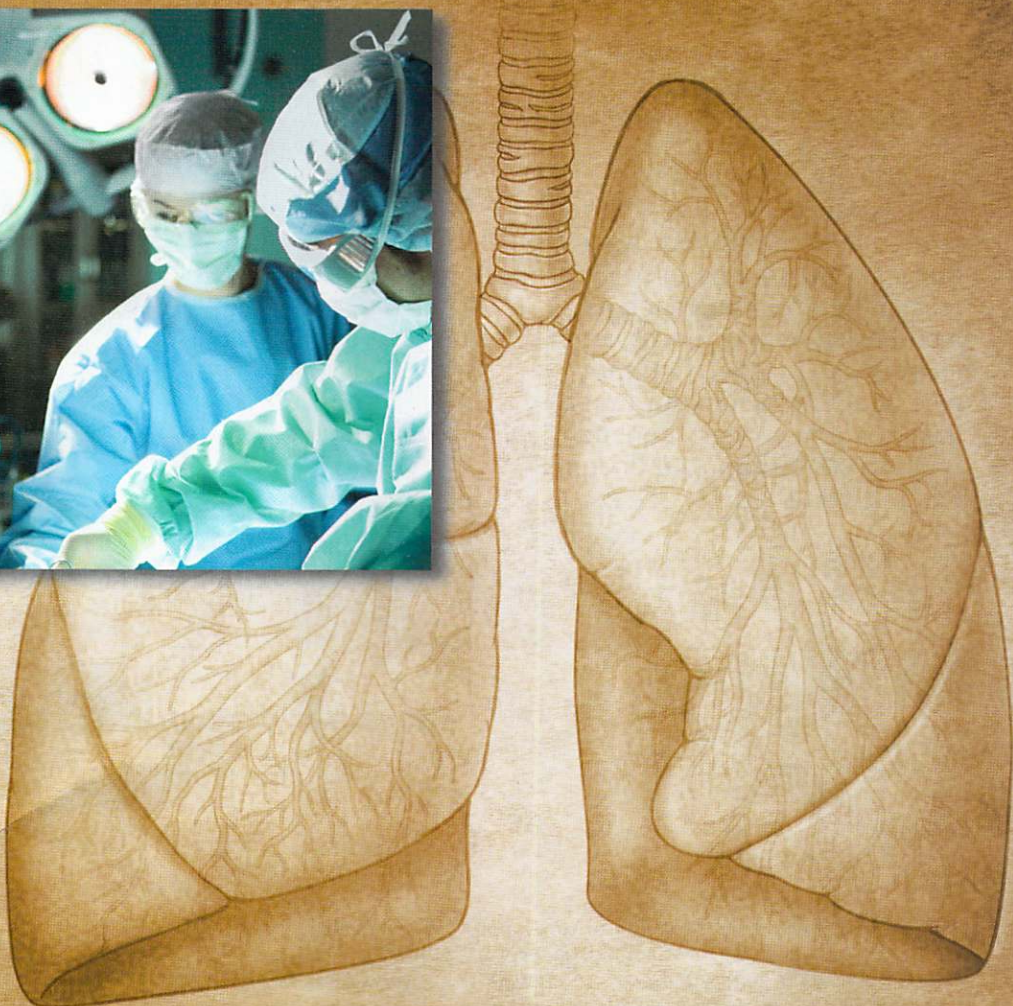


Lung Surgery

Treatment for Lung Problems

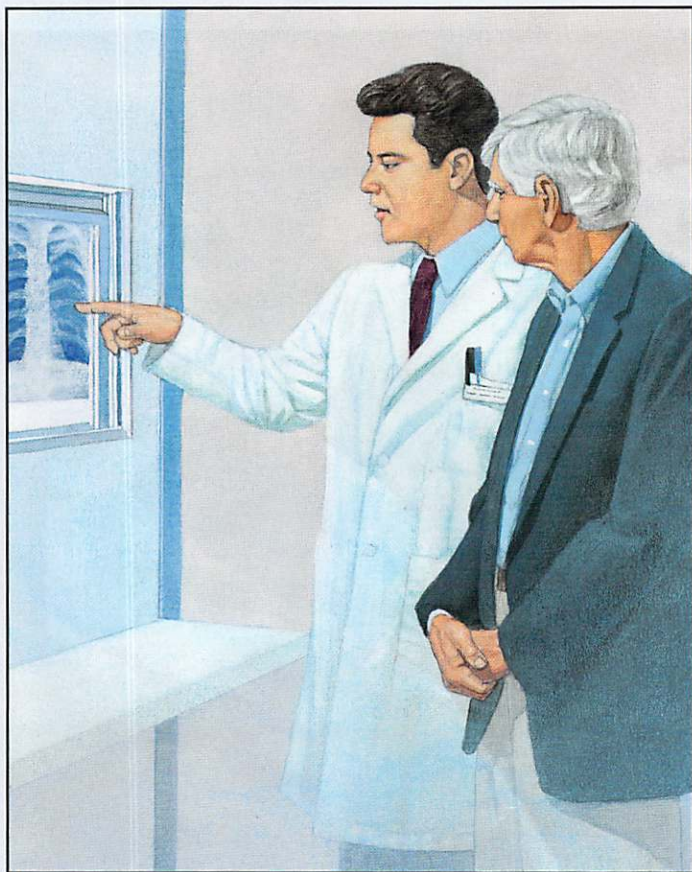


A Problem with Your Lungs

Your doctor has told you that you need surgery for your lung problem. Surgery alone may treat your lung problem. Or you may need other treatments as well. There are two types of surgery: thoracoscopy and thoracotomy. Your doctor will choose the one that's right for you. It's normal to be concerned about surgery. You may want to know how it will affect your health. And you may wonder what the future holds. Read this booklet to learn more about what to expect.

What Can Lung Surgery Do for Me?

Your doctor is recommending lung surgery because it's the best way to treat your lung condition. If a problem has been found in your lung during a routine test (such as an x-ray), surgery may be needed to confirm the exact diagnosis. This is especially true when a mass is found in your lung. Surgery can also be used to treat lung problems such as a collapsed lung. If necessary, surgery can be done to remove part or all of one of your lungs. The goals of surgery depend on your condition. Your doctor can tell you more.



This booklet is not intended as a substitute for professional medical care. Only your doctor can diagnose and treat a medical problem.

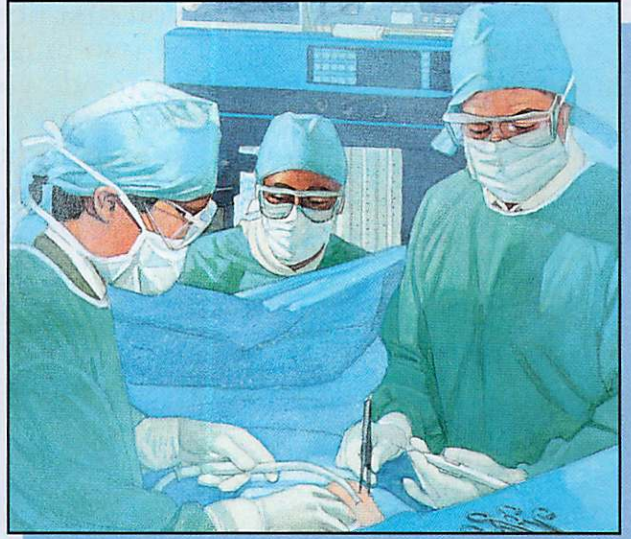
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What Is Lung Surgery?

Lung surgery involves entering the chest wall to get to the lung. There are two ways to do this. Your surgeon will choose the method that's best for your condition.

- **Thoracoscopy** (also known as VATS) uses several small incisions. The surgeon places a thin tube containing a camera through one incision and can view a lung on a video monitor.
- **Thoracotomy** uses a larger incision in the chest. This opening allows the surgeon to see the lung directly.

Either procedure may be done alone, or a thoracoscopy may be performed to help decide whether a thoracotomy is needed.



Do I Have Other Options?

Your doctor will give you as much information as possible to help you understand why surgery is the best option for you. You'll be told what's involved, how long your recovery will be, and what kind of results you might expect. Your doctor will also outline any other treatment options you may have. If you have concerns or questions, write them down and bring them with you to your next appointment.

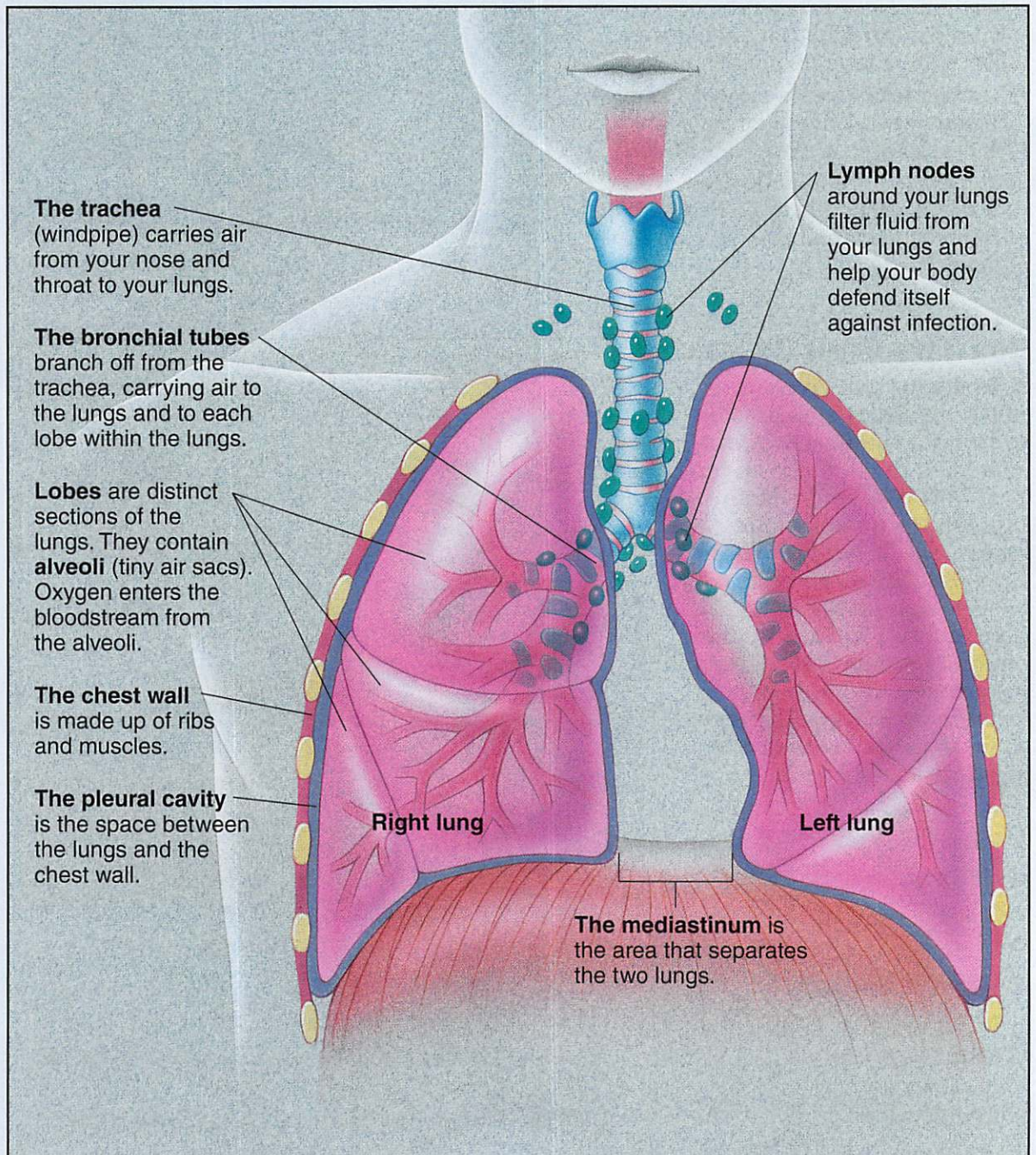


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Inside Normal Lungs

To see how surgery can help, you first need to understand the anatomy of your lungs. The two lungs, which take up most of the space in your chest inside your rib cage, are divided into sections called **lobes**—three in the right lung and two in the left. Air flows into and out of the lungs and lobes through **bronchial tubes** (breathing passages). Each lobe contains many microscopic air sacs called **alveoli**.

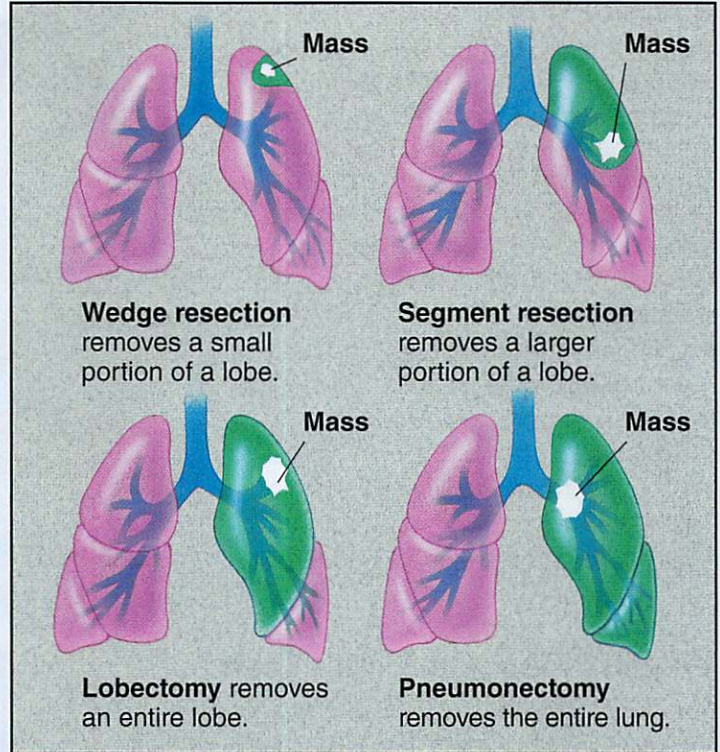


Common Reasons for Lung Surgery

Surgery is often done to get a closer look at the inside of the lungs and to help treat lung problems. If a mass is found in the lung, surgery can help determine its cause. If necessary, the mass may also be removed. Surgery may be done for other conditions, as well, such as a collapsed lung or fluid around the lung.

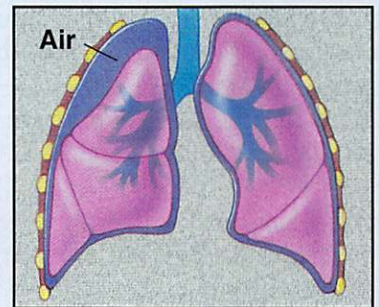
A Lung Mass

If a mass has been found in the lung, a **biopsy** (sample) can be removed and examined to determine whether the growth is **benign** (not cancerous) or **malignant** (cancerous). Other areas can also be examined to check whether the mass has spread. If the mass needs to be removed, its size, location, and spread determine how much of the surrounding lung also needs to be removed. Removal of part or all of a lung is called lung **resection**.



A Collapsed Lung

If a portion of the lung is thin or ruptured, air may leak into the **pleural cavity** (the space between the lungs and the chest wall). If air collects here, the lung may collapse (this is called **pneumothorax**). Tubes placed during surgery can drain air from the pleural cavity so the lung re-expands. During surgery, the lung can also be repaired so it's less likely to collapse again.



Other Lung Conditions

Fluid may collect in the pleural cavity around the lungs. One common cause of this is a lung infection, which may be a complication of certain types of surgery or an illness such as pneumonia. Tubes can be placed in the pleural cavity to drain fluid and help the lungs heal.

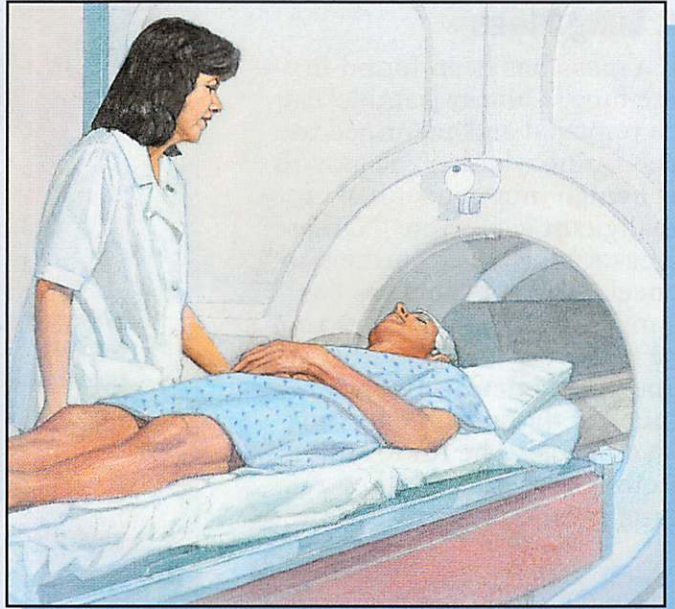
Your Evaluation

To help your doctor evaluate your lungs and diagnose your condition, a variety of tests may be performed. You may already have had some of these tests, and others may be scheduled before your surgery. Your doctor uses the information gathered during these tests to help determine the best course of action for your condition.

Imaging Tests

Imaging tests, which take pictures of your lungs, can detect problems such as a mass, an infection, or air in the pleural cavity. However, they can't tell the doctor for certain whether a lung mass is benign or malignant. Imaging tests you may have include:

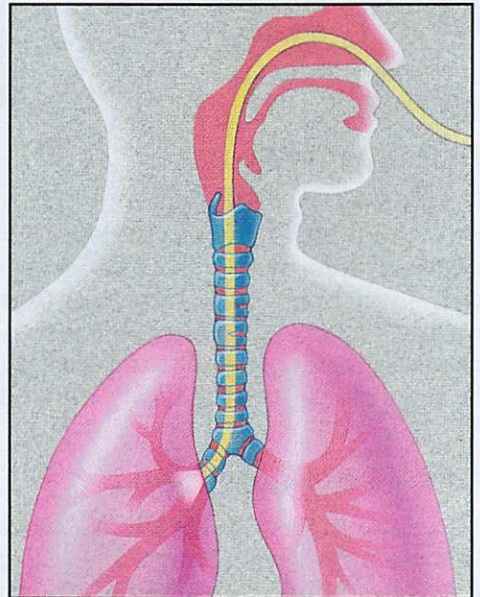
- **Chest x-rays**
- **CT** (computed tomography), also called CAT scans
- **MRI** (magnetic resonance imaging)
- **PET** (positron emission tomography)
- Other imaging tests as needed



Visualization and Biopsy Tests

Visualization tests show the inside of your lungs and the area around your lungs. A biopsy of lung cells or tissue may also be examined later under a microscope. You'll be told about anesthesia beforehand. Possible tests include:

- **Bronchoscopy**, which is done using a thin, lighted tube (**bronchoscope**) inserted through the nose or mouth to examine the breathing passages at the entrance to your lungs.
- **Mediastinoscopy**, during which a tube is inserted through an incision above the breastbone to look at the area between the lungs.
- **Mediastinotomy**, during which the lymph nodes in the chest are examined through an incision in the chest wall, and a biopsy may be done.
- **Needle biopsy**, which involves insertion of a needle through the chest wall or a bronchoscope to collect tissue or fluid.



Bronchoscopy gives a closer look at your breathing passages.

Other Tests

You may have tests to measure how well your lungs work. They include:

- **Spirometry**, which measures lung properties such as how much air your lungs can hold, and how much air is left in your lungs after you exhale. It also measures how fast you can empty your lungs of air.
- **Pulse oximetry**, which measures how much oxygen is passed from your lungs to your blood.
- **Arterial blood samples**, which show how much oxygen is in your blood.



Spirometry measures how well your lungs function.

Treatment Options for Lung Cancer

If a diagnosis of lung cancer is suspected or confirmed, your doctor can outline your treatment. These options depend mainly upon the location of the cancer in your lung and the extent, or **stage**, of the cancer. The stage of a cancerous lung mass is based on its size, the type of cancer cells it contains, and how far the cancer has spread. In early stages, cancer may be confined to one small area of the lung. In later stages, it may spread within the lungs or through the lymph nodes to other parts of the body.

Once the stage has been determined, the best treatment method can be chosen. You and your doctor can decide on a treatment plan that best fits your needs. Three methods are available to treat lung cancer. One method or a combination of methods may be used.

- **Surgery** removes part or all of a lung to try to eliminate the cancer.
- **Radiation therapy** uses high-energy rays to destroy cancer cells.
- **Chemotherapy** uses special medications to control cancer cells.

Thoracoscopy

Thoracoscopy is also called video-assisted thoracoscopic surgery (VATS). It is less invasive than thoracotomy. It is often used to repair a collapsed lung; to examine, biopsy, and stage a mass in the lung; or to drain fluid from around the lungs. Thoracoscopy is done through small incisions in the chest wall. If a thoracoscopy can't be continued safely, a thoracotomy (open procedure) may be done.

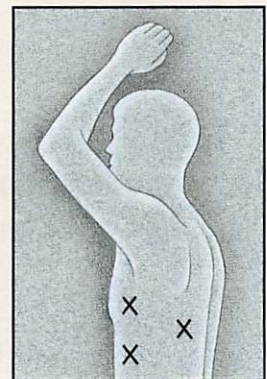
Preparing for Your Surgery

- Ask your doctor any questions you have about the procedure.
- Have blood tests or other routine tests that your doctor orders.
- If you smoke, stop immediately.
- Tell your doctor about any medications you're taking (including over-the-counter medications such as aspirin), and ask if you should stop taking them. Also mention any vitamins, herbs, or teas you take.
- Don't eat or drink anything after midnight the night before your surgery, or as directed.
- Be sure to arrive at the hospital on time the day of your surgery.



The Surgical Procedure

- The anesthesiologist gives you **general anesthesia**, which lets you sleep and keeps you free from pain during surgery. Once you're asleep, you're positioned comfortably on your side.
- Several small incisions are made in your side.
- The surgeon inserts a thin, tubelike instrument containing a tiny camera through one of the incisions. This camera allows the surgeon to view your lung on a video monitor. Surgical instruments are inserted through the other incisions.
- When the procedure is finished, one or more tubes may be temporarily placed in the chest to drain fluid and air. The tubes are connected to a special container. The incisions are then closed with sutures or staples.



Possible incision sites for thoracoscopy.

Risks and Complications

The risks of thoracoscopy include:

- Wound infection
- Bleeding
- Air leak from the lung, requiring a longer hospital stay
- Pain or numbness at the incision site
- Inflammation of the lungs (pneumonia)

Recovering in the Hospital

After surgery, you'll wake up in a recovery area. At first you may feel groggy and thirsty. An **IV** (intravenous) line provides you with fluids and medications to relieve pain, and monitors keep track of your breathing and heart-beat. To help keep your lungs clear and prevent inflammation, a respiratory therapist will teach you breathing exercises to do every hour or so.

Recovering at Home

When you return home, follow your doctor's instructions about how to care for your healing skin and lungs. These instructions may include the following:

- Take your pain medications as prescribed to help relieve soreness and make activity and deep breathing easier.
- Continue to do the breathing exercises taught to you by your therapist.
- Walk to keep your blood moving and strengthen your muscles, but avoid strenuous activity, heavy lifting, and driving for several weeks.
- Ask your doctor when you can go back to work.
- Resume sexual relations when you feel ready.
- Follow up with your doctor, who'll monitor your healing and discuss the results of the procedure.

Depending on your condition, a nurse or therapist will help you get up and walk soon after your surgery to keep your blood moving and improve healing. The hospital stay after a thoracoscopy is generally 1 to 4 days. If you have chest tubes, you won't go home until they're removed.



When to Call Your Doctor

Call your doctor if you have any of these symptoms after your procedure:

- Shortness of breath
- Very red or draining incision
- Sudden, sharp chest pain
- Fever over 101°F (38.3°C)
- Coughing up bright red blood

Thoracotomy: The Procedure

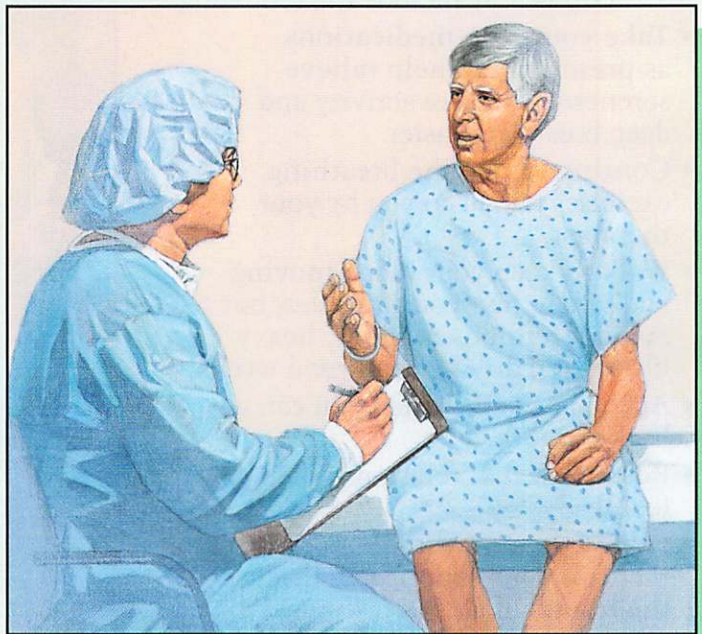
During a thoracotomy, your surgeon directly views a lung and the area around it. Additional procedures may be done, such as removing part or all of a lung if a mass is present. Your surgeon will give you instructions on how to get ready for the procedure and explain what the surgery can do to help treat your condition.

Preparing for Your Surgery

- Have blood tests or other routine tests that your doctor recommends.
- If you smoke, stop immediately.
- Ask your doctor about donating your own blood before surgery.
- Tell your doctor about any medications you're taking (including over-the-counter medications such as aspirin), and ask if you should stop taking them. Also mention any vitamins, herbs, or teas you take.
- Don't eat or drink anything after midnight the night before your surgery, or as directed.

Anesthesia

The anesthesiologist can discuss the type of medications you'll be given during the procedure and answer your questions. **General anesthesia** lets you sleep and keeps you free from pain during surgery. You may also receive an **epidural**, a thin, flexible tube, in your lower back. Medication flows through the tube to help relieve pain. Epidural medications can interfere with the muscle control in your lower body. So you may receive a bladder catheter to help drain your urine while the epidural is in place. Other pain-relieving procedures, such as a nerve block, may be done during the surgery.



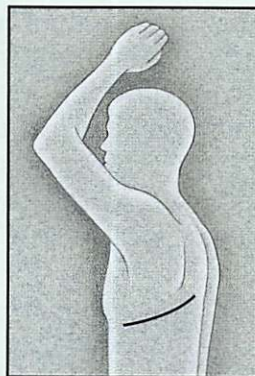
Risks and Complications

The risks associated with thoracotomy include:

- Risks of general anesthesia
- Wound infection
- Bleeding
- Inflammation of the lungs (pneumonia)
- Air leak from the lung, requiring a longer hospital stay
- Worsening of any existing heart problems
- Blockage of a blood vessel in the leg (deep vein thrombosis) with potential for blood clots in the lung (pulmonary embolism)

Reaching Your Lungs

Once you're asleep, you're positioned comfortably on your side and covered with sterile drapes. Your surgeon then makes an incision across your side. Your rib cage is separated to expose your lungs.

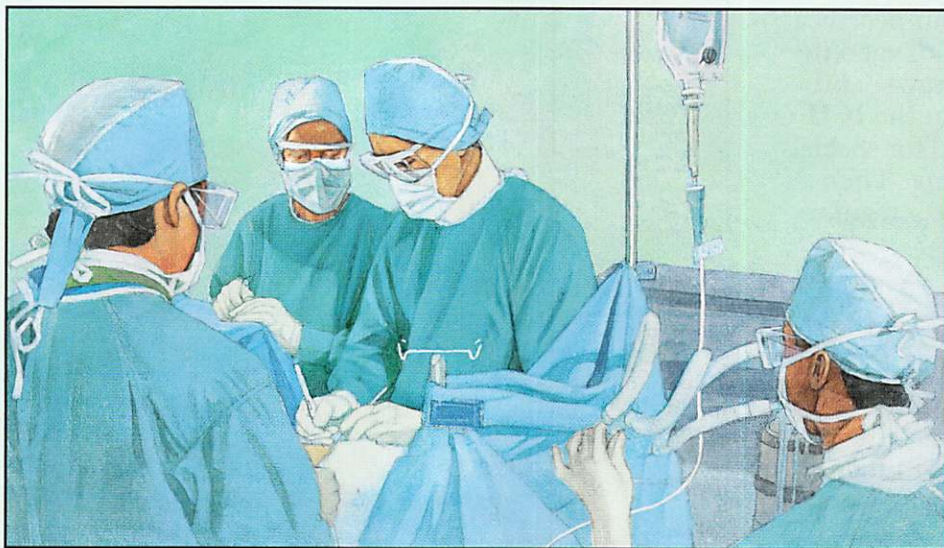


Possible incision site for thoracotomy.

The Surgical Procedure

The lung to be operated on is deflated, while a breathing tube helps your other lung continue working. The deflated lung can then be examined and any necessary procedure performed, including removing part or all of the lung. In some cases, nearby lymph nodes may be removed, as well.

When the procedure is finished, one or more tubes are placed in the chest temporarily to drain fluid and air. Then the rib cage is repaired and the muscle and skin are closed with sutures or staples.



Notes to Family and Friends

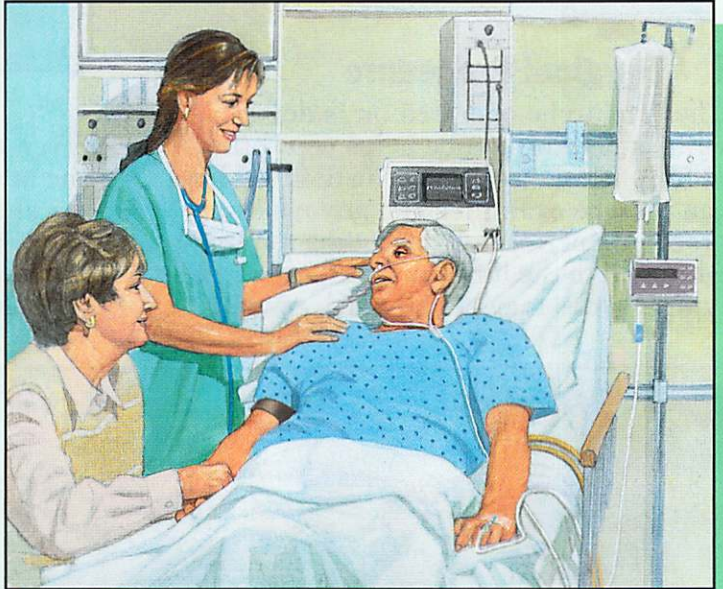
- The entire procedure, from preparation through surgery, may take 2 to 5 hours. Plan activities to help pass the time while you wait.
- After surgery, your loved one will be taken to the recovery room or another monitoring unit. You may be able to visit within a couple of hours.
- When you visit, be prepared to see your loved one surrounded by tubes and monitors. He or she may be groggy, pale, and puffy-looking. This is normal following major surgery.
- The pain medications that help make your loved one more comfortable may also make him or her sleepy or confused.

Thoracotomy: Your Hospital Recovery

After surgery, you'll be moved to a recovery area where you can be closely monitored. From there, you may go to a special care unit and then to a regular room. During your recovery, you'll be given pain medications to help make you more comfortable. You may also be taught exercises to improve your breathing and your range of motion while you heal. The hospital stay after a thoracotomy varies from patient to patient, but it's often a week or longer.

Immediately After Surgery

When you first wake up from the anesthesia, you may feel groggy, thirsty, or cold. If the breathing tube given to you during surgery remains in place, you won't be able to talk. Flexible tubes in your chest drain air, blood, and fluid. IV (intravenous) lines give you fluid and medications. Monitors record your heartbeat and the amount of oxygen in your blood. You may spend one or more days in the ICU (intensive care unit) for special care and monitoring. Then you'll be moved to a regular hospital room.



Managing Your Pain

As soon as possible, you'll begin to move around to improve your muscle strength and blood flow. Your nurse or a physical therapist will help you as you start to sit up and walk. Pain medications help make activity more comfortable. These medications may be given to you by a nurse, or a special pump may allow you to give yourself medication as you need it. If you received an epidural before surgery, it may remain in place for a few days to continue to relieve the pain of your incision.



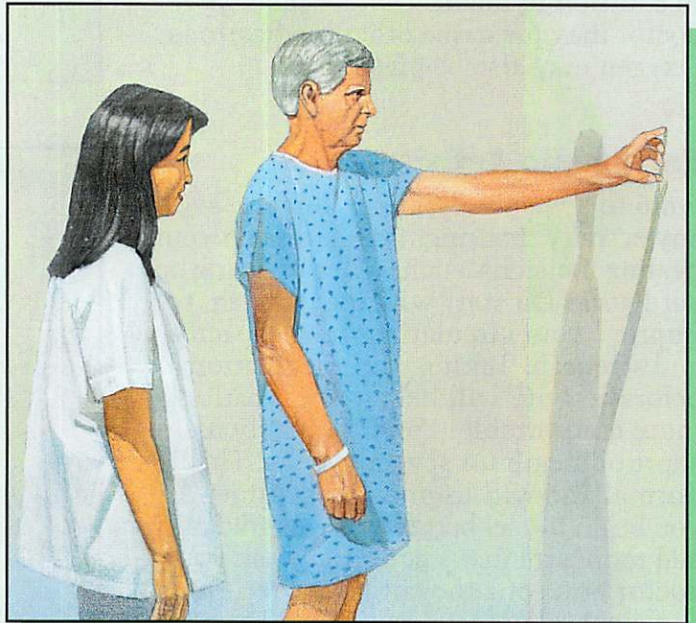
Respiratory Therapy

Soon after your surgery, a nurse or therapist will teach you exercises to keep your lungs clear, strengthen your breathing muscles, and help prevent complications. The exercises include **incentive spirometry**, where you put your mouth around a plastic device and inhale as much air as you can. You will also be taught coughing and deep-breathing exercises and other breathing techniques. You will be asked to perform these regularly on your own.



Range-of-Motion Exercises

While you're in the hospital, your nurse or a physical therapist may teach you some range-of-motion exercises. These exercises help stretch and strengthen the muscles on the side of surgery to keep your shoulder moving freely. You may also be taught exercises you can continue to do at home while you heal.



Going Home

Before you leave the hospital, your doctor will review the results of your surgery with you and tell you what to expect during your recovery. You and your doctor can discuss any further treatment you may need for your condition, review the next phase of your treatment plan, and schedule follow-up visits. When you're ready to leave the hospital, have an adult friend or family member drive you home.

Thoracotomy: Your Home Recovery

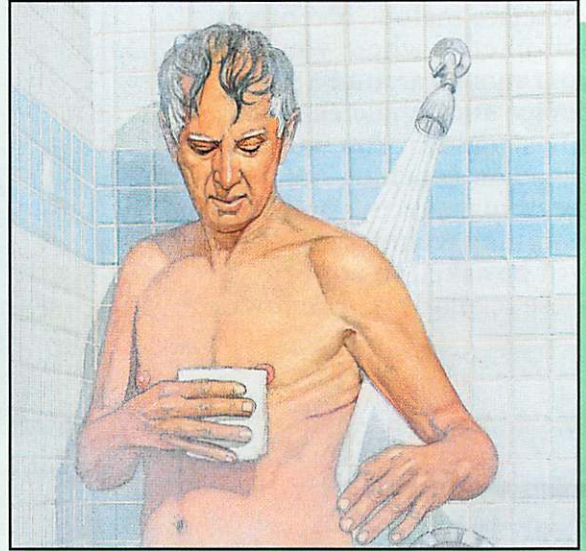
For the first several weeks after your surgery, you'll be gaining a little more energy and strength each day. Breathing may be uncomfortable at first, and you may be short of breath. Take things slowly, and rest when you get tired. Your doctor or nurse can talk to you about what you can and can't do as you recover.

Caring for Your Incision

Your doctor will tell you when it's okay to shower. When you shower, wash your incision gently with warm (not hot) water and mild soap. Bruising, itchiness, soreness, and numbness at your incision site are normal for several weeks after surgery.

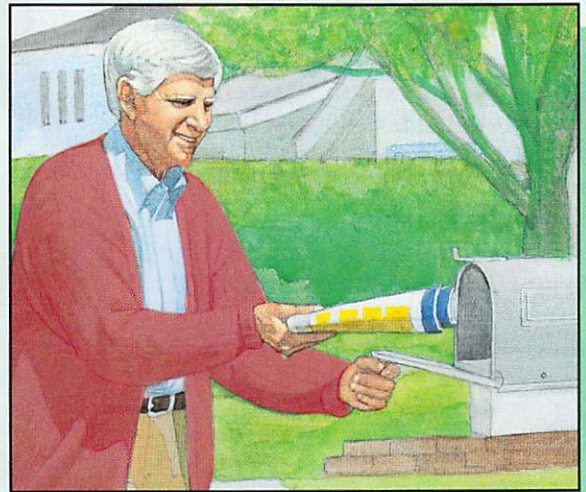
Taking Medications

Take your pain medications regularly as your doctor instructs—don't wait until the pain gets bad before you take them. In addition to medication for pain, your doctor may prescribe other medications. Oxygen may also be prescribed.



Easing into Activity

For 6 to 8 weeks after your surgery, avoid any activity that might put stress on your healing incisions, such as heavy lifting or yardwork. Do start walking, though, to improve your circulation, lung capacity, and strength. Taking pain medications before activity will help make breathing more comfortable. You'll probably feel short of breath for several weeks. This is normal and will improve with time. As you begin to feel better, you can gradually add more strenuous activities. Ask your doctor how long to wait before returning to sexual relations, driving, and work.



When to Call Your Doctor

Call your doctor if you have any of these symptoms:

- Very red or draining incision
- Sudden, severe shortness of breath
- Sudden, sharp chest pain
- Fever over 101°F (38.3°C)
- Rapid heartbeat or "fluttering" in your chest

Looking Toward the Future

Recovering from major surgery can be difficult emotionally as well as physically. A diagnosis of cancer can cause additional stress and concern. Talk to your doctor about your feelings, and stay close to your family and friends, who can help you through rough times.

Dealing with Your Emotions

It's common to feel depressed and anxious after major surgery. You might feel energetic and cheerful one day, then tired and cranky the next. You may even have trouble sleeping or eating. If the surgery was for cancer or suspected cancer, you may also feel scared and wonder what it means for your health and your future. Try not to withdraw from those around you. Share your feelings with your loved ones and tell them how they can help.

Following Up with Your Doctor

As you recover from the surgery, you'll see your doctor for regular follow-up visits. During these visits, your healing and recovery can be monitored. Your doctor or nurse can also discuss your plan of care with you and outline your options if you need further treatment.



Notes to Family and Friends

- Your loved one might feel depressed, frustrated, or scared during his or her recovery. This is common. You might even feel that way yourself. Talk about your feelings with each other.
- If your loved one had surgery for cancer, you may have concerns about that as well. Joining a support group might help you and your loved one.
- Let your loved one do what he or she feels able to do. Offer encouragement, and try not to be overprotective.

Getting Support

If you have cancer, talking with others who also have cancer may help you and your family cope. If you smoke, stop-smoking groups can help you quit. For local support groups and information, contact your hospital's patient education department or the organizations below.

American Lung Association

800-586-4872

lung.org

American Cancer Society

800-227-2345

www.cancer.org

National Cancer Institute

800-422-6237

www.cancer.gov

National Heart, Lung, and Blood Institute

301-592-8573

www.nhlbi.nih.gov

National Jewish Health

800-222-5864

www.nationaljewish.org



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