Abdominal Ultrasound

Ultrasound imaging of the abdomen uses sound waves to produce pictures of the structures within the upper abdomen. It is used to help diagnose pain or distention (enlargement) and evaluate the kidneys, liver, gallbladder, bile ducts, pancreas, spleen and abdominal aorta. Ultrasound is safe, noninvasive and does not use ionizing radiation.

This procedure requires little to no special preparation. Your doctor will instruct you on how to prepare, including whether you should refrain from eating or drinking beforehand. Leave jewelry at home and wear loose, comfortable clothing. You may be asked to wear a gown.

What is an abdominal ultrasound?

Ultrasound imaging is a noninvasive medical test that helps physicians diagnose and treat medical conditions. It is safe and painless. It produces pictures of the inside of the body using sound waves. Ultrasound imaging is also called sonography (http://www.radiologyinfo.org) . It uses a small probe called a transducer and gel placed directly on the skin. High-frequency sound waves travel from the probe through the gel into the body. The probe collects the sounds that bounce back. A computer uses those sound waves to create an image. Ultrasound exams do not use radiation (http://www.radiologyinfo.org) (x-rays (http://www.radiologyinfo.org)). Because ultrasound captures images in real-time, it can show the structure and movement of the body's internal organs. The images can also show blood flowing through blood vessels.

An abdominal ultrasound (http://www.radiologyinfo.org) produces a picture of the organs and other structures in the upper abdomen.

A Doppler ultrasound study may be part of an abdominal ultrasound examination.

Doppler ultrasound (http://www.radiologyinfo.org) is a special ultrasound technique that evaluates movement of materials in the body. It allows the doctor to see and evaluate blood flow through arteries and veins in the body.

What are some common uses of the procedure?

Abdominal ultrasound imaging is performed to evaluate the:

- kidneys (http://www.radiologyinfo.org)
- liver (http://www.radiologyinfo.org)
- gallbladder (http://www.radiologyinfo.org)
- bile ducts
- pancreas (http://www.radiologyinfo.org)
- spleen (http://www.radiologyinfo.org)
- abdominal aorta (http://www.radiologyinfo.org) and other blood vessels of the abdomen

Ultrasound is used to help diagnose a variety of conditions, such as:

- abdominal pain or distention (enlargement)
- abnormal liver function
- enlarged abdominal organ
- *kidney stones (https://www.radiologyinfo.org/en/info/stones-renal)*
- gallstones (https://www.radiologyinfo.org/en/info/gallstones)
- an abdominal aortic aneurysm (AAA) (https://www.radiologyinfo.org/en/info/abdoaneurysm)

Additionally, ultrasound may be used to provide guidance for biopsies.

Doppler ultrasound helps the doctor to see and evaluate:

- blockages to blood flow (such as clots)
- narrowing of vessels
- tumors and congenital vascular malformations
- reduced or absent blood flow to various organs, such as the testes or ovary
- increased blood flow, which may be a sign of infection

How should I prepare?

Wear comfortable, loose-fitting clothing. You may need to remove all clothing and jewelry in the area to be examined.

You may need to change into a gown for the procedure.

Preparations depend on the type of ultrasound you are having.

- For a study of the liver, gallbladder, spleen, and pancreas, you may be asked to eat a fat-free meal on the evening before the test and then to avoid eating for eight to 12 hours before the test.
- For ultrasound of the kidneys, you may be asked to drink four to six glasses of liquid about an hour before the test to fill your bladder. You may be asked to avoid eating for eight to 12 hours before the test to avoid gas buildup in the intestines.
- For ultrasound of the aorta, you may need to avoid eating for eight to 12 hours before the test.

What does the equipment look like

Ultrasound machines consist of a computer console, video monitor and an attached transducer (http://www.radiologyinfo.org) . 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 listens for the returning echoes. The same principles apply 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 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 considers what type of body structure and/or tissue the sound is traveling through.

How does the procedure work?

Ultrasound imaging uses the same principles as the sonar that bats, ships, and fishermen use. 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 its size, shape, and consistency. This includes whether the object is solid or filled with fluid.

Doctors use ultrasound 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 (http://www.radiologyinfo.org) both sends the sound waves and records the echoing (returning) 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. A computer instantly measures these signature waves and displays them as real-time pictures on a monitor. The technologist typically captures one or more frames of the moving pictures as still images. They may also save short video loops of the images.

Doppler ultrasound, a special ultrasound technique, measures the direction and speed of blood cells as they move through vessels. The movement of blood cells causes a change in pitch of the reflected sound waves (called the Doppler effect). A computer collects and processes the sounds and creates graphs or color pictures that represent the flow of blood through the blood vessels.

How is the procedure performed?

For most ultrasound exams, you will lie face-up on an exam table that can be tilted or moved. Patients may turn to either side to improve the quality of the images.

The radiologist (a doctor specifically trained to supervise and interpret radiology exams) or sonographer will position you on the exam table. They will apply a water-based gel to the area of the body under examination. The gel will help the transducer make secure contact with the body. It also eliminates air pockets between the transducer and the skin that can block the sound waves from passing into your body. The sonographer places the transducer on the body and moves it back and forth over the area of interest until it captures the desired images.

There is usually no discomfort from pressure as they press the transducer against the area being examined. However, if the area is tender, you may feel pressure or minor pain from the transducer.

Doctors perform Doppler sonography with the same transducer.

Once the imaging is complete, the technologist will wipe off the clear ultrasound gel from your skin. Any portions that remain will dry quickly. The ultrasound gel does not usually stain or discolor clothing.

What will I experience during and after the procedure?

Most ultrasound exams are painless, fast, and easily tolerated.

Abdominal ultrasound is usually completed within 30 minutes.

If the doctor performs a Doppler ultrasound exam, you may hear pulse-like sounds that change in pitch as they monitor and measure the blood flow.

When the exam is complete, the technologist may ask you to dress and wait while they review the ultrasound images.

After an ultrasound exam, you should be able to resume your normal activities immediately.

Who interprets the results and how do I get them?

A radiologist, a doctor trained to supervise and interpret radiology exams, will analyze the images. The radiologist will send a signed report to the doctor who requested the exam. Your doctor will then share the results with you. In some cases, the radiologist may discuss results with you after the exam.

You may need a follow-up exam. If so, your doctor will explain why. Sometimes a follow-up exam further evaluates a potential issue with more views or a special imaging technique. It may also see if there has been any change in an issue over time. Follow-up exams are often the best way to see if treatment is working or if a problem needs attention.

What are the benefits vs. risks?

Benefits

- Most ultrasound scanning is noninvasive (no needles or injections).
- Occasionally, an ultrasound exam may be temporarily uncomfortable, but it should not be painful.
- Ultrasound is widely available, easy to use, and less expensive than most other imaging methods.
- Ultrasound imaging is extremely safe and does not use radiation.
- Ultrasound scanning gives a clear picture of soft tissues that do not show up well on x-ray images.
- Ultrasound provides real-time imaging. This makes it a good tool for guiding minimally invasive (http://www.radiologyinfo.org) procedures such as needle biopsies (http://www.radiologyinfo.org) and fluid aspiration.

Risks

- Standard diagnostic ultrasound (http://www.radiologyinfo.org) has no known harmful effects on humans.

What are the limitations of abdominal ultrasound?

Ultrasound waves are disrupted by air or gas. Therefore, ultrasound is not an ideal imaging technique for the air-filled bowel or organs obscured by the bowel. Ultrasound is not as useful for imaging air-filled lungs, but it may be used to detect fluid around or within the lungs. Similarly, ultrasound cannot penetrate bone, but may be used for imaging bone fractures or for infection surrounding a bone.

Large patients are more difficult to image by ultrasound because greater amounts of tissue weaken the sound waves as they pass deeper into the body and need to return to the transducer for analysis.

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