ULTRASONOGRAPHIC EVALUATION OF PALPABLE BREAST MASSES

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ABSTRACT

PURPOSE : To retrospectively evaluate the sonographic findings and the diagnostic value of sonography in palpable breast masses at Phayao Hospital by using terminology of the Breast Imaging Reporting and Data System (BI-RADS) in order to categorize lesions from the sonograms and compare them with the histopathologic reports of the masses.

MATERIALS AND METHODS : Sonographic studies of 27 patients with palpable breast mass(es) which were histopathologically proven between January 1, 2007 and October 31, 2007 at Phayao Hospital were retrospectively reviewed. Each lesion was evaluated using the sonographic BI-RADS terminology and assigned a final BI-RADS category. The final assessment of sonographic BI-RADS and biopsy results were compared.

RESULTS : The sonographic BI-RADS classifications of all 27 patients were as follows : BI-RADS 5 in 7 patients,BI-RADS 4 in 6 patients,BI-RADS 3 in 8 patients and BI-RADS 2 in 6 patients. Of the 7 patients in the BI-RADS 5 category, 4 patients had malignant tumors, 2 patients had mastitis with abscesses, and 1 patient had fibroadenoma. One patient in the BI-RADS 4 ,one patient in the BI-RADS 3 and one patient in the BI-RADS 2 categories had chronic inflammation, hemolysed blood,and lipoma,respectively. The remaining 17 patients in the BI-RADS 2,3,4 categories had fibroadenomas or fibrocystic changes.

CONCLUSION: Ultrasound is a useful available and inexpensive method in the early detection and diagnosis of palpable breast masses, particularly in small hospitals which do not have mammographic x-ray equipment and in which most of the patients have economic problems. The sonographic BI-RADS descriptors and categories are also very helpful in catagorizing lesions, making management recommendations and differentiating between benign and malignant masses.

INTRODUCTION

Although mammography is recognized as the best method of screening for breast cancer, ultrasonography of the breast also plays a critical role in the diagnostic evaluation for screening, detection of palpable masses. Ultrasound with a high frequency transducer is essential for accurate, noninvasive diagnosis of breast cysts and has shown promises in differentiating between benign and malignant solid masses.[7,8] In light of widespread uses of sonography, the American College of Radiology (ACR) recently developed the Breast Imaging Reporting and Data System (BI-RADS) for breast sonography to standardize the characterization of sonographic lesions.[14,15] This BI-RADS includes descriptors of various features such as mass shape, orientation, margin, and posterior acoustic transmission, and other sonographic features.

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The purpose of this study was to evaluate the sonographic findings and the usefulness of sonography in palpable breast masses at Phayao Hospital by using sonographic BI-RADS descriptors and categories. The final BI-RADS assessments were compared with the histopathologic reports.

MATERIALS AND METHODS

The ultrasonographic studies of 46 patients with palpable breast mass (es) obtained between January 1, 2007 and October 31, 2007 at Phayao Hospital were retrospectively reviewed. None of the patients received a mammographic examination before sonographic examination, due to the lack of mammographic x-ray equipment in Phayao Hospital.

All patients were examined with real-time sonography equipment (Logiq 5 Pro GE Mediacal Systems) using a multifrequency linear array 7.5 -12 MHz transducer.

19 patients were excluded from the study due to having no tissue diagnosis. Sonographic studies in these patients were interpreted as benign mass (es) in the BI-RADS 2 category. Their treatment was giving directory advices, follow up sonography and follow up physical examinations.

The study group included 27 females from 16 to 51 years of age.

The median age of these patients was 31.3 years.

All 27 patients of the study group had histopathologically proven masses. The assessments of the breast masses by sonography were grouped into seven broad categories based on sonographic BI-RADS descriptors,[3, 11] as follows: mass shape (Oval, round, irregular), mass margin (well-circumscribed, microlobulated, speculated, angular, indistinct), posterior echo (enhanced, unaffected,shadowing, or combined), mass echogenicity (hyperechoic, isoechoic, mildly hypoechoic, markedly hypoechoic, complex, anechoic), lesion boundary (abrupt, echogenic halo), mass orientation (parallel, or not) and presence of calcifications.

The sonographic diagnoses were recorded according to their sonographic ACR BI-RADS category. **Table 1.**

Table 1 : US BI-RADS Categories and Interpretation

US BI-RADS category	Interpretation.
0	Need additional imaging
1	Negative study.
2	Benign Findings
3	Probably Benign Findings: Short interval follow up suggested.
4	Suspicious Abnormality: Biopsy should be considered.
5	Highly Suggestive of Malignancy

The US BI-RADS 0 and 1 categories were not included in this study.

The final BI-RADS assessments were compared with the histopathologic reports.

RESULTS

All 27 patients included in the study had histopathologic diagnosis.

Among these patients, 6 patients were diagnosed as BI-RADS 2 category, 8 patients were diagnosed as BI-RADS 3 category, 6 patients were diagnosed as BIRADS 4 category and 7 patients were diagnosed as BIRADS 5 category.

The sizes of all breast masses were ranging from 1 cm. to 9 cm.

All 20 patients in the BI-RADS 2,3,4 categories were benign in the histologic diagnosis, as follows:

- 1 patient in the BI-RADS 2 category had lipoma,
- 1 patients in the BI-RADS 3 category had a hematoma with hemolysed blood in the breast and had a history of recent breast trauma.Sonopraphic study showed a mass with irregular shape and complex echogenicity.
- 1 patient in the BI-RADS 4 category had a history of breast masses and breast pain. Sonography showed a mass with inhomogeneous echo and indistinct margin. FNA was performed and the pathologic report showed chronic inflammatory process from possible granulomatous mastitis.
- The remaining 17 patients had pathologically proven fibroadenoma or fibrocystic changes.

In the 7 patients in BI-RADS 5, malignancy was revealed in 4 cases, mastitis with abscess formation in 2 cases and a fibroadenoma in 1 case. **Table 2**

TABLE 2 : BI-RADS category compared with histopathology

Final BI-RADS assessment (category)	Number of patients (cases)	**Histopathology**
BI-RADS 2 (6 cases)	5	Fibroadenoma, Fibrocystic changes.
	1	Lipoma
BI-RADS 3 (8 cases)	7	Fibroadenoma, Fibrocystic changes.
	1	Hemolysed blood.
BI-RADS 4 (6 cases)	5	Fibroadenoma, Fibrocystic changes.
	1	Chronic inflammatory processes, possible granulomatous mastitis.
BI-RADS 5 (7 cases)	4	Malignancy (Intraductal carcinoma, Invasive ductal carcinoma, Papillary ductal carcinoma in situ,and infiltrating ductal carcinoma, respectively.)
	2	Mastitis with abscess formation.
	1	Fibroadenoma.
Total	27	

TABLE 3 : Mass descriptions of each sonographic BI-RADS category

US BI-RADS category. / Mass Descriptors	BIRAD2 (No of cases)	BIRAD3 (No of cases)	BIRAD 4 (No of cases)	BIRAD5 (No of cases)
Mass shape				
-Oval	6	7	4	2
-Round	-	-	1	-
-Irregular	-	1	1	5
Mass margin				
-Well-circumscribed	6	8	5	-
-Microlobulation.	-	-	-	1
-Angular	-	-	-	1
-Spiculation.	-	-	-	2
-Indistinct	-	-	2	3
Mass exhogenicity				
-Hyperechoic.	1	-	-	-
-Isoechoic	-	-	-	-
-Mildly hypoechoic.	-	5	4	1
-Markedly hypoechoic.	3	2	2	3
-Complex.	-	1	-	3
-Anechoic	2	-	-	-
Lesion Boundary				
-Abrupt	6	8	6	7
-Echogenic halo.	-	-	-	-
Acoustic transmission.				
-Enhanced	5	5	1	-
-Normal	-	3	3	1
-Shadowing	1	-	2	3
-Combined	-	-	-	3
Mass orientation				
-Parallel	6	8	6	5
-Not parallel	-	-	-	2
Calcifications within mass				
-Present	-	-	-	-
-Absent	6	8	6	7

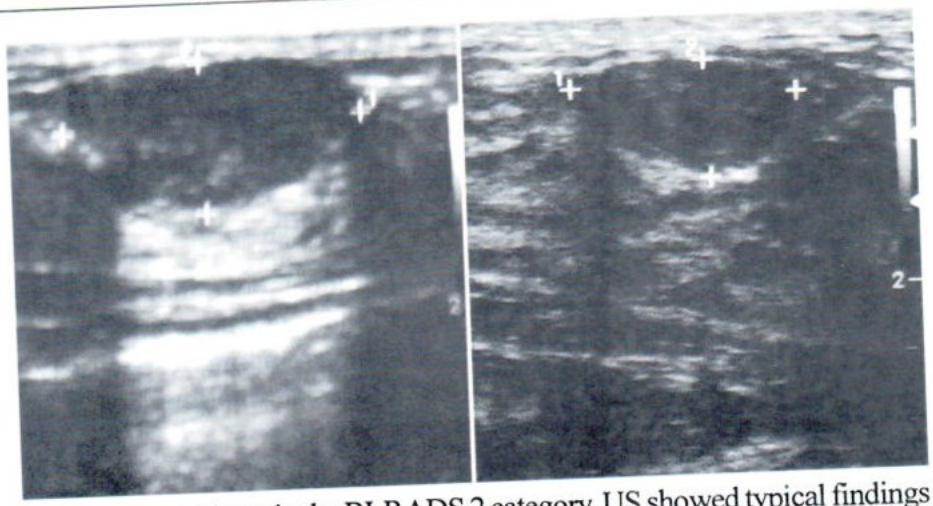

Fig.1 Two patients in the BI-RADS 2 category. US showed typical findings of benign masses: oval shape, well-circumscribed, hypoechoic, abrupt boundary and posterior enhancement. **US : Ultrasonography**

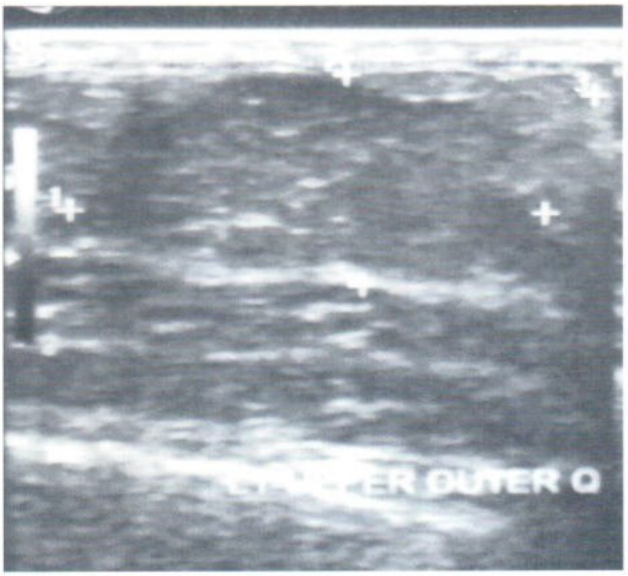

Fig.2 Sonography in a 28-year-old woman showed an oval-shaped mass with indistinct margin and inhomogeneous echo: BI-RADS 4 category. Tissue diagnosis was chronic inflammatory process, possible granulomatous mastitis.

DISCUSSION

Although there has been some controversy regarding the utility of sonography when evaluating solid breast masses for the likelihood of malignancy,[9,10] several studies have suggested that sonographic appearance can be useful in differentiating benign from malignant solid breast masses.[5,7]

The addition of the BI-RADS lexicon for ultrasonography is helpful and can be used with good agreement among radiologists, even those without specific training in the new terminology.[11]

The sonographic findings suspicious for malignancy included shadowing, solid nodule, spiculation, angular margins, thick echogenic halo, microlobulation,taller-than-wide, hypoechogenicity, calcifications and duct extension or branch pattern.[7]

Sonographic evidence of spiculated margin suggests infiltrating growth of the lesion into the surrounding tissue, whereas an irregular shape can indicate inconsistent growth and advancement of the lesion edge. Nonparallel orientation on sonography can suggest spread of the lesion through tissue-plane boundaries. All of these characteristics are more likely to be associated with malignant lesions. In contrast, circumscribed margin and oval shape representing smooth uniform growth without involvement of surrounding tissue are associated more with a benign lesion.[11]

In this study all patients in the BI-RADS 2,3 and 4 categories were benign in the histologic diagnoses. All 6 cases in BI-RADS 4 showed some findings of suspicious malignancy such as posterior shadowing in 2 patients,indistinct margins in 2 patients and irregular mass shape in 1 patient. So tissue diagnosis had to be performed to exclude malignancy.

Among the 7 patients in BI-RADS 5 group:

4 patients had typical sonographic evidences of malignancy and no doubt in the diagnosis,

1 patient had a large fibroadenoma , that showed some malignancy findings (lobulated margin, combined posterior shadowing and complex echogenicity)

2 patients had mastitis with breast abscesses, these conditions being difficult to be the differentiated from malignancy by ultrasound alone, particularly if there were no signs of inflammation.

Breast abscess and inflammatory breast carcinoma may have identical clinical and mammographic findings. Quick use of aspiration biopsy may expedite appropriate patient care.[12]

Most patients included in this study were more concerned about having a malignant breast mass than about their cosmetic appearance. So the patients and the clinicians preferred to have tissue diagnosis of the occult palpable breast masses together with follow up studies.

Mammographic studies were not done in most patients due to economic problems and lack of

mammographic x-ray equipment in Phayao Hospital. Treatment planning and treatment decisions by the clinicians usually depended on sonographic findings and physical examinations.

Statistic analysis was not done in this study because of the small number of patients.

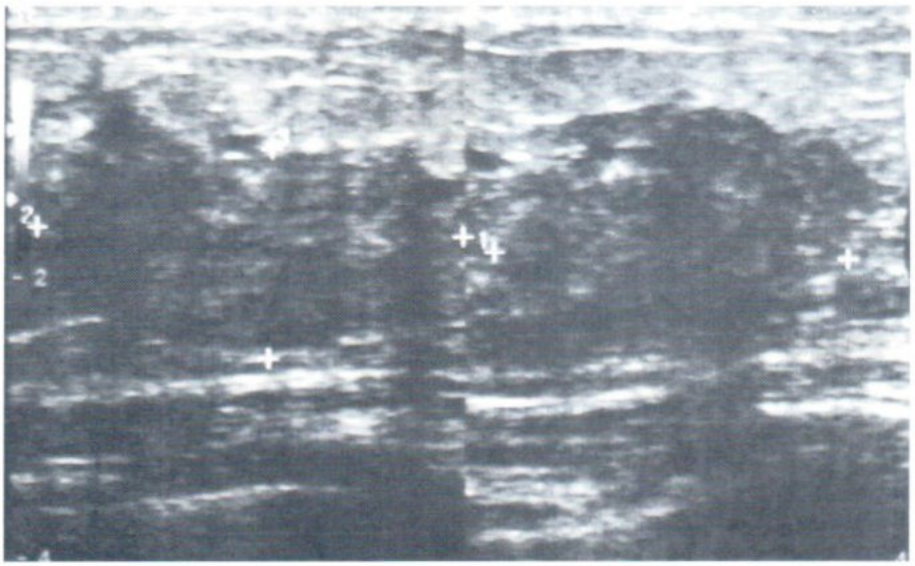

Fig.3 US in a 34-year-old woman showed a mass with irregular shape, indistinct margin and complex echo: BI-RADS 5 category. Tissue diagnosis was mastitis with abscesses formation.

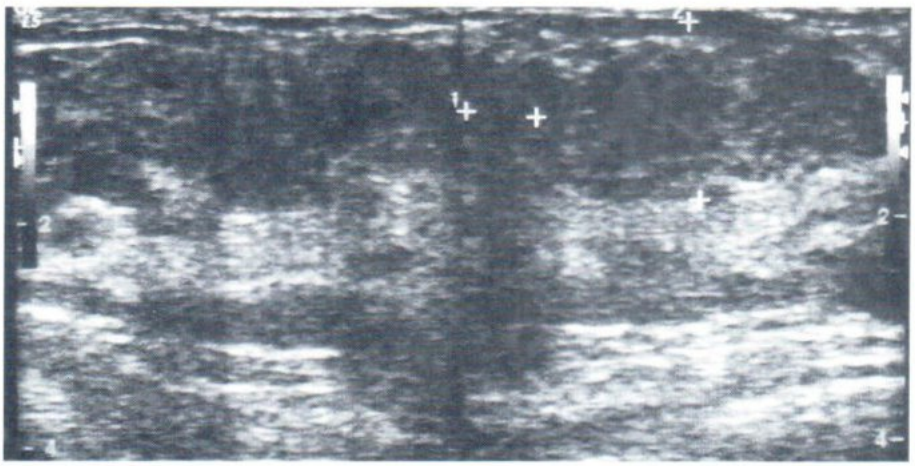

Fig.4 US in a 29-year-old woman. Final assessment was BI-RADS 5 category. Tissue diagnosis was mastitis with abscesses formation.

Fig.5 US in a 48-year-old woman showed a small mass (1 cm.) with spiculated margin and posterior shadowing: BI-RADS 5 category. Tissue diagnosis was intraductal carcinoma.

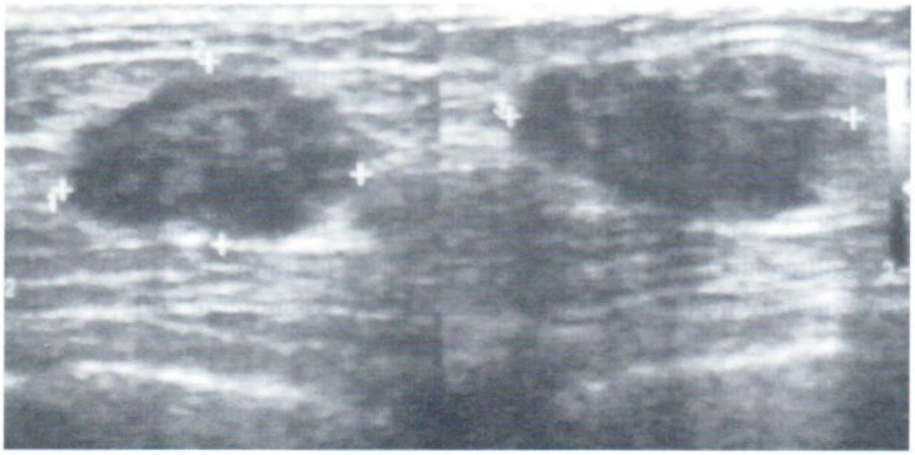

Fig.6 US in a 34-year-old woman showed an inhomogeneous hypoechoic mass with spiculate margin : BI-RADS 5 category. Tissue diagnosis was invasive ductal carcinoma.

CONCLUSION

Ultrasound is a useful, available and inexpensive method in the early detection and diagnosis of palpable breast masses, particularly in small hospitals which do not have mammographic x-ray equipment or other advanced imaging equipment and in which most of the patients have economic problems. The sonographic BI-RADS descriptors and categories are also very helpful in characterizing lesions, making management recommendations and differentiating between benign and malignant breast masses, but are less helpful in differentiating between breast abscess and inflammatory breast cancer or malignant breast masses in the BI-RADS 5 category.

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