Abnormal Findings in Breast Imaging: A Hospital-Based Survey in 4264 Thai Women

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Objective : *To evaluate the distributions of common and significant imaging findings from breast imagings at King Chulalongkorn Memorial Hospitals.*
Material and Method : *Data was collected from every mammography performed from November 1, 2001 to October 31, 2002. The reports were analyzed and imaging findings were recorded. The ACR BI-RADS category was applied to all cases.*
Results : *There were 4264 patients and all of them were female. The age range was between 19-90 years and average age was 50.1 years. The most common positive findings were cysts (39.22%), followed by focal lesions (14.76%), mass (8.69%), architectural distortion (7.83%), calcification (7.36%) and thick ducts (3.76%). According to ACR BI-RADS, most of the studies were in category 2 (42.59%), followed by category 1 (38.67%), category 3 (12.08%) category 5 (3.45%), category 4 (3.12%) and category 0 (0.09%).*
Conclusion : *Breast imaging is the standard screening tool for breast cancer and can reveal different kinds of findings. Knowing the distribution of these findings helps both the radiologists to understand the scope of their work and the institution to audit their practice.*

Keywords : *Mammography, Mammary ultrasonography, Data collections, Health surveys*

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Mammography is a procedure of choice for breast cancer screening and is widely performed throughout Thailand, as breast cancer awareness has been promoted. However, the imaging findings vary from place to place due to the demographic pattern of the disease, referring physician's choice as well as patient's background and education. In the remote areas where health care is limited and patients are uneducated, more advanced disease is seen. King Chulalongkorn Memorial Hospital is one of the largest hospitals in Thailand. Being tertiary care, there are all kinds of patients, screening, early disease, advanced disease and referral patients. This descriptive study shows all the abnormal imaging findings in the presented patients, knowing this information will help radiologists to know the scope of their work, including burden of screening mammography, and predict the future of their practice.

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Material and Method

The data was collected from every mammography performed from November 1, 2001to October 31, 2002. Mammography was performed by trained technologists in two standard views, mediolateral oblique (MLO) and craniocaudal (CC) views. The radiographs were reviewed by radiologists specialized in breast imaging (3 senior radiologists with more than 10-years experience in breast imaging and 2 junior radiologists with 1-year experience). Additional ultrasonography (US), performed by radiologists, was done in every case unless the breast is almost entirely fat (defined as fatty breast according to the American College of Radiology Breast Imaging Report and Data System, ACR BI-RADS [1] Additional views including cone compression, magnification, rolled, true lateral, extended CC, cleavage and axillary views were sometimes done if there were any suspicious findings. Mammographic reading was done afterward in the film reading room. Some of the patients were called back after film reviewing for more additional views or US.

The findings from both mammography, standard and additional views, and US were then summarized in the report.

The authors excluded screening patients that only underwent US of breasts, patients who performed mammography as part of needle guide or stereotaxis biopsy. Patients who had 2 mammographies during the time of the study, for the analysis purpose, were counted as 2 studies. Patient's age, known history of breast cancer, and nipple discharge were recorded.

The reports were then analyzed for the specific findings. The authors recorded data from the right and left breast separately. Positive findings were calcifications, cysts, cysts with associated calcification, architectural distortion, thick ducts, focal lesions, mass, mass with associated architectural distortion and mass with associated calcifications. (Fig. 1) Focal lesions were solid lesions that were smaller than 1 cm in greatest diameter and specific diameters of the lesion were recorded. Masses were lesions that were equal or greater than 1 cm in size. Negative finding was defined by lack of all the positive findings. ACR BI-RADS category was then given as 0-Incomplete study, 1-Negative, 2-Benign finding, 3-Probably benign finding, 4-Suspicious abnormality, 5-Highly suggestive of malignancy.

Results

From November 1, 2001 to October 31, 2002, there were 4470 mammographies performed at the Radiology Department, King Chulalongkorn Memorial Hospital. There were 4264 patients and all of them were female. The age range was between 19-90 years and average age was 50.1 years. There were 16 patients who had a complaint of nipple discharge and 269 patients with known history of prior treated breast cancer during the examination period.

There were 1669 negative studies (37.34%). Two thousand eight hundred and one (2801) patients had at least one positive finding in either breast (62.66%). There were 2258 and 2203 negative findings in separate right and left breast, respectively. Seventy seven (77) patients had calcifications in both breasts, 278 in the right breast and 273 in the left breast. Two hundred and thirteen (213) patients had calcification and cysts in both breasts, 448 in the right breast and 419 in the left breast. Eight hundred and fifty nine (859) patients had cysts in both breasts, 1251 in the right breast and 1236 in the left breast. Two (2) patients had architectural distortion in both breasts, 55 in the right breast and 63 in tehe left breast only. Eighty (80) patients had thick ducts in both breasts, 117 in the right breast only and 124 in the left breast only (Fig. 2).

There were 72 cases with bilateral breast masses, 331 in the right breast only, and 338 in left breast only. In these patients, 251 patients had masses without other findings, 120 in the right breast, 117 in the left breast and 14 in both breasts. As previously mentioned, the associated findings of calcifications and architectural distortion were recorded. Ninety seven (97) patients had a mass with associated calcifications, 49 in the right breast, 41 in the left breast and 7 in both breasts. Seventy two (72) patients had masses with associated architectural distortion, 35 in the right breast and 37 in the left breast (Fig. 3).

Focal lesions, less than 1 cm in greatest diameter, were found , 532 in the right breast, 558 in the left breast and 169 in both breasts. The 1 mm focal lesions were found in 2 cases, 1 in the right breast and the other in the left breast. The 2 mm focal lesions were found in 10 cases, 5 in the right breast and 5 in the left breast. The 3 mm focal lesions were found in 67 cases, 39 in the right breast, 27 in the left breast and 1 in both breasts. The 4 mm focal lesions were found in 146 cases, 69 in the right breast, 76 in the left breast and 1 in both breasts. The 5 mm focal lesions were found in 208 cases, 94 in the right breast, 108 in the left breast and 6 in both breasts. The 6 mm focal lesions were found in 193 cases, 91 in the right breast, 95 in the left breast and 7 in both breasts. The 7 mm focal lesions were found in 215 cases, 90 in the right breast, 118 in the left breast and 7 in both breasts. The 8 mm focal lesions were found in 158 cases, 80 in the right breast, 74 in the left breast and 4 in both breasts. The 9 mm focal lesions were found in 116 cases, 62 in the right breast, 53 in left breast and 1 in both breasts. The details of focal lesions findings are shown in Fig. 4.

According to ACR BI-RADS category, the authors have 4 studies in category 0 (need further investigation such as ductogram), 1725 studies in category 1 (1669 negative study, 56 nonrelevant findings such as calcifications outside the breast, skin lesions), 1900 studies in category 2, 539 studies in category 3, 139 studies in category 4 and 154 studies in category 5 (Fig. 5). There were 9 patients in which ACR BI-RADS category was not assessed and were excluded from the analysis.

Discussion

Mammography is the standard screening tool for breast cancer. The sensitivity, specificity, and

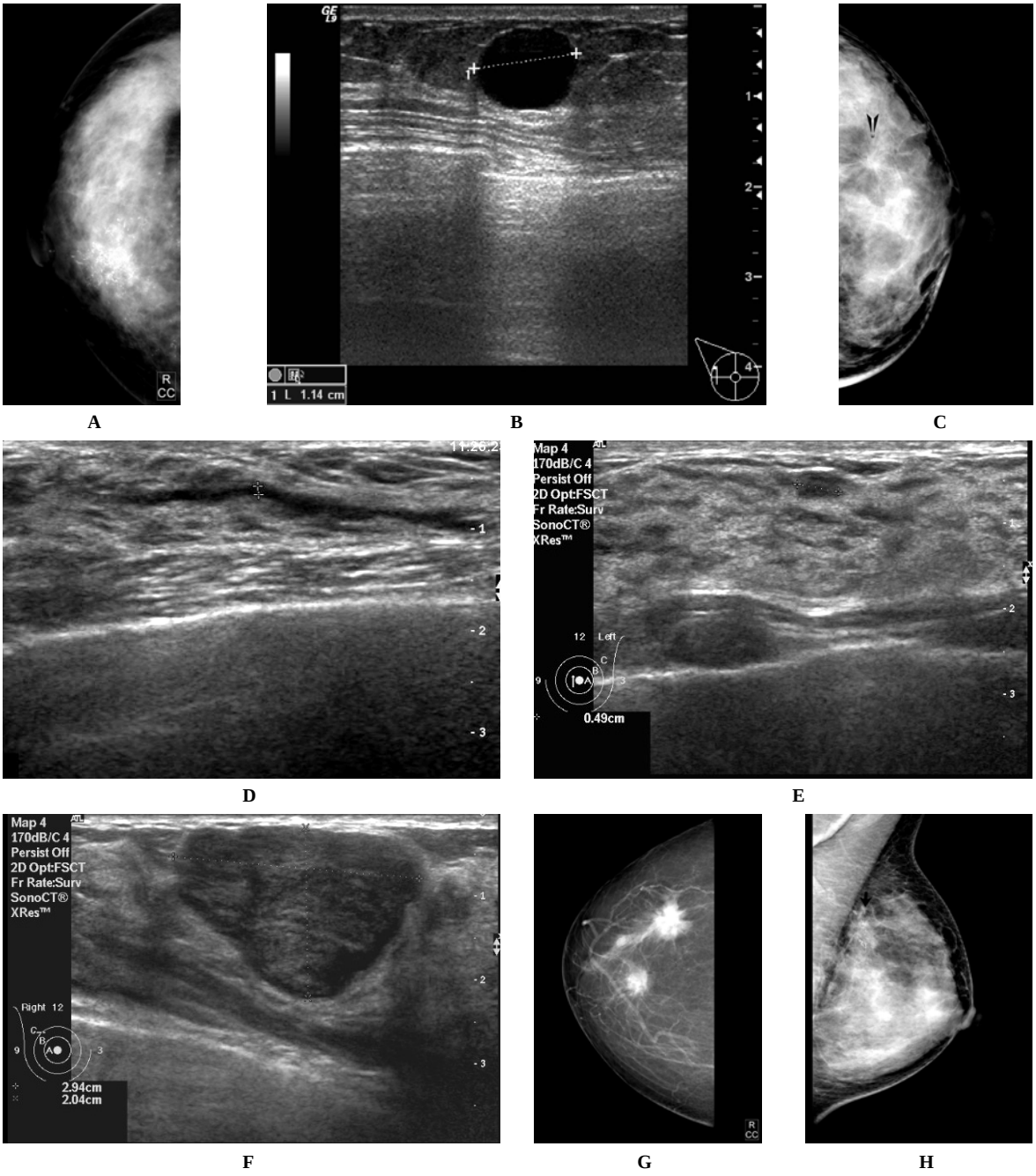

Fig. 1 Positive findings

A. CC view of right breast shows clustered pleomorphic microcalcifications which were classified as "calcification".

B. Ultrasonography shows a well-defined anechoic lesion with posterior acoustic enhancement, representing a simple cyst.

C. CC view of left breast shows architectural distortion (arrowhead).

D. Thick duct in subareolar region was shown in ultrasonography.

E. A 0.5 cm ill-defined hypoechoic lesion in left breast, which was defined as focal lesion.

F. A 2.9 cm lobulated hypoechoic lesion, which was defined as "mass" due to its greatest diameter.

G. Mammography showed three nodules, large one was with architectural distortion, representing "mass with associated architectural distortion".

H. MLO view of left breast showed a mass with associated calcifications (arrow).

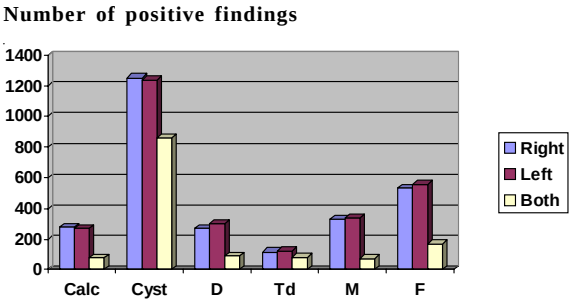

Fig. 2 Distribution of positive findings Calc = calcification, D = architectural distortion, Td = thick ducts, M = mass, F = focal lesion

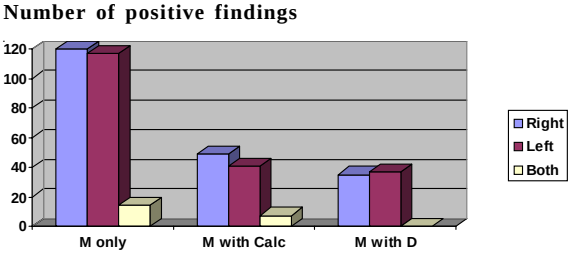

Fig. 3 Distribution of mass lesions: M = mass, Calc = calcification, D = architectural distortion

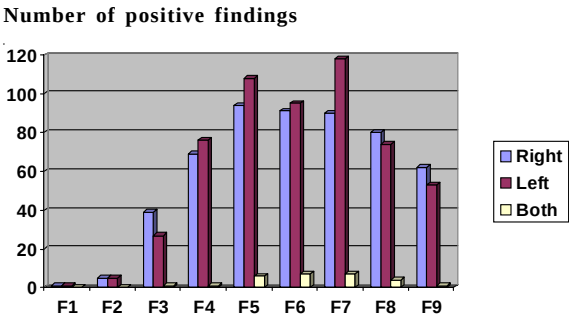

Fig. 4 Distribution of focal lesions. F = focal lesions, Number = greatest diameter of the lesion (millimeters)

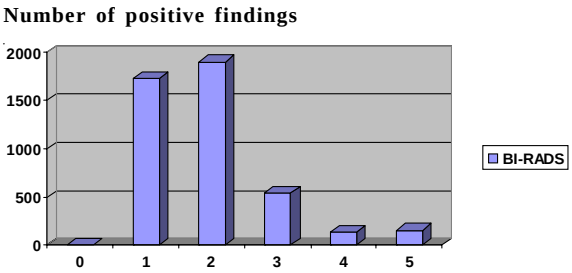

Fig. 5 Distribution of ACR BI-RADS category

accuracy were 77.6%, 98.8%, and 98.6%, respectively. Screening breast ultrasonography increased the number of women diagnosed with nonpalpable invasive cancer by 42%. Together, these two modalities had significantly higher sensitivity than did mammography and physical examination[2].

During the period of one year, there were more than 4000 mammographic studies performed in our institute. These studies include screening and diagnostic patients. The negative results (BI-RADS 1) are about 37.34%, which means most of the presented patients has at least one positive finding. The most common positive findings were cysts (39.22%), followed by focal lesions (14.76%), mass (8.69%), architectural distortion (7.83%), calcification (7.36%) and thick ducts (3.76%). This corresponds well with the common knowledge of fibrocystic change as the normal varia-tion in aging breasts other than disease. This might partly be due to much improved resolution of the ultrasound machine, which also improves detection of small cysts.

By the aothors' definition, focal lesions could be any lesions from fat lobule, small cysts with internal echo, small fibroadenomas or early carcinomas. These lesions, particularly those under 5 mm, are too small to characterize and usually require further investigation or serial short interval follow up (BI-RADS 3). Lesions under 3 mm in greatest diameter (F1, F2) were rarely seen (0.16% and 0.79%, respectively), probably due to limitation of ultrasound machine resolution.

Mass can be seen in both mammography and ultrasonography, however in the present study, the authors defined a mass as more than a 1 cm lesion in US since the authors would like to further correlate size of the lesion with the detection ability. The authors agreed on 1 cm as the limit of acceptable of detecting a lesion. Mass is also further classified to mass only, mass with calcification and mass with architectural distortion, as these associated findings usually warrant further management. Some of the patients in this category, as well as patients with focal lesions, underwent further investigation such as fine needle aspiration (FNA), which revealed various pathological results including ductal hyperplasia, apocrine cyst, fibroadenomas, or carcinomas[3].

Architectural distortion is better seen in mammography than in US. This condition could result from previous surgery, benign condition such as radial scar or malignant tumour. This lesion is difficult to detect in asymmetrical or dense breast unless the fibroglandular tissue is markedly distorted or associated with a mass lesion.

Calcification is also another common finding which is better seen in mammography. Unlike archi-

tectural distortion or mass, some of the calcifications in mammography can be ignored due to obviously benign appearance, such as vascular calcifications or a calcified skin lesion. The reported calcifications consist of suspicious ones such as clustered or pleomorphic microcalcifications and significant benign calcifications such as popcorn calcifications or secretory microcalcifications.

Thick ducts are described as distended tubular structure underneath subareolar regions, radiating toward nipples. The authors include this in the present findings because these findings might warrant follow up or further investigation in patients with positive clinical findings of nipple discharge and patients with proliferative change. However, this is a subjective finding and not consistent in wording the report.

According to ACR BI-RADS category, most of the presented patients were in category 2 (42.59%), followed by category 1 (38.67%), category 3 (12.08%) category 5 (3.45%), category 4 (3.12%) and category 0 (0.09%). The overall negative findings (category 1 and 2) were more common than positive findings (category 3, 4 and 5). However, the benign findings (category 2) were most common due to the additional US which could reveal nonsignificant benign findings such as cysts or small focal lesions.

The present study did not include demographic information of the patients such as history of hormonal replacement therapy, family history of breast cancer and previous surgery because the relationship with the mammographic findings needed to be evaluated individually with each factor and would have made the result more redundant. The pathologic results of the aspirated or biopsied lesions were not included and imaging-pathologic correlation, particularly in category 4 and 5, should further be done as part of the auditing process. Since this is the first reported mammographic findings pattern in our institute, there are some pitfalls which should be improved in data collection for auditing in the future. Calcifications should be subclassified as microcalcifications, macrocalcifications and concensus should be made among the radiologists when to call a significant calcification. Thick ducts, which are still a subjective finding, should also be clarified and correlation with follow up or pathologic result should be made. Finally, BI-RADS category was revised at the end of year 2003 and further update in our data collection will be done.

Conclusion

Mammography with additional US is performed as a routine procedure in our institution and revealed different kinds of findings, some of which are significant and warrant further investigation. Other incidental findings which are not significant are also identified. In our study, the most common abnormal findings are cysts (39.22%), followed by focal lesions (14.76%), mass (8.69%), architectural distortion (7.83%), calcification (7.36%) and thick ducts (3.76%). According to ACR-BIRADs, most of the studies are in category 2 (42.59%), followed by category 1 (38.67%), category 3 (12.08%) category 5 (3.45%), category 4 (3.12%) and category 0 (0.09%). Knowing the distribution of these findings helps both the radiologists to understand the scope of their work and the institution to audit their practice.

Acknowledgement

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References

1. American College of Radiology. Breast imaging reporting and data system (BI-RADS). Reston (VA): American College of Radiology; 1993: 2-3.
2. Kolb TM, Lichy J, Newhouse JH. Comparison of the performance of screening mammography, physical examination, and breast US and evaluation of factors that influence them: an analysis of 27,825 patient evaluations. Radiology 2002; 225: 165-75.
3. Sampatanukul P, Bunjunwetwat D, Pak-art P. Role of combined fine needle aspiration and ultrasonography in the diagnosis of impalpable lesions of the breast. J Med Assoc Thai 2003; 86(Suppl 2): S284-90.

ความผิดปกติของภาพทางรังสีจากการตรวจเต้านมด้วยแมมโมแกรมและอุลตร้าซาวด์: ผลการศึกษาในผู้ป่วย 4,264 รายที่โรงพยาบาลจุฬาลงกรณ์

พัชราจิรี ภาคอรรถ, ดรุณี บุญยืนเวทวัฒน์, ลัดดาวัลย์ วัชระคุปต์, วิภา อมรรัตนไพจิตร, เกษร วัชรพงศ์, พิเชฐ สัมปทานุกูล, กฤษณ์ จาฏามระ

วัตถุประสงค์ *: เพื่อศึกษาลักษณะของภาพทางรังสีจากการตรวจเต้านมด้วยแมมโมแกรมและอุลตร้าซาวด์ที่มีความสำคัญและพบบ่อยในโรงพยาบาลจุฬาลงกรณ์*

วิธีการ *: กลุ่มผู้วิจัยได้เก็บข้อมูลของผู้ป่วยที่ได้รับการตรวจแมมโมแกรมในโรงพยาบาลจุฬาลงกรณ์ตั้งแต่วันที่ 1 พฤศจิกายน 2544- 31 ตุลาคม 2545 รายงานผลการตรวจได้ถูกนำมาวิเคราะห์และแจกแจงผลการตรวจทั้งที่ปกติและผิดปกติ รวมทั้งจำแนกผู้ป่วยตาม ACR BI-RADS category*

ผลการศึกษา *: ในระยะเวลา 1 ปี มีผู้ป่วยที่ได้รับการตรวจการตรวจเต้านมด้วยแมมโมแกรมและอุลตร้าซาวด์ในโรงพยาบาลจุฬาลงกรณ์จำนวน 4264 คน ซึ่งอยู่ในช่วงอายุ 19-90 ปี, อายุเฉลี่ย 50.1 ปี ความผิดปกติที่พบมากที่สุดได้แก่ถุงน้ำ (cyst) (ร้อยละ 39.22), รอยโรคขนาดเล็กกว่า 1 เซนติเมตร (focal lesions) (ร้อยละ14.76), ก้อน (mass) (ร้อยละ8.69), architectural distortion (ร้อยละ7.83), หินปูน (calcification) (ร้อยละ7.36) และท่อนมที่หนาตัวขึ้น (thick ducts) (ร้อยละ3.76) จำแนกตาม ACR BI-RADS, category 2 เป็นกลุ่มที่พบมากที่สุด (ร้อยละ42.59), รองลงมาคือ category 1 (ร้อยละ38.67), category 3 (ร้อยละ12.08), category 5 (ร้อยละ3.45), category 4 (ร้อยละ 3.12) และ category 0 (ร้อยละ0.09)*

สรุป *: การตรวจเต้านมด้วยแมมโมแกรมและอุลตร้าซาวด์เป็นการตรวจที่มีประโยชน์ในการคัดกรองหามะเร็งเต้านมในระยะเริ่มต้น จากการตรวจสามารถพบความผิดปกติได้หลายชนิด รังสีแพทย์ที่ทำการตรวจควรมีความเข้าใจถึงสิ่งที่ตรวจพบเพื่อพัฒนาตนเองและการทำงานของสถาบันต่อไป*