

Obstetric Ultrasound

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What is Obstetric Ultrasound Imaging?

Ultrasound imaging, also called ultrasound scanning or sonography, is a method of obtaining images of internal organs by sending high-frequency sound waves into the body. The sound wave echoes are recorded and displayed as a real-time visual image. No ionizing radiation (x-ray) is involved in ultrasound imaging. Obstetric ultrasound refers to the specialized use of sound waves to visualize and thus determine the condition of a pregnant woman and her embryo or fetus.

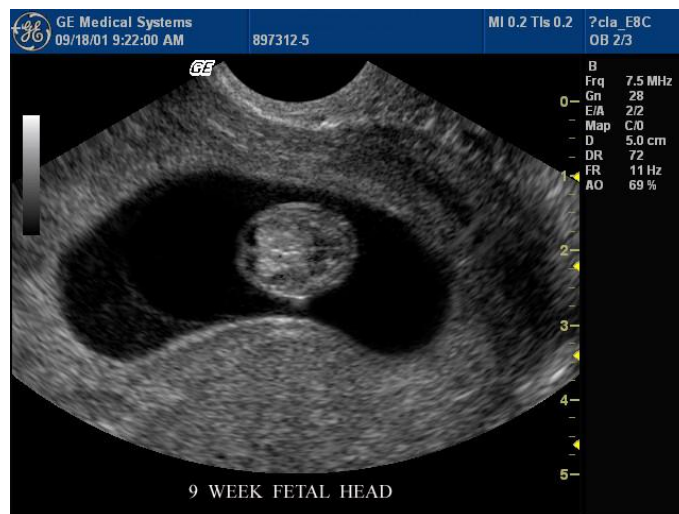


Prenatal Ultrasound

What are some common uses of Obstetric Ultrasound?

Obstetric ultrasound should be performed only when clinically indicated. Some indications may be:

- To establish the presence of a living embryo/fetus.
- To estimate the age of the pregnancy.
- To diagnose congenital abnormalities.
- To evaluate the position of the fetus.
- To evaluate the position of the placenta.
- To determine if there are multiple pregnancies.
- To determine the amount of amniotic fluid around the fetus.
- To check for opening or shortening of the cervix or mouth of the womb.



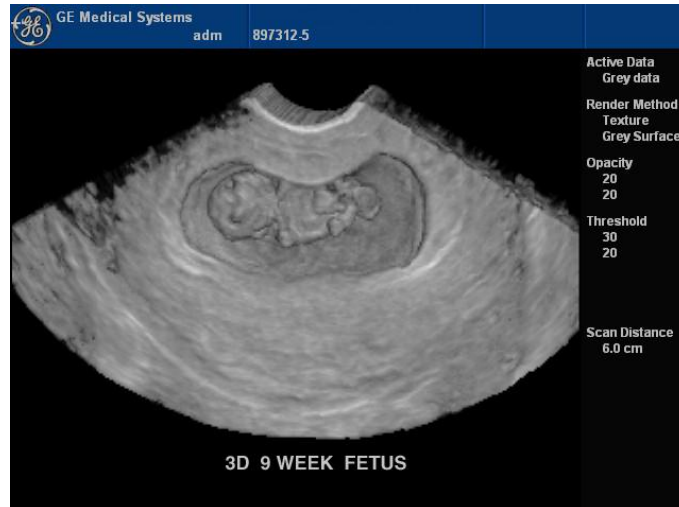
Ultrasound: Neonatal, 9 week fetal head.

How should I prepare for my Obstetric Ultrasound procedure?

You should wear a loose-fitting two-piece outfit for the examination. Only the lower abdominal area needs to be exposed during this procedure; consequently, a two-piece outfit will prevent you from having to readjust or remove all of your clothing.

If an ultrasound is ordered by your clinician early in your pregnancy, you may be instructed to have a full bladder for the procedure. Air interferes with sound waves, so if your bladder is distended, the air-filled bowel is pushed out of the way and an image of the uterus and embryo or fetus is obtained. About an hour before the procedure you should empty your bladder. You may be instructed to drink up to six glasses of water and avoid urinating until the procedure is completed. A full bladder is not necessary in most cases,

especially after the first two to three months of pregnancy. The radiologist or sonographer may elect to examine an early pregnancy by means of transvaginal ultrasound. This requires an empty urinary bladder. You should ask for instructions when you make your appointment.



Ultrasound: 3D view of 9 week fetus.

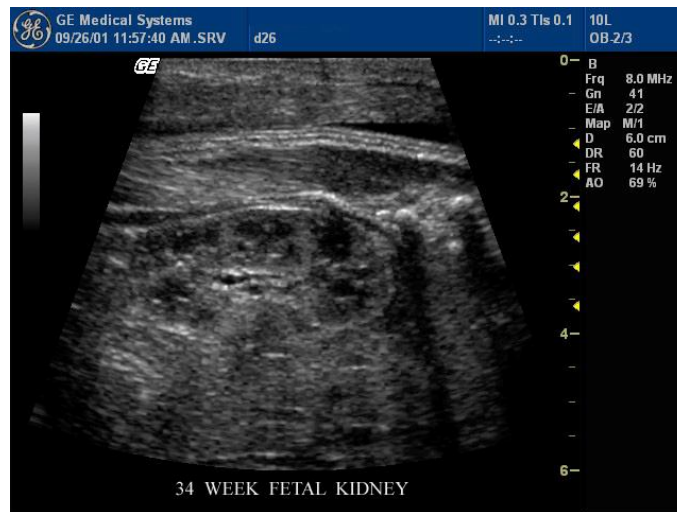
How does the Obstetric Ultrasound procedure work?

Ultrasound imaging is based on the same principles involved in the sonar used by bats, ships at sea and anglers with fish detectors. As a controlled sound bounces against objects, its echoing waves can be used to identify how far away the object is, how large it is, its shape and its internal consistency (fluid, solid or mixed).

The ultrasound transducer functions as both a loudspeaker (to create the sounds) and a microphone (to record them). For obstetric ultrasound, when the transducer is pressed against the skin, it directs a stream of inaudible, high-frequency sound waves into the lower abdomen and pelvis. As the sound waves echo from the embryo or fetus and surrounding structures in the uterus, the sensitive microphone 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. The live images of the examination can be recorded on videotape. In addition, still frames of the moving picture are usually "frozen" to capture a series of images. Conventional ultrasound displays the images as thin sections (like looking at single slices of bread in a loaf). 3-D ultrasound is the result of modern computer technology that can reformat data into three-dimensional images (like looking at the entire loaf of bread from various projections). 4-D ultrasound is 3-D ultrasound in motion.

Doppler ultrasonography is the application of diagnostic ultrasound to detect moving blood cells and measure their direction and speed of movement. The Doppler effect is used to evaluate blood flow by measuring changes in the frequency of the echoes reflected from blood cells.

The movement of the embryo or fetus and the heart beat can be seen as an ongoing ultrasound "movie." Most ultrasound devices also have an audio component that processes the echoes produced by blood flowing through the fetal heart, blood vessels and umbilical cord. This sound can be made audible to human ears and has been described by patients as a "whooshing" noise.



Ultrasound: Neonatal, 34 week fetal kidney.

How is the Obstetric Ultrasound procedure performed?

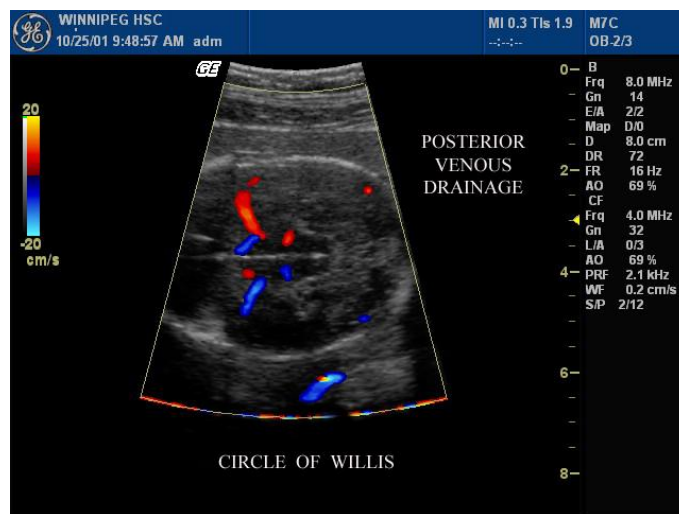
You will be asked to lie on your back or side. You will also be asked to expose your lower abdominal area. The sonographer or radiologist then spreads a warm water-soluble gel over your lower abdomen. This gel allows better transmission of the sound waves by making it easier to move the transducer over your abdomen and by sending the sound beam directly into the body without the interference from even a tiny amount of air on the skin. The transducer emits high-frequency sound waves as the sonographer or radiologist moves it over your abdomen. The transducer also detects the echoes that bounce off anatomic structures as reflections. Sometimes the radiologist determines that a transvaginal scan will need to be performed. Instead of a transducer being moved over your abdomen, the high-frequency waves will be emitted by a transducer placed in the vagina. This technique often provides improved, more detailed images of the uterus and ovaries. It is especially useful in early pregnancy. With this approach the urinary bladder needs to be empty. Shown is an example of a transvaginal

transducer. Only two to three inches of the transducer are inserted into the vagina. The rest of the transducer is a handle for use by the operator.

The obstetric ultrasound examination takes about 20 minutes.

What will I experience during my Obstetric Ultrasound ?

This is a painless procedure. There may be varying degrees of discomfort from pressure as the sonographer or radiologist guides the transducer over your abdomen, especially if you are required to have a full bladder. At times the sonographer may have to press more firmly to get closer to the embryo or fetus to better visualize the structure. This discomfort is temporary. Also, you may dislike the feeling of the water-soluble gel applied to your abdomen. With transvaginal scanning, there may be minimal discomfort as the transducer is moved in the vagina, especially when the bladder begins to refill.



Ultrasound: Circle of willis, brain.

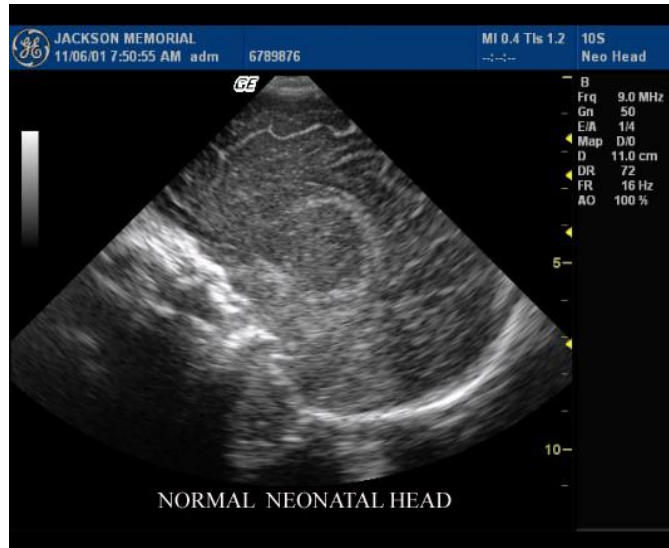
What are the benefits vs. risks of Obstetric Ultrasound?

Benefits

- Ultrasound does not use x-rays to produce an image—neither the mother nor her unborn child is exposed to ionizing radiation.
- Ultrasound has been used to evaluate pregnancy for nearly four decades and there has been no evidence of harm to the patient, embryo or fetus. Nevertheless, ultrasound should be performed only when clinically indicated.
- Ultrasound allows the doctor to see inside the uterus and provides much information about the pregnancy.

Risks

- For standard diagnostic ultrasound there are no known harmful effects to humans.



Ultrasound: Normal neonatal head.

What are the limitations of Obstetric Ultrasound?

Obstetric ultrasound cannot identify all fetal abnormalities. Consequently, when there are clinical or laboratory suspicions for a possible abnormality, a pregnant woman may have to undergo nonradiologic, invasive testing such as amniocentesis (the evaluation of fluid taken from the sac surrounding the fetus) or chorionic villus sampling (evaluation of placental tissue) to determine the health of the fetus, or she may be referred by her primary care provider to a perinatologist (an obstetrician specializing in high-risk pregnancies).