Carotid Ultrasound, Various Types

WHAT IS ULTRASOUND?

Ultrasound is like ordinary sound, but it has a pitch (*frequency*) higher than human beings can hear. It can be sent into your body from a *transducer*. This is a device that changes electrical signals into sound energy. As the device is resting on your skin, the sound is reflected off internal structures. The returning echoes are received by the transducer. Then they are converted into an image on a viewing screen. This type of ultrasound is called 2D, or two-dimensional ultrasound. These continually changing images can be recorded on videotape or film. Diagnostic ultrasound imaging is commonly called sonography or ultrasonography. When this study is done on your carotid arteries, it is known as a carotid ultrasound. The carotid arteries are the large arteries on both sides in the front of the neck. They are the main blood supply to the brain. Carotid ultrasound studies are done to look for problems or abnormalities in the carotid artery.

WHAT IS DOPPLER ULTRASOUND?

Doppler ultrasound is a special form of ultrasound. It is commonly used to evaluate blood flow. There are several types of Doppler ultrasound in use:

- *CONTINUOUS WAVE DOPPLER ULTRASOUND.* This type of Doppler ultrasound uses the change in pitch of the sound waves to provide information about blood flow through a blood vessel. Your caregiver listens to the sounds produced by the transducer to evaluate the blood flow through an area that may be blocked or narrowed. This type of ultrasound can provide a rapid estimate of the extent of blood vessel damage or disease.
- *DUPLEX DOPPLER ULTRASOUND*. Duplex Doppler ultrasound uses standard ultrasound methods to produce a picture of a blood vessel and surrounding organs. In addition, a computer converts the Doppler sounds into a graph. It provides information about the speed and direction of blood flow through the blood vessel being evaluated. With this type of Doppler ultrasound, it is possible to see the structures inside the body (2D) and evaluate blood flow (continuous wave) within those structures at the same time. To do this, the ultrasound machine uses the 2 methods of ultrasound at the same time. Blood flow in individual blood vessels is most commonly evaluated by duplex Doppler ultrasound.
- *COLOR DOPPLER ULTRASOUND*. Color Doppler ultrasound uses standard ultrasound methods to produce a picture of a blood vessel (2D). In addition, a computer converts the Doppler sounds into colors. They are overlaid on the image of the blood vessel and represent the speed and direction of blood flow through the vessel.
- *POWER DOPPLER ULTRASOUND*. Power Doppler ultrasound is a new ultrasound technique. It is up to 5 times more sensitive than color Doppler ultrasound. Power Doppler ultrasound can also obtain some images that are difficult or impossible to obtain using standard color Doppler ultrasound. However, power Doppler ultrasound is used most commonly to evaluate blood flow through vessels within organs. Examples are the liver or kidneys.

WHY SHOULD I HAVE A DOPPLER ULTRASOUND EXAM?

A Doppler ultrasound exam is often called a scan. It gives your caregiver a great deal of information about your blood vessels and about the way blood is passing through them. Doppler ultrasound is particularly well suited to evaluate problems within your veins and arteries. We have blood vessels throughout our bodies. So Doppler ultrasound may be used almost anywhere. Some of the most common sites where Doppler ultrasound is used are in the neck, heart, abdomen, and legs.

In your neck, Doppler ultrasound is used to look at carotid arteries. These vessels supply large amounts of blood to your brain. But they may become blocked. Blockage can lead to stroke. In your heart, Doppler ultrasound can tell your caregiver about the flow of blood and whether it is directed correctly. In your abdomen or stomach, Doppler ultrasound can be used to help evaluate blood flow to the liver and many other organs in your abdomen. Doppler ultrasound also is used to evaluate blood flow in your legs. It may be helpful in identifying blockages in your arteries and clots in your veins.

WILL IT HURT? ARE THERE ANY SPECIAL PREPARATIONS FOR THE EXAM?

There is no pain involved in an ultrasound examination. For most Doppler ultrasound exams, no preparation is necessary. Your caregiver may ask you to hold off from eating the morning of your exam if the ultrasound scan involves your upper abdomen. A gel is applied to your skin. An instrument, called a transducer, is then placed on the area to be examined. This gel may feel cool. Even though it wipes off easily, it may stain some fabrics. It is a good idea to wear clothing that is easily washable.

WHAT CAN I EXPECT DURING THE EXAM?

The images made by the returning echoes are displayed on one or more monitors. These look like small television screens. In addition, returning sound waves that have been reflected by moving blood can be heard through speakers in the instrument. The sounds may be similar to the sound of wind blowing through the trees. The room is usually darkened during the examination. This makes it easier for the sonographer or caregiver to see the images on the monitor.

HOW LONG WILL THE EXAM TAKE?

On average, a Doppler ultrasound exam takes from 30 to 60 minutes. The length of the exam depends on a number of factors including the part of your body to be examined and the complexity of the anatomy. With hardening of the arteries (*arteriosclerosis*), the vessels may be very difficult to evaluate. It may require more scanning time.

WHO WILL PERFORM THE EXAM?

A Doppler ultrasound exam may be performed by a doctor, or by a vascular technologist or sonographer. These are individuals specially trained to perform ultrasound exams. A specialist will read (*interpret*) the exam results.

WILL I NEED MORE THAN ONE EXAM?

In many cases, follow-up exams are needed to estimate the progress of your condition or your response to therapy.

IS ULTRASOUND SAFE?

There are no known harmful effects associated with the medical use of sonography. Based on current information, there appears to be no risk.

HOW MUCH DOES THE EXAM COST?

The price of an ultrasound scan varies widely depending on:

- The reason for the exam.
- Its complexity.
- The type of equipment used.

Generally, insurance companies will help cover the cost of the examination.

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