Upper Gastrointestinal (GI) Tract X-ray (Radiography)

What is Upper Gastrointestinal (GI) Tract X-ray?

Upper gastrointestinal tract radiography, also called an upper GI, is an x-ray examination of the pharynx, esophagus, stomach and first part of the small intestine (also known as the duodenum) that uses a special form of x-ray called fluoroscopy and a contrast material called barium.

An x-ray (radiograph) is a painless medical test that helps physicians diagnose and treat medical conditions. Radiography involves exposing a part of the body to a small dose of ionizing radiation to produce pictures of the inside of the body. X-rays are the oldest and most frequently used form of medical imaging.

Fluoroscopy makes it possible to see internal organs in motion. When the gastrointestinal tract is coated with barium, the radiologist is able to view and assess the anatomy and function of the pharynx, esophagus, stomach and the duodenum.

An x-ray examination that evaluates only the pharynx and esophagus is called a barium swallow.

In addition to drinking barium, some patients are also given baking-soda crystals to further improve the images. This procedure is called an air-contrast or double-contrast upper GI.

What are some common uses of the procedure?

An upper GI examination helps evaluate digestive function and to detect:

- ulcers
- tumors
- inflammation of the esophagus, stomach and duodenum
- hiatal hernias
- scarring
- blockages
- abnormalities of the muscular wall of gastrointestinal tissues.

The procedure is also used to help diagnose symptoms such as:

- difficulty swallowing
- chest and abdominal pain
- reflux (a backward flow of partially digested food and digestive juices)
- unexplained vomiting
- severe indigestion
- blood in the stool (indicating internal GI bleeding).

How should I prepare?

Your physician will give you detailed instructions on how to prepare for your upper GI.

You should inform your physician of any medications you are taking and if you have any allergies, especially to contrast materials. Also inform your doctor about recent illnesses or other medical conditions.

Women should always inform their physician or x-ray technologist if there is any possibility that they are pregnant. Many imaging tests are not performed during pregnancy because radiation can be harmful to the fetus. If an x-ray is necessary, precautions will be taken to minimize radiation exposure to the baby.

To ensure the best possible image quality, your stomach must be empty of food. Therefore, you will likely be asked not to eat or drink anything (including any...
medications taken by mouth, especially antacids) and to refrain from chewing gum and smoking after midnight on the day of the examination.

On the night before the test, you may be asked to take a laxative to help clean out your intestines. Prior to the exam, you may also need to have the contents of your stomach removed using a special tube that is inserted through your nose.

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

What does the equipment look like?

The equipment typically used for this examination consists of a box-like structure containing the x-ray tube and fluoroscopic equipment that sends the x-ray images to a television-like monitor for viewing that is located in the examining room or in a nearby room. This structure is suspended over a table on which the patient lies. A drawer under the table holds the x-ray film or image recording plate that captures the images.

How does the procedure work?

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 image recording plate.

Fluoroscopy uses a continuous x-ray beam to create a sequence of images that are projected onto a fluorescent screen, or television-like monitor. When used with a 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 view internal organs in motion. Still images are also captured and stored either on film or electronically on a computer.

X-ray images are maintained as hard film copy (much like a photographic negative) or, more likely, as a digital image that is stored electronically. These stored images are easily accessible and are sometimes compared to current x-ray images for diagnosis and disease management.

How is it performed?

This examination is usually performed on an outpatient basis and is often scheduled in the morning to reduce the patient’s fasting time.

A radiologic technologist and a radiologist, a physician specifically trained to supervise and interpret radiology examinations, guide the patient through the upper GI series.

As the patient drinks the liquid barium, which resembles a light-colored milkshake, the radiologist will watch the barium pass through the patient’s digestive tract on a fluoroscope, a device that projects radiographic images in a movie-like sequence onto a monitor. The exam table will be positioned at different angles and the patient’s abdomen may be compressed to help spread the barium. Once the upper gastrointestinal tract is adequately coated with the barium, still x-ray images will be taken and stored for further review.

The patient must hold very still and may be asked to keep from breathing for a few seconds while the x-ray picture is taken to reduce the possibility of a blurred image. The technologist will walk behind a wall or into the next room to activate the x-ray machine.
For a double-contrast upper GI, the patient will swallow baking-soda crystals that create gas in the stomach while additional x-rays are taken.

When the examination is completed, the patient will be asked to wait until the technologist determines that the images are of high enough quality for the radiologist to read.

This exam is usually completed within 20 minutes.

**What will I experience during and after the procedure?**

Some patients find the thick and chalky consistency of the barium unpleasant and difficult to swallow. The liquid barium has a chalky taste that may be masked somewhat by added flavors such as strawberry or chocolate.

Being tilted on the examination table and having pressure applied to the abdomen can be unpleasant. The examination may make you feel bloated and nauseated.

If you receive gas producing crystals you may feel the need to belch. However, the radiologist or technologist will tell you to try to hold the gas in (by swallowing your saliva if necessary) to enhance the detail in the x-ray images.

In some medical centers, the technologist can minimize patient movement by automatically tilting the examining table. These actions assure that the barium is coating all parts of the upper GI tract. As the procedure continues, the technologist or the radiologist may ask you to drink more barium. You may hear the mechanical noises of the radiographic apparatus moving into place during the exam.

After the examination, you can resume a regular diet and take orally administered medications unless told otherwise by your doctor.

The barium may color your stools gray or white for 48 to 72 hours after the procedure. Sometimes the barium can cause temporary constipation, which is usually treated by an over-the-counter laxative. Drinking large quantities of fluids for several days following the test can also help. If you are unable to have a bowel movement or if your bowel habits undergo any significant changes following the exam, you should contact your physician.

**Who interprets the results and how do I get them?**

A radiologist, a physician specifically trained to supervise and interpret radiology examinations, will analyze the images and send a signed report to your primary care or referring physician, who will share the results with you.

**What are the benefits vs. risks?**

**Benefits**

- Upper gastrointestinal tract radiography is an extremely safe, noninvasive procedure.
- The results of the upper GI series usually lead to an accurate analysis of the esophagus, stomach and duodenum.
- Because barium is not absorbed into the blood, allergic reactions are rare.
- No radiation remains in a patient’s body after an x-ray examination.
- X-rays usually have no side effects.

**Risks**

- There is always a slight chance of damage to cells or tissue from radiation. However, the radiation risk is very low compared with the potential benefits.
- The effective radiation dose from this procedure is about 2 mSv, which is about the same as the average person receives from background radiation in eight months.
- Some patients may be allergic to the flavoring added to some brands of barium. If you have experienced allergic reactions after eating chocolate, certain berries or citrus fruit, be sure to tell your physician or the technologist before the procedure.
- There is a slight chance that some barium could be retained, leading to a blockage of the digestive system. Therefore, patients who have an obstruction in the gastrointestinal tract should not undergo this examination.
- Women should always inform their physician or x-ray technician if there is any possibility that they are pregnant.

**A Word About Minimizing Radiation Exposure**

Special care is taken during x-ray examinations to use the lowest radiation dose possible while producing the best images for evaluation. National and international radiology protection councils continually review and
update the technique standards used by radiology professionals.

State-of-the-art x-ray systems have tightly controlled x-ray beams with significant filtration and dose control methods to minimize stray or scatter radiation. This ensures those parts of a patient's body not being imaged receive minimal radiation exposure.

**What are the limitations of Upper Gastrointestinal (GI) Tract Radiography?**

Irritation of the lining of the stomach or esophagus is difficult to detect, as well as ulcers smaller than ¼ inch in diameter. The test will detect an ulcer, but not most common cause of stomach ulcers—an infection with the bacteria Helicobacter pylori. A biopsy of an abnormal area cannot be performed with this test.

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