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นิพนธ์ต้นฉบับ **Original Article**

Accuracy for Detection of Breast Cancer by Mammography and Ultrasound in Nakhonpathom Hospital

ความแม่นยำในการใช้แมมโมแกรม และอัลตราซาวด์ วินิจฉัยมะเร็งเต้านม ในโรงพยาบาลนครปฐม

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ABSTRACT

Objectives: To determine the accuracy for detection of breast cancer by mammography and ultrasonography correlate with histopathology and unchanged follow up mammographic reports in 2 years.

Materials and methods: Retrospective study of 2,766 mammographic reports with BI-RADS classification into BI-RADS 1 for negative study, BI-RADS 2 for benign finding, BI-RADS 3 for probably benign lesion, BI-RADS 4 for suspicious malignancy and BI-RADS 5 for highly suggestive of malignancy. All patients had been confirmed diagnosis with tissue histopathology or unchanged mammographic reports up to 2 years.

Results: The overall sensitivity was 91.73%, specificity 98.63% and accuracy 85.86% which are similar to the previous studies.

Conclusion: Mammography with additional sonographic examination is effective screening method for breast cancer.

Keywords: breast cancer, mammography

บทคัดย่อ

มะเร็งเต้านม เป็นมะเร็งที่พบบ่อยเป็นอันดับแรกของมะเร็งในสตรีไทย จากรายงานของสถาบันมะเร็งแห่งชาติ ในปี พ.ศ. 2544 - 2546

ตั้งแต่เดือนพฤษภาคม 2551 ถึงเดือนเมษายน 2553 มีผู้เข้ารับการตรวจเอกซเรย์เต้านม (แมมโมแกรม) ที่

โรงพยาบาลนครปฐม จำนวน 2,766 ราย การวิเคราะห์ข้อมูลย้อนหลังจากใบรายงานผลเอกซเรย์ เวชระเบียน และผลตรวจพยาธิวิทยาของชิ้นเนื้อ พบว่าการตรวจด้วยแมมโมแกรมและอัลตราซาวด์ มีความไว (sensitivity) 91.73% ความจำเพาะ (specificity) 98.63% และความแม่นยำ (accuracy) 85.86% ซึ่งใกล้เคียงกับการศึกษาที่มีผู้ทำไว้ก่อนหน้านี้

การตรวจแมมโมแกรม ร่วมกับอัลตราซาวด์ เป็นการตรวจคัดกรองมะเร็งเต้านม ที่มีประสิทธิภาพ

คำสำคัญ: เอกซเรย์เต้านม, มะเร็งเต้านม

Introduction

Breast cancer is the most prevalent cancer among women throughout the world and one of the mortality cancers among women in the world today.

In Thailand, breast cancer is the most common cancer in women. The estimated incidence rate is 20.5 per 100,000 women.[1] The incidence is increasing in the past decade.

Cause of CA breast is probably due to multiple factors.[2] The risk of breast cancer increases with age and drops off at 80 years of age. However, the incidence of breast cancer is increasing in younger women and many cases of this disease are being reported in women in their twenties and thirties. The incidence of breast cancer among women across all ages are also continue to be rising.

Early and accurate diagnosis of breast cancer can provide curative treatments with decreased morbidity and mortality. Mammography is the role acceptable method for breast cancer screening and diagnosis. The use of ultrasound as an adjunct to mammography in diagnosis of breast cancer is well established[3-6] with increase in diagnostic accuracy of the breast cancer detection.

This study presents the accuracy for detection of breast cancer by mammogram and ultrasound in Nakhonpathom hospital.

Materials and Methods

From May 2009 - April 2011, mammography was performed on 2,766 women at Nakhonpathom hospital. In my practice, mammogram and subsequent ultrasound were performed in the same visit in all women. The final assessment was based on the combination of mammogram and ultrasound findings. Medical records and mammographic reports as well as sonogrophic reports of these patients were retrospectively reviewed.

At least two standard craniocaudal and mediolateral oblique views were routinely obtained and additional views such as magnification view were also obtained for better delineation of a masses or microcalcifications. The mammographic machines are LORAD Selenia (HOLOGIC) and 7.5 MHz linear probe ultrasound Aloka alpha 10.

The result of mammographic reports were classified into category of the Breast Imaging Reporting and Data System (BI-RADS) of the American College of Radiology by a radiologist who has experienced in breast imaging. Negative study were classified as BI-RADS I, benign findings were classified as BI-RADS II, probably benign findings were classified as BI-RADS III, suspicious-

lesion of malignancy were classified as BI-RADS IV and highly suggestive of malignancy were classified as BI-RADS V. The BI-RADS 0 (incomplete study) and BI-RADS VI (known case of malignancy) were excluded from the study.

Results

There were 2,766 mammographic reports to be studied with the ages ranged from 25-82 years old. Average age was 44.56 years with high peak of the age incidence ranged between 50-54 years.

In 548 patients of BI-RADS III, biopsies were performed on 52 patients (9.49%). Invasive breast cancer was found in six patients (1.09%) and lobular carcinoma in situ in four patients (0.73%). The remainder patients were fibrocystic change (10), fibroadenoma (30), lipoma (2) and unchanged mammographic reports in 2 years (496)

In 53 patients of BI-RADS IV, 24 patients (45.28%) were tissue proven as malignancy. The remainder patients were fibroadenoma (18) benign intraductal papilloma (2), fibrocystic change (8) and fat necrosis (1)

In 90 patients of BI-RADS V, 87 patients (96.67%) were tissue proven as malignancy. Only 3 patients were tissue proven as benign (mammary fibrosis 1, fibrocytic tissue 1 and fibrocystic change 1).

All data were statistically analyzed. BI-RADS I, II, III who were regarded as negative for malignancy whereas BI-RADS IV, V were regarded as positive for malignancy.

True positive (TP) means the patients in BI-RADS IV, V who were diagnosed as malignancy in mammography and proven to be malignancy by histopathology.

TP = 24 + 87 = 111

True negative (TN) means the patients in BI-RADS I, II, III who were diagnosed as benign and confirmed to be benign or normal.

TN = 921 + 850 + 538 = 2,309

False negative (FN) means the patients who were diagnosed as non-malignancy in BI-RADS I, II, III but proven to be malignancy by histo-pathology.

FN = 0 + 0 + 10 = 10

False positive (FP) means the patients who

Table 1 age distribution of the patients

Age	Number
< 30	6
30-34	46
35-39	203
40-44	449
45-49	638
50-54	643
55-59	403
60-64	195
65-69	90
70-74	52
75-79	25
> 80	16
Total	**2,766**

Graph 1 number of patients distribution by age groups Number of patients

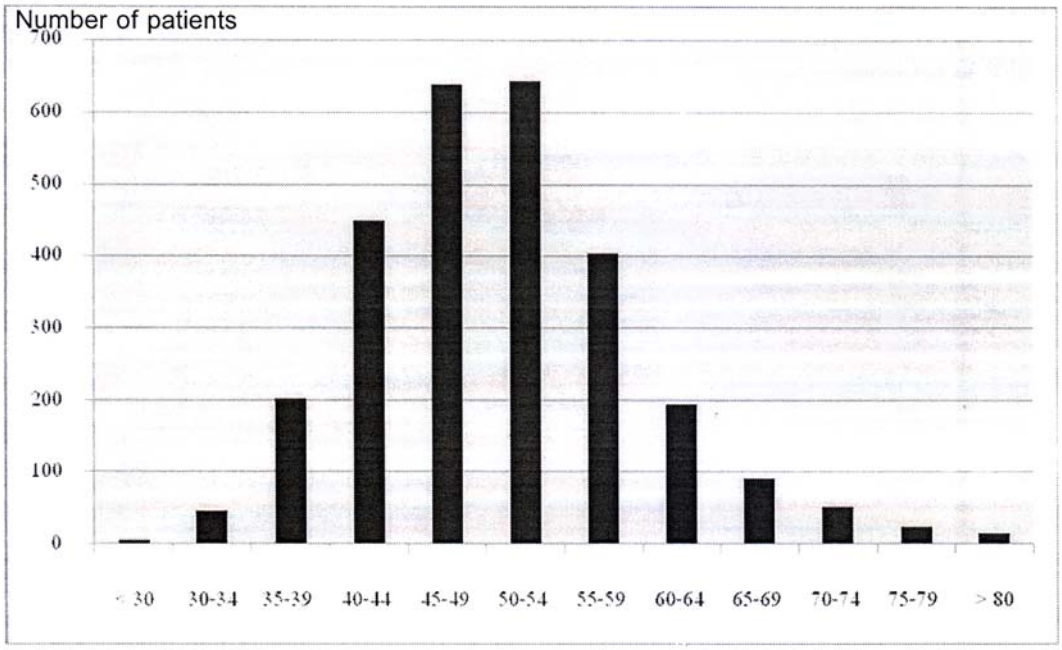


Table 2 mammographic reports by BI-RADS classification

Mammographic reports		Histopathology or 2 years Followed - up mammography				Total
		Benign		Malignancy		
		number	%	number	%	
BI-RADS I	Negative studies	921	100	0	0	921
BI-RADS II	Benign	850	100	0	0	850
BI-RADS III	Probably benign	538	98.17	10	1.82	548
BI-RADS IV	Suspicious of malignancy	29	54.72	24	45.28	53
BI-RADS V	Highly suggestive of malignancy	3	3.33	87	96.67	90

Table 3 PPV and NPV of each BI-RADS classification

Mammographic reports	Positive Predictive Value (%)	Negative Predictive Value (%)
BI-RADS I Negative studies	-	100
BI-RADS II Benign	-	100
BI-RADS III Probably benign	-	98.17
BI-RADS IV Suspicious of malignancy	45.28	
BI-RADS V Highly suggestive of malignancy	96.67	

Table 4 overall PPV and NPV

Mammographic reports	Positive Predictive Value (%)	Negative Predictive Value (%)
Benign (BI-RADS I, II, III)	-	99.56
Malignancy (BI-RADS IV, V)	97.62	-

were in diagnosed as malignancy in BI-RADS IV , V but proven to be benign condition by histopathology.

FP = 29 + 3 = 32

Negative predictive value (NPV) = TN / total negative malignancy on mammography.

Positive predictive value (PPV) = TP / total positive malignancy on mammography.

Sensitivity = TP / (TP + FN)
= 111 / (111 + 10)
= 91.73%

Specificity = TN / (TN + FP)
= 2,309 / (2,309 + 32)
= 98.63%

Accuracy = (TN + TP) / total number of study
= (2,309 + 66) / 2,766
= 85.86 %

Discussion

Mammography is accepted to be an effective screening method for breast cancer. Its wide use has resulted in the increase in the number of discoveries of small lesions which are not palpable on the physical examination. According to BI-RADS classification, it is easily helpful to make decision for further management of the patient after mammography having been taken. The groups of BI-RADS I, II, III were defined as normal or negative for malignancy (benign condition). In this study, overall NPV in BI-RADS I, II, III is 99.56% and overall PPV for malignancy in BI-RADS IV, V is 97.62%

This study shows high sensitivity (91.73%), specificity (98.63%) and accuracy (85.86%) that are similar to previous studies.[11-12] According to study from Berg WA et al. in 2004[3], they found sensitivity of the index cancer ranged from 63 to 98% and has been reported to be as low as 30-48% in dense breast.

Conclusions

Mammography is useful to be the screening tool for breast cancer which is not too expensive but give high sensitivity, specificity and accuracy. However, the sensitivity, specificity and accuracy depend on multiple factors such as good technology of machines (mammography and ultrasound), well trained radiologic technicians as well as well trained and experienced radiologist.[13]

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