

Foreign Body Retrieval

Foreign body retrieval is the removal of objects or substances that have been introduced into the body. Objects may be inhaled into the airway, swallowed or lodged in the throat or stomach, or embedded in the soft tissues. About 80 percent of foreign body ingestions occur among children. Most foreign bodies pass through the gastrointestinal tract without complication, and endoscopic or surgical intervention is required only 10 to 20 percent of the time.

Evaluation and treatment will depend on the type of foreign body and how it was introduced. If it was swallowed, you may undergo a direct examination of your throat and esophagus or an x-ray examination. If it is lodged in a soft tissue, such as a splinter embedded under the skin, you may undergo an ultrasound, x-ray or CT scan to locate and remove the object. Tell your doctor if there's a possibility you are pregnant and discuss any recent illnesses, medical conditions, medications you're taking and allergies, especially to iodinated contrast materials. Leave jewelry at home and wear loose, comfortable clothing. You may be asked to wear a gown.



What is Foreign Body Retrieval?

Foreign body retrieval involves the removal of potentially dangerous objects or substances in the body that have been introduced from the outside. They can be inhaled into the airway or swallowed and enter the esophagus and stomach either accidentally or intentionally, or introduced into the soft tissues. Commonly swallowed objects include coins, buttons, pins, nails, glass pieces, toothpicks, batteries, small toys or pieces of toys and fish bones. Swallowing of magnets can cause significant problems including bowel blockages that may require surgical removal of magnets.

Children account for about 80 percent of foreign body ingestions. Sometimes problems occur when button batteries are swallowed as mercury within the batteries can leak into the bowel and cause mercury poisoning. Magnetic toys can obstruct the bowel when they stick together.

Foreign bodies in the throat or stomach:

Some ingested foreign bodies cause no symptoms. Alternatively, the patient may experience a sensation of something being stuck in their throat or esophagus. Drooling and difficulty swallowing are common symptoms. A small sharp object may become lodged in the esophagus and cause pain, even though they are able to swallow. Larger foreign bodies can partially or completely obstruct the stomach, the small intestine or, in rare cases, the large intestine, causing cramps, bloating, loss of appetite, vomiting, and sometimes fever. A sharp object that pierces the stomach or intestines can cause severe abdominal pain, fever, fainting and shock.

Foreign bodies in the airway:

Most foreign bodies in the airway are usually expelled through coughing. However, some foreign bodies may move from the throat into the bronchial branches. This can cause the patient to cough, but the foreign body remains trapped in the lung. This typically occurs in children and requires removal by bronchoscopy.

Foreign bodies in the soft tissues:

A soft tissue foreign body is an outside object like a splinter, rock or piece of metal or glass that gets embedded in the tissue under the skin. Soft tissue foreign bodies can cause infection and damage to surrounding tissues.

What are some common uses of the procedure?

Foreign body retrieval is used to remove one or more foreign objects that have been ingested through the mouth or airway or introduced into the soft tissues. In some cases, objects can be dislodged rather than removed so that they pass safely through the digestive system.

How should I prepare?

If you ingest a foreign body or witness a child ingest one or suspect the presence of a soft tissue foreign body, contact your physician immediately. Treatment will depend on the type of foreign body and nature of the symptoms.

You should inform your physician of any medications being taken and if there are any allergies, especially to iodinated contrast materials. Also inform your doctor about recent illnesses or other medical conditions.

You may need to fast for about four hours before direct examination of the esophagus, so that your stomach is empty as you may receive sedation.

If sedation is required, you will need to have a relative or friend accompany you and drive you home afterward.

Foreign bodies are typically dealt with in the emergency room and the x-ray department. Some patients require sedation before their imaging exam.

You will be asked to remove some of your clothes and to wear a gown during the exam. You may also be asked to remove jewelry, removable dental appliances, eye-glasses and any metal objects or clothing that might interfere with the x-ray images.

If you are to undergo a direct examination of your throat and esophagus, you may be given lozenges containing a local anesthetic to numb your throat. This eliminates the gag reflex and enables the physician to perform the examination without discomfort. Alternatively, the back of your throat may be sprayed with a local anesthetic. You also may be given a sedative to relax you.

Women should always inform their physician and x-ray technologist if there is any possibility that they are pregnant. Many imaging tests are not performed during pregnancy so as not to expose the fetus to radiation. If an x-ray is necessary, precautions will be taken to minimize radiation exposure to the baby. See the Safety page (<http://www.radiologyinfo.org/en/info/safety-radiation>) for more information about pregnancy and x-rays.

If the foreign body is lodged in a soft tissue, an x-ray or ultrasound exam may be performed to locate the object. In some cases, a CT scan may be needed to see the foreign body.

What does the equipment look like?

A variety of x-ray or ultrasound equipment may be used to detect foreign bodies.

The equipment typically used for this examination consists of a radiographic table, one or two x-ray tubes and a television-like monitor that is located in the examining room. Fluoroscopy, which converts x-rays into video images, is used to watch and guide progress of the procedure. The video is produced by the x-ray machine and a detector that is suspended over a table on which the patient lies.

A portable x-ray machine is a compact apparatus that can be taken to the patient in a hospital bed or the emergency room. The x-ray tube is connected to a flexible arm that is extended over the patient while an x-ray film holder or image recording plate is

placed beneath the patient.

Additionally, ultrasound imaging may be used to detect foreign bodies, evaluate the surrounding area and potentially guide removal of the object.

Ultrasound scanners consist of a computer console, video display screen and an attached transducer. The transducer is a small hand-held device that resembles a microphone. Some exams may use different transducers (with different capabilities) during a single exam. The transducer sends out inaudible, high-frequency sound waves into the body and then listens for the returning echoes. The principles are similar to sonar used by boats and submarines.

The technologist applies a small amount of gel to the area under examination and places the transducer there. The gel allows sound waves to travel back and forth between the transducer and the area under examination. The ultrasound image is immediately visible on a video display screen that looks like a computer monitor. The computer creates the image based on the loudness (amplitude), pitch (frequency) and time it takes for the ultrasound signal to return to the transducer. It also takes into account what type of body structure and/or tissue the sound is traveling through.

Common equipment for identifying and removing foreign bodies from the esophagus includes an endoscope, which is a long, thin, flexible or rigid tube with a light and a video camera attached. A bronchoscope is used to remove foreign bodies from the airway. The physician may also use forceps and other instruments to grasp and remove the foreign bodies.

How does the procedure work?

Your physician may use an x-ray or ultrasound of the neck, chest and abdomen to locate objects and to identify possible complications of foreign body ingestion, including swelling and perforation of the esophagus.

X-rays are a form of radiation like light or radio waves. X-rays pass through most objects, including the body. Once it is carefully aimed at the part of the body being examined, an x-ray machine produces a small burst of radiation that passes through the body, recording an image on photographic film or a special detector.

Many foreign bodies, like coins and batteries, are radio-opaque, meaning that x-rays will not pass through them, and they will appear white on an x-ray. Some soft-tissue foreign objects, such as metal, gravel and glass, are radio-opaque or white on x-ray.

Fluoroscopy is a special x-ray technique that makes it possible to see internal organs in motion. When used with an oral contrast material, which clearly defines the area being examined by making it appear bright white, this special x-ray technique makes it possible for the physician to locate foreign bodies not visible on ordinary x-rays.

Ultrasound imaging is based on the same principles involved in the sonar used by bats, ships and fishermen. When a sound wave strikes an object, it bounces back, or echoes. By measuring these echo waves, it is possible to determine how far away the object is as well as the object's size, shape and consistency. This includes whether the object is solid or filled with fluid.

In medicine, ultrasound is used to detect changes in the appearance of organs, tissues, and vessels and to detect abnormal masses, such as tumors.

In an ultrasound exam, a transducer both sends the sound waves and records the echoing waves. When the transducer is pressed against the skin, it sends small pulses of inaudible, high-frequency sound waves into the body. As the sound waves bounce off internal organs, fluids and tissues, the sensitive receiver in the transducer records tiny changes in the sound's pitch and direction. These signature waves are instantly measured and displayed by a computer, which in turn creates a real-time picture on the monitor. One or more frames of the moving pictures are typically captured as still images. Short video loops of the images may also be saved.

Using an ultrasound transducer to visualize the location of the object, the physician may make an incision in the skin and remove the soft tissue foreign body. With continuous ultrasound imaging, the physician is able to view the surgical instrument as it

advances to the location of the foreign object in real-time.

Your physician also may locate soft-tissue objects by probing the wound. Additional tests may include magnetic resonance imaging (MRI) or computed tomography (CT).

How is the procedure performed?

There are a number of ways to remove foreign bodies or facilitate their exit from the body. When your physician suspects that a blunt foreign body is stuck in the esophagus, you may receive an intravenous drug to relax the esophagus and allow the object to pass through the digestive tract. Other drugs taken by mouth can help blunt foreign objects pass through the digestive tract by causing muscles to contract and push the object farther down.

In some cases, prompt removal of the foreign body is necessary. Common procedures include:

Flexible esophagoscopy

Flexible esophagoscopy is a common diagnostic examination that enables a safe and detailed visual study of the esophagus while the patient is under local anesthesia and sedation. *See the Safety page (<http://www.radiologyinfo.org/en/info/safety-radiation>) for more information about anesthesia.* A flexible esophagoscope is introduced with gentle pressure as the patient swallows. Air is blown into the esophagus for improved visualization, and images of the inside of the digestive tract can be seen on a screen.

Rigid esophagoscopy

This highly effective procedure involves the introduction of a rigid tube down the esophagus, while the patient is under general anesthesia. Once the foreign body has been identified, instruments can be passed through the tube to grasp or manipulate it. Among the instruments that may be used are forceps, snares, magnets and oval loops, as well as Roth baskets, which are mesh nets that can be closed to trap small objects.

Foley catheter technique

A Foley catheter is a thin tube that can be used to help trap smooth objects like a marble, or to orient foreign bodies with the use of two snares. The catheter is guided into place just beyond the foreign object using x-ray fluoroscopy. A balloon at the end of the catheter is inflated with contrast material, and then the catheter is slowly withdrawn, pulling the foreign body out ahead of it.

Esophageal bougienage

For this procedure, you will sit upright while the physician passes a device from the mouth to the stomach that helps dilate, or widen, the esophagus. This helps advance the foreign body into the stomach, from where it is most likely to pass spontaneously onwards. It is useful for freeing smooth, round objects from the esophagus.

Open surgery

You may need surgical intervention in cases of perforation or abscess formation.

Your physician may make an incision in your skin to remove soft tissue foreign bodies. You might require stitches or other treatments to close the wound, and your caregiver may give you antibiotics if the wound has a high risk of infection. You also may need a tetanus shot to prevent a potentially deadly infection of the nervous system.

In some cases, your physician may choose to perform surgery using ultrasound guidance. Ultrasound provides real-time imaging, making it a good tool for guiding removal procedures.

In some cases, it is potentially more harmful to remove the foreign body, such as when it is located near vital structures like nerves and blood vessels, so your physician may choose to leave it in place.

The majority of foreign bodies pass through the gastrointestinal tract without complication, and intervention in the form of endoscopy or surgery is required in only 10 percent to 20 percent of cases.

What will I experience during and after the procedure?

You will feel a slight pinch when the needle is inserted into your vein for the IV line and when the local anesthetic is injected. Most of the sensation is at the skin incision site. This is numbed using local anesthetic. You may feel pressure when the catheter is inserted into the vein or artery. However, you will not feel serious discomfort.

If you receive a general anesthetic, you will be unconscious for the entire procedure, and you will be monitored by an anesthesiologist.

If the procedure is done with sedation, the intravenous (IV) sedative will make you feel relaxed, sleepy and comfortable for the procedure. You may or may not remain awake, depending on how deeply you are sedated.

For endoscopic procedures, you may receive a mouthpiece to help you keep your mouth open. You may be asked to lie on your left side, your knees drawn up slightly, or you may be seated or asked to lie on your back. As the tip of the esophagoscope is placed in your mouth and directed down your throat, you will be asked to swallow.

Even with anesthesia and sedation, you may gag or experience pain. Your physician may need to adjust the levels of sedative and anesthetic.

Ultrasound may be used to guide the foreign body removal procedure.

After you are positioned on the examination table, the radiologist or sonographer will apply some warm water-based gel on your skin and then place the transducer firmly against your body, moving it back and forth over the area of interest until the desired images are captured. There is usually no discomfort from pressure as the transducer is pressed against the area being examined.

If scanning is performed over an area of tenderness, you may feel pressure or minor pain from the transducer.

For surgical removal, you may feel pressure or discomfort as your physician makes an incision and removes the foreign body.

You will remain in the recovery room until you are completely awake and ready to return home.

At first you may feel lightheaded, but this should pass. It takes a few hours for the effects of any local anesthetic to wear off, and you must not eat or drink anything until sensation has returned fully.

Who interprets the results and how do I get them?

The radiologist will interpret any imaging results. Follow-up imaging may be necessary to ensure that no foreign bodies remain in the body and to check for the presence of any side effects such as infection.

What are the benefits vs. risks?

Benefits

- Removal of a foreign body will reduce your chances of suffering an infection or an allergic reaction.
- Prompt removal of the foreign body will ensure that it does not migrate to other areas of the body, or enter your blood vessels.

- Removal of larger foreign bodies will ensure that they do not partially or completely obstruct your stomach, small intestine, or large intestine, or pierce the stomach or intestines. Removal of button batteries will ensure that mercury is not ingested from the intestines. Removal of magnets will ensure that there is not a bowel obstruction from the magnets pulling together parts of bowel.
- Removal of soft-tissue foreign bodies will reduce chances of an infection that could damage tissue, nerves and blood vessels, block blood flow or cause a blood clot.
- Ultrasound provides real-time imaging, making it a good tool for guiding foreign body removal procedures.

Risks

- While foreign body removal procedures are safe and effective, there is a slight risk of damage to your esophagus from the instruments and devices used to remove them.
- A foreign body dislodged during the Foley catheter technique may temporarily block your airway. By observing the procedures under fluoroscopy, this can be avoided.
- In rare cases, the general anesthesia used during rigid esophagoscopy can cause allergic reactions, changes in blood pressure, and other complications.
- There is always a slight chance of cancer from excessive exposure to radiation. However, the benefit of an accurate diagnosis far outweighs the risk.

What are the limitations of foreign body detection and removal?

The primary limitation of an x-ray examination is the potential failure to detect radiolucent (does not appear on x-rays or CT) foreign bodies like toothpicks. Small esophageal foreign bodies like fish bones also may be difficult to visualize. Additional evaluation is required when the suspected foreign body is radiolucent or when the presence of a retained object is highly suspected. X-ray evaluations can underestimate the extent or degree of involvement, such as the amount of swelling with foreign bodies that are retained for long periods.

The limitations of endoscopic procedures include the need for anesthesia and an operating suite, post-procedural hospitalization and greater complication rates than those experienced with other techniques. In spite of these limitations, endoscopy is still widely regarded as the most successful and reliable technique for foreign body removal.

Limitations of the Foley catheter technique occasionally include the need for anesthesia, intravenous access and fluoroscopic guidance. However, it is typically an outpatient procedure requiring no sedation(anesthesia) and no IV.

Disclaimer

This information is copied from the RadiologyInfo Web site (<http://www.radiologyinfo.org>) which is dedicated to providing the highest quality information. To ensure that, each section is reviewed by a physician with expertise in the area presented. All information contained in the Web site is further reviewed by an ACR (American College of Radiology) - RSNA (Radiological Society of North America) committee, comprising physicians with expertise in several radiologic areas.

However, it is not possible to assure that this Web site contains complete, up-to-date information on any particular subject. Therefore, ACR and RSNA make no representations or warranties about the suitability of this information for use for any particular purpose. All information is provided "as is" without express or implied warranty.

Please visit the RadiologyInfo Web site at <http://www.radiologyinfo.org> to view or download the latest information.

Note: Images may be shown for illustrative purposes. Do not attempt to draw conclusions or make diagnoses by comparing these images to other medical images, particularly your own. Only qualified physicians should interpret images; the radiologist is the physician expert trained in medical imaging.

Copyright

This material is copyrighted by either the Radiological Society of North America (RSNA), 820 Jorie Boulevard, Oak Brook, IL 60523-2251 or

the American College of Radiology (ACR), 1891 Preston White Drive, Reston, VA 20191-4397. Commercial reproduction or multiple distribution by any traditional or electronically based reproduction/publication method is prohibited.

Copyright © 2021 Radiological Society of North America, Inc.