RELATIONSHIP OF BREAST PARENCHYMAL PATTERNS AND BREAST LESIONS: ULTRASONIC EVALUATION

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The breast is the seat of permanent and cyclic changes controlled by hormonal factors. Through the periodic effect of the estrogen on the connective tissue of the breast, the breast stroma may show changes in water content and hyperplastic action. The fibro-fatty matrix and epithelium-connective tissue ratio may be molded during the whole course of life. The breast parenchyma may have various patterns depending on the amount of fibro-fatty matrix and glandular tissue. The radiological pattern of the breast parenchyma has been found to be an indicator for risk, or relative lack of risk, for development of breast cancer (Wolfe, 1976). The breast parenchymal patterns (BPP) on ultrasound (US) may be correlated well with those on X-ray mammography (XRM) (Chou et al, 1990). High-resolution US may classify the BPP more reliably because better fibrous-glandular tissue differentiation can be achieved using US. The BPP can change with aging and parity as a result of atrophy of the glandular elements and replacement by fat or to a lesser extent fibrous tissue. More fibrous tissue in the parenchyma will generate higher echogenicity. As atrophy of glandular tissue progresses, more fat tissue deposits in the stroma, and the breast is generally depicted as an anechoic structure except minimal residual strongly echogenic fibrous strands. Four classifications of ultrasonic BPP can be applied glandular (G), more glandular with less fibrous (G+f), more fibrous with less glandular (g+F), and fibrous (F); the last pattern (F) may be frequently associated with fatty replacement of the breast.

Between October 1992 and September 1994, the Division of Ultrasound of Department of Radiology at the Veterans General Hospital-Taipei (VGH), undertook a long-term follow up study for 2053 women who were referred for breast evaluation. All patients have suspicious lumps on self-examination or physical examination by the referring physicians, or mastalgia. These women ranged in age from 13 to 94 years, with an average of 41.8 years. The US examinations were performed by two well-experienced
radiologists and one well-trained sonographer. The US scans were reviewed by these two radiologists. All the detected lesions were classified into three main groups: fibrocystic changes (FCC), fibroadenomas or papillomas (FA), and carcinomas (CA). Lesions with solid pattern on US were suggested to have a fine needle aspiration cytology (FNAC) or biopsy, or surgical intervention based on the sonographic suspicion of malignancy. All patients were followed for at least 2 years to confirm their clinical final diagnosis. The BPP of these 2053 women included G=1327 (64.6%), G+f=244 (11.9%), g+F=263 (12.8%), and F=219 (10.7%). The pathologies of the breast included FCC=776 (37.7%), FA=442 (21.5%), and CA=191 (9.3%); the other 664 patients (31.4%) showed no evidence of focal pathology. There was a significant difference among these three groups of diseases \( p < 0.01 \) with a higher incidence of CA in patients with a BPP of ultrasonic F classification. The BPP may change as the age increases, or may change with severe weight gain or loss. The reason of higher incidence of CA in patients with F classification may be related to the patient’s age, however, women before the age of fifty with F breast should be evaluated more carefully.

References


THE USEFULNESS OF SCORING SYSTEM DISTINGUISHING BETWEEN BENIGN AND MALIGNANT BREAST MASSES ON ULTRASONOGRAM

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Purpose: To evaluate the scoring system based on ultrasonographic findings as a means of distinguishing between benign and malignant solid breast masses.

Materials and Methods: In histopathologically confirmed benign (n=102) and malignant (n=73) breast masses, ultrasonographic findings were reviewed for the shape, border, internal echo, boundary echo, posterior echo, lateral echo, and ratio of transverse to anteroposterior diameter. There were statistically significant (p<0.001; chi-square test) differences in each feature for benign and malignant lesions. The findings suggesting benignancy, equivocality, and malignancy of the masses were scored as 0, 1, and 2 respectively. The scores for all features were summed for each lesion. ROC curve was obtained.

Results: Fine benign masses and seven malignant masses had score of 5 respectively. The score of 0 and 1 were all benign masses and score of mass above 11 were all malignancy. Turning point was a score of 6 on ROC curve, so a score of a mass above 7 suggests malignancy.

Conclusion: A ultrasonographic scoring system can be used for characterization of the breast masses. A score of a mass above 7 suggests probable malignancy and a score below 5 suggests benignancy of the mass.
NONPALPABLE SMALL BREAST LESIONS: DIFFERENTIAL POINTS BETWEEN MALIGNANT AND BENIGN LESIONS ON ULTRASONOGRAM

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Purpose: To find the differential points of malignant and benign nonpalpable small lesions, less than 1cm in longest diameter, in breast by ultrasonographic examination.

Materials and Methods: Among 40 lesions of 33 patients, we classified into 3 groups; cancers, fibroadenomas, fibrocystic diseases. Among ultrasonographic findings, we focused the ratio of anterior-posterior and width (AP/W), the margin and echogenicity of the lesions for differentiation between malignant and benign lesions. The echogenicity was compared with intramammary fat (defined isoechoic). The mammogram was also evaluated with or without visible mass.

Results: Of the 12 fibroadenomas, the margin of the mass was well-defined in 11 lesions (91.7%) and ill-defined in 1, which showed hypoechoic in 5, isoechoic in 6, and hyperechoic in 1. The AP/W ratio of fibroadenomas was mostly less than 1 in 11 cases (91.7%). The 14 fibrocystic diseases showed well-defined margin in 9 (64.9%) and ill-defined in 5, and hypoechoic in 8 and isoechoic in 6 that revealed less than 1 of AP/W ratio in 13 cases (92.9%). Among the 14 malignant lesions, the only 3 cases showed well-defined margin and ill-defined in 11 (78.6%) and the echogenicity was hypoechoic in 8 and isoechoic in 6. The AP/W ratio of malignant lesions revealed over than 1 in 7 and less than 1 in 7 (50%).

On mammogram, the mass was not detected in 8 cases of fibroadenomas, 14 of fibrocystic diseases, and all of malignant lesions.

Conclusion: We concluded that the ill-defined margin was specific finding of malignant lesions, but AP/W ratio with less than 1 showed high specificity (89.3%) in benign lesions.
ULTRASONOGRAPHIC PATTERNS FOR PATHOLOGICAL CONFIRMATION OF BREAST CANCER

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Purpose: The purpose of this study is to investigate the accurate method for the preoperative pathological diagnosis of breast cancer based on the ultrasonographic findings.

Materials and Methods: We classified the ultrasonographic images of 256 invasive ductal carcinomas into four types by posterior echogenicity, 1) Enhanced, 2) Intermediate, 3) Attenuated, 4) Shadow to compared with the result of fine needle aspiration cytology (FNAC) or core needle biopsy (CNB).

Results: The posterior echogenicity of the tumor brings the false negative rate in each types, 6.9% in enhanced, 13.0% in intermediate, 15.0% in attenuated, and 30.8% in shadow type, respectively. Sixteen of 17 tumors judged negative or suspicious by FNAC revealed malignancy by CNB. We first underwent CNB to the tumors of the attenuated and the shadow types since January 1997. The positive rate of CNB performed to the attenuated and the shadow types was 100%.

Conclusion: The classification of ultrasonographic images based on the posterior echogenicity of breast cancer was useful for much more accurate preoperative pathological diagnosis. We conclude CNB should be chosen for both of the attenuated type and the shadow type.
CHARACTERISTICS OF BREAST CANCER DETECTED BY SCREENING ULTRASONOGRAPHY

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Purpose: At our center, breast screening has been performed by physical examination, ultrasonography (US), and mammography (MMG), since November, 1985. We evaluated the characteristics of breast cancer detected by US.

Subjects and Methods: The subjects were 33,209 females who underwent breast screening during the 11-year period between April, 1987 and May, 1998. US and MMG were performed by sonographers and radiographers, respectively. Subsequently, medical doctors performed physical examination while observing obtained images and made the diagnosis.

Results: Breast cancer was detected in 67 females, of whom 13 had a non-invasive carcinoma, and 46 had an invasive carcinoma (the other 8 are still under investigation). For non-invasive carcinomas, both the sensitivity of US and that of MMG were 61.5%. For the invasive carcinomas, the sensitivity of US was 91.3%, but that of MMG was 58.7%, showing the excellence of US. In particular, in the females aged 40-49 years who had a non-palpable invasive carcinoma, the sensitivity of US was 83.3% while that of MMG was 66.7%.

Conclusion: US is useful for detecting non-palpable invasive carcinomas in females aged 40-49 years.