Mammographic Diagnosis of Breast Carcinoma: An Institutional Experience

Sidharth,[1] Thapa B,[1] Singh Y,[1] Sayami P,[1] Khanal U[2]

[1]Department of Surgery; [2]Department of Radiology; Institute of Medicine, Tribhuwan University Teaching Hospital, Kathmandu, Nepal

ABSTRACT

Mammogram is a common diagnostic modality for breast carcinoma. Diagnostic mammogram is available at only few centers in Nepal. The aim of this study was to determine the accuracy of diagnostic mammogram in Nepalese women suffering from breast carcinoma. A retrospective analysis of the breast carcinoma was carried out in the Department of Surgery, Tribhuwan University Teaching Hospital from October 1995 to October 2007. Out of 556 patients with histologically proven breast carcinoma, 378 patients (68%) had undergone mammography. Breast carcinoma was identified on mammography in 328 (87%) cases while 50 cases (13%) were reported as normal or benign lesions. Diagnostic mammogram had a sensitivity of 86.8%, a specificity of 98.6% with a positive predictive value of 68.8% and a negative predictive value of 99.5%. In mammographically missed breast carcinoma, 34% were less than 40 years of age (P<0.05), 60% were premenopausal (P<0.05) and 88% patients presented with a painless lump. The study shows that the diagnostic accuracy of the mammogram is very high. However, there is a chance of missing the breast carcinoma in young and premenopausal women.

Key words: *breast carcinoma, diagnostic mammogram, premenopausal women*

INTRODUCTION

Diagnostic mammogram is commonly used to facilitate the diagnosis of breast cancers in women who present with symptoms or signs of the disease. The symptoms or signs may include a breast lump, pain, nipple discharge or retraction, and breast dimpling or other skin changes. A diagnostic mammographic examination usually consists of standard screening views and additional views using spot compression and/or magnification of a specific area. Although mammography is sufficient to evaluate the clinical finding, additional imaging with ultrasound, ductography or other imaging techniques may also be required.

Sensitivity and specificity have been well studied for screening mammographic studies but not for diagnostic mammography.[1-3] Diagnostic mammogram may have superior performance over screening mammogram, because noticeable symptoms or clinical findings may indicate a more advanced tumor that is easier to locate and identify. Dee and Sickles found that tumors detected by diagnostic mammogram were larger than those detected by screening mammogram.[4]

In a country data published by WHO (1998), lung cancer accounted for 8.2% of all cancer cases, while cancer of the cervix accounted for 6.3% and breast cancer for 6% of all cancer cases in Nepal.[5] Even though breast

Correspondence:
Dr. Sidharth
Department of Surgery
Institute of Medicine, TUTH, Kathmandu, Nepal
E-mail: sidd_iom@yahoo.com

carcinoma is one of the most common carcinoma in females, the role of mammogram has not been studied in Nepal. We evaluated the performance of diagnostic mammogram and how performance would be influenced by the characteristics of the women undergoing the diagnostic investigation.

MATERIAL AND METHODS

This is a retrospective study done in the Department of Surgery at Tribhuwan University Teaching Hospital, Kathmandu, Nepal from October 1995 to October 2007. The data of all the cases treated surgically were retrieved from the surgery and radiology departments. The records were divided into two groups, namely benign and malignant. Breast Imaging Reporting and Data System (BIRADS) I (Normal), II (Benign finding) and III (Probably benign finding; short-interval follow-up suggested) were called benign while IV (Suspicious abnormality; biopsy should be considered) and V (Highly suggestive of malignancy; appropriate action should be taken) were taken as malignant. Only histologically confirmed cases of breast carcinoma were included in the analysis.

The individual patient factors like age, symptoms, menopausal status, size of breast lump, clinical stage and hormone receptor status were retrieved for analysis. The primary performance outcomes like sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) of mammogram were analyzed. Statistical analysis was done by using chi-square test for variables, $P<0.05$ being considered as statistically significant.

RESULTS

A total of 11,067 diagnostic mammograms were performed in TUTH in the past 12 years. Mammographically, 477 (4.4%) were malignant (BIRADS IV-V) and 10,590 (95.6%) were benign (BIRADS I-III). During the study period, 556 patients underwent surgery for breast carcinoma of which only 378 (68%) patients had undergone mammogram. Out of 378 patients, 328 (87%) were of BIRADS score IV-V and 50 patients (13%) of BIRADS score I-III (Table 1). Diagnostic mammogram had a sensitivity of 86.8%, a specificity of 98.6%, a PPV of 68.8% and a NPV of 99.5% (Table 2).

To clarify the factors for the mammographically missed 13% of breast carcinoma, the characteristics of 378 operated and histopathologically proven cases of carcinoma breast were analyzed. Individual patient factors like age, symptoms, menopausal status, size of breast lump, clinical stage and hormone receptor status were analyzed. The comparison between mammographically malignant and benign characteristics of women with histologically proven breast carcinoma has also been shown (Table 3).

Table 1. BIRADS score of patients who had undergone surgery

BIRADS score	Number of patients (%)
I	22 (5.8)
II	25 (6.6)
III	3 (0.8)
IV	41 (10.9)
V	287 (75.9)
	378 (100)

Table 2. Comparison of mammographic diagnosis with histological diagnosis

Mammographic diagnosis	Histological diagnosis		
	Malignant	Benign	Total
Malignant	328	149	477
Benign	50	10540	10590
Total	378	10689	11067

In the mammographically malignant group, 19% of patients were between 20 to 39 years of age whereas in the mammographically benign group, 34% of the patients were in this age group, which was statistically significant (Table 3). The average age was 48.7 (range 22 – 82) years in mammographic malignant group and 43.3 (range 22 – 67) years in the mammographically benign group.

Ninety-six percent of patients in both groups presented with lump, the mean duration of which was 8 months (range two weeks to 2.9 years) in the mammographically malignant group and 9 months (range two weeks to two years) in the mammographically benign group. Sixty percent of patients were premenopausal in whom breast carcinoma was missed mammographically, whereas only 40% of patients were premenopausal in mammographically malignant cases ($P<0.05$) (Table 3).

In the mammographically benign group, 34% of patients had a tumor size of more than 5 cm whereas it was 28% in the mammographically malignant group. In both the groups, more than 80% of breast carcinoma was in stage II/III (Table 3). Only 95 patients had undergone immunohistochemical analysis of estrogen receptor (ER) and progesterone receptor (PR). Eighty-two patients were in the mammographically malignant group in which 37.8% (31 patients) had ER/PR positive, whereas out of 13 patients in the mammographically benign group 46.1% (6 patients) had ER/PR positive. Altogether, 38.9% histologically proven cases of breast carcinoma had ER/PR positive.

Table 3. Characteristics of women with histologically proven breast carcinoma who underwent ammography

Characteristics	Malignant (%)	Benign (%)	p-value
Age (years)			
20–29	6 (2.0)	3 (6.0)	
30–39	57 (17.0)	14 (28.0)	<0.05
40–49	113 (34.0)	17 (34.0)	
50–59	94 (29.0)	13 (26.0)	
≥60	58 (18.0)	3 (6.0)	
Symptoms			
Painless lump	278 (85)	44 (88)	
Painful lump	13 (4)	4 (8)	
Lump + skin invasion	24 (7)	0	NS
Nipple discharge	7 (2)	2 (4)	
Asymptomatic	6 (2)	0	
Menopausal status			
Pre-menopausal	130 (40)	30 (60)	<0.05
Post-menopausal	198 (60)	20 (40)	
Size of lump			
≤ 2	39 (12)	8 (16)	
2-5	185 (56)	23 (46)	
>5	91 (28)	17 (34)	NS
No lump	13 (4)	2 (4)	
Stage			
0	2 (0.6)	2 (4)	
I	25 (7.6)	6 (12)	
II	153 (46.6)	25 (50)	NS
III	141 (42.4)	16 (32)	
IV	7 (2.2)	1 (2)	

DISCUSSION

Diagnostic mammogram is an important tool for evaluating the patient who presents with symptoms and/or signs of breast carcinoma. However, only 68% of total breast carcinoma patients operated in our institute underwent mammography. The reason could be the cost of mammogram, technical problems, unavailability of mammogram (in the initial phase) and clinically obvious lesions (skin ulcerations). Nevertheless, in the last five years, almost all patients with breast carcinoma underwent diagnostic mammogram.

This study assessed the overall performance of diagnostic mammography. Several studies on diagnostic mammography have been performed in Europe.[6-8] Duijm et al found that diagnostic mammography had a sensitivity of 92.0% and a specificity of 97.7%. Eltahir et al.[6-7] obtained similar results of 93.2% sensitivity and 96.7% specificity for symptomatic women. In a study by Flobbe et al.[8] diagnostic mammography had a sensitivity of 89% and a specificity of 98%. Our results are comparable to the above studies. A meta-analysis of screening studies showed that sensitivity ranged from 83% to 95% and specificity ranged from 93.5% to 99.1%.[3] Screening sensitivity may be lower because the cancers detected are smaller than those detected with diagnostic mammography. However, the population undergoing screening is older, and average breast density may be less. Both sensitivity and specificity of screening mammography increase with age and decrease with increasing breast density.[9-12] We found similar results with diagnostic mammography.

A significant number of patients with breast carcinoma in the younger and premenopausal group were missed by diagnostic mammogram. This may be attributed to dense breast tissue. In younger patients with dense breast, additional imaging with ultrasonography is helpful. The diagnostic accuracy for carcinomas of the breast appears to improve when mammography is combined with ultrasonogram even in cases that reveal no evidence of microcalcification or other abnormalities[13]. However, in our study, all patients were evaluated by mammography not in combination with ultrasound. Symptoms, size of lump and stage of carcinoma were not significant in our study.

Our previous study showed ER/PR positivity rate ranging from 11 to 15%, but in the present study it was 38.9%.[14] This could be due to the less number of cases in the previous study. However, hormone receptor status was not associated with mammographic diagnosis of breast carcinoma. Other possible causes for missed breast carcinoma include dense parenchyma obscuring a lesion, poor positioning or technique, perception error, incorrect interpretation of a suspect finding, inexperience of radiologist, subtle features of malignancy and slow growth of a lesion[15].

CONCLUSION

Diagnostic mammogram has become an essential part of breast carcinoma management in Nepal. The accuracy of the detection of breast carcinoma by mammogram is very high. However, there is a chance of missing the breast carcinoma in young and premenopausal women.

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