WorldCare Clinical
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The WCC Note™

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A Weekly Guide To Harmonizing Clinical Trial Imaging

Volume 1, Number 6 – October 31, 2007

BREAST ULTRASOUND

RADIOLOGY: THE BASIC MODALITIES
Part Six: Ultrasound Mammography

How It Works. As discussed in a recent issue of *The WCC Note* (Volume 1, Number 3), an ultrasound machine uses sound waves to differentiate the types of tissues within the breast. Because of the lack of radiation and its ability to see structures in "real time," ultrasound is a good tool for the evaluation of the breast in certain situations.

However, ultrasound is not a good test for screening the breasts – that is, if a healthy woman without any symptoms gets an ultrasound scan, it can be extremely difficult to find a small cancer. In addition, ultrasound is a poor test in patients with very large or dense breasts, because the sound waves cannot pass through the excess fatty tissue. Breast ultrasound is useful in evaluating masses that have already been seen on a mammogram or felt by a patient.

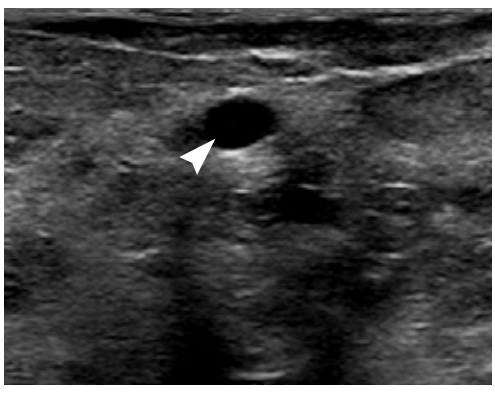

Figure 1: *Simple cyst on breast ultrasound*

Evaluating a Known Mass

If a woman feels a lump in her breast but it can't be seen on a mammogram, or if a mass is seen on a mammogram but it is uncertain whether it is benign or malignant (which is very common), an ultrasound can be done to evaluate it further. In these situations, the ultrasound operator already knows the location of the mass and can do a dedicated ultrasound examination of that area to characterize it better. This is useful because an ultrasound can show that a mass is definitely a benign growth, which would prevent the woman from having to get a biopsy.

The most common benign mass that can be confirmed on an ultrasound is a simple cyst – a small collection of fluid (see Figure 1). Ultrasound is extremely accurate in identifying simple cysts, because it depends on the transmission of sound waves and simple fluid transmits sound waves very well. As a result, a simple cyst will appear completely black on ultrasound; this black appearance is called "anechoic," meaning that the fluid produces no echoes, or does not make any of the sound waves bounce back, because the sound waves are transmitted through it so easily.

BREAST BIOPSY

Biopsies: Ultrasound, Stereotactic, and MRI

A biopsy is a procedure where a small piece of a mass that is suspected to be cancer is removed from a patient using a needle, so that it can be examined under a microscope to see what it is. Ultrasound is also very useful in helping physicians find the right place to insert the needle during a biopsy. Because it is a "real-time" imaging exam, the images seen on the screen show exactly what is happening at the time the transducer is on the patient (See Figure 2). Thus, a physician can watch in real time as the needle goes through the patient's skin and into a mass, to make sure it is going to the correct place.

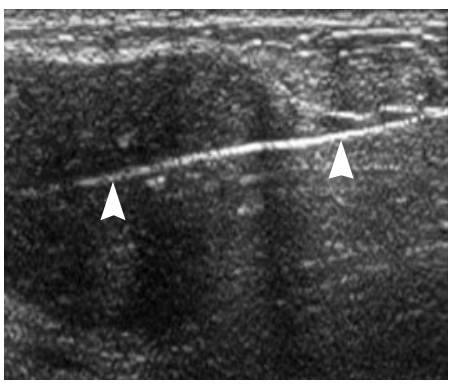

Figure 2: *Sonogram image during ultrasound-guided biopsy shows the core biopsy needle (arrows) sampling the lesion.*

Another method used for breast biopsy is stereotactic biopsy, which uses x-ray (or mammogram) guidance instead of ultrasound guidance. Because x-rays cannot be done as real-time exams, in a stereotactic biopsy the physician (with the help of a computer program) figures out exactly where to place the needle based on x-rays taken prior to the biopsy. After careful planning, a machine helps the physician place the needle in the center of the mass. X-rays are taken again after the needle is placed, to confirm that it is in the correct position.

As we discussed last week, a newer technique for breast biopsy is MRI-guided biopsy, which is used only for masses that cannot be seen on either a mammogram or ultrasound.

MODALITIES USED IN DETECTING BREAST CANCER

MODALITY	FACTS	COMMON USES
Mammograms	• Quick and easy • Uses x-rays • Relatively small amount of radiation	• Yearly screening for women over 40 years old who are at average risk
Ultrasound	• No radiation • Uses sound waves	• To get a better look at a mass found on mammogram • To look at a lump found by a woman on self-exam
MRI	• No radiation • More expensive • Takes longer time • Relatively accurate and sensitive for finding and recognizing cancers, especially aggressive ones	• Screening for women at high risk • Screening for some women with history of breast cancer • To evaluate a questionable finding from mammogram or ultrasound • In women with known breast cancer in one breast, to make sure there is no cancer in the other breast • To monitor how a cancer responds to treatment

Because MRI and ultrasound do not use radiation, they are very suitable for research studies.

NEXT WEEK: Nuclear Medicine

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