DIDACTIC LECTURES
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Ninth International Congress
on the Ultrasonic Examination of the Breast
THE RATIONALE FOR ULTRASOUND IMAGING OF BREASTS COMPRESSED AND POSITIONED IN THE MODES APPLIED IN X-RAY MAMMOGRAPHY

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The continuing increase in breast cancer incidence has emphasized the need for improved techniques for both detection and diagnosis of breast cancer. It can be expected, in the near future, combined imaging technologies will be widely applied for examination of the breasts for symptomatic and asymptomatic patients. In the immediate future, x-ray mammography and ultrasound mammography will be the most likely candidates for this combined approach.

On an international level, a number of investigations from the early 1980's to the present have shown ultrasound imaging capable of providing accurate diagnostic information which is not limited to simply differentiating between the solid or cystic nature of a breast mass (1-20). In Japan, on the basis of long-term studies, ultrasound mammography has achieved an equal clinical status with x-ray mammography (6,11). European investigators during the late 1980's and early 1990's also found that ultrasound imaging can equal x-ray mammography in the diagnosis of overt malignant breast masses (17,19). However, in the United States during the 1980’s and on into the 1990’s (21-25), a number of investigators concluded that ultrasound could not provide accurate diagnostic data on solid breast masses. Thus, in the United States, with the exception of individual clinicians, ultrasound breast imaging has had a limited role, with emphasis placed on its ability to differentiate cystic and solid masses (21-25).

If consideration is given to the problem of correlating diagnostic information provided by x-ray mammography and that provided by ultrasound imaging, it is apparent that the anatomical arrangement of tissues traversed by the two imaging modalities, during breast examination, is quite different. Consequently, if comparisons are made between ultrasound images of breast masses of patients held in the supine position and x-ray mammography images of patients held in any of the standard mammography positions, the following must be considered in respect to diagnosis:

1. The orientation of the tissues surrounding the mass are completely different for these two imaging modalities, i.e., the tissues traversed by sound wave when a patient is in the supine position are not the same as the orientation of the tissues traversed by an x-ray beam for a breast compressed between two plates;

2. The compression of a breast mass and its associated tissues, as applied by the compression plates, influences the imaging characteristics of the mass; and,

3. Since breast tissue is mobile, the location of a mass can be significantly different for the case of breast compression between two plates and an uncompressed breast with the patient in a supine position.
It is possible that, in some cases, a mass diagnosed on x-ray mammography film may not be the same mass viewed on the ultrasound film. This is not to say that correlations cannot be made between x-ray mammography and ultrasound imaging. Clearly, many investigators have made such correlations. The supine position for a patient undergoing an ultrasound breast imaging procedure has, in fact, a number of advantages (1). However, in terms of the ability to make exact comparisons between the diagnostic information provided by x-ray mammography and that provided by ultrasound mammography, the differences in patient positions for these two modalities can cause interpretive errors.

At the Fifth International Congress on the Ultrasonic Examination of the Breast, Kelly-Fry proposed that it is possible to examine breasts by ultrasound imaging, while compressed and held in the same positions used in x-ray mammography, if appropriate studies are carried out on the physical characteristics of compression paddle materials. On the basis of preliminary studies of such materials, ultrasound images of breasts recorded in this manner were presented. Since that time, progress has been made by various investigators in terms of application of this technique (26-31). Several scientific presentations will be made at this Ninth Congress on results obtained with this new technique. The potential of this method for improving correlation between x-ray mammography and ultrasound imaging, and, in addition, for advancing ultrasound mammography techniques will be presented.

Progress in application of this new technique does not mean that standard techniques currently applied for ultrasound mammography will be completely abandoned since ultrasound examination of a patient in the supine position has clinical advantages (1). As advancement in ultrasound imaging technologies continues to increase, many different approaches to breast imaging will be discussed.

References:


