Original article

Analysis of mammographic findings in a tertiary care hospital of Nepal

Humagain M, Paudel S.

Department of Radiology and Imaging, Institute of Medicine, Tribhuvan University Teaching Hospital, Kathmandu, Nepal.

Correspondence: Mukunda Prasad Humagain, Associate Professor, Department of Radiology and Imaging, Institute of Medicine, Tribhuvan University Teaching Hospital, Kathmandu, Nepal.

E-mail: mphumagain222@gmail.com

Abstract

Introduction: Mammography is commonly the first line imaging procedure in screening of breast cancer in women. It is also commonly used as diagnostic test in the assessment or characterization of palpable breast mass along with ultrasonography. The purpose of our study was to assess the mammographic findings in women undergoing screening and diagnostic mammography.

Methods: This was a prospective cross sectional study analyzing the outcomes of 497 consecutive screen-film mammographic examinations, 369 (74.2%) diagnostic and 128 (25.8%) screening, performed in female patients from 4th July 2012 to 15th October 2012 in Tribhuvan University Teaching Hospital. Analysis was based on the final assessment report of mammogram reviewed by the experienced radiologists following Breast Imaging Reporting and Data System (BI-RADS) classification. BI-RADS score 4, 5 and 6 were considered as positive, BI-RADS score 1, 2 and 3 were considered as negative and BI-RADS score 0 was considered inconclusive requiring additional imaging.

Results: The mean age of women was 46.3 years (range 26-83 years). Among 369 cases of diagnostic mammograms 300 (81.3%) were negative, 27 (5.4%) were positive and rest 42 (8.4%) were inconclusive. Among 128 cases of screening mammograms, 117 (91.4%) were negative, 11 (8.6%) were inconclusive and none of them were positive. Among total (497) numbers of mammographic examinations, 417 (84%) were negative, 27 (5.4%) were positive and 53 (10.6%) were inconclusive. BI-RADS 1 was the most common reported finding comprising 26.8% in diagnostic and 12.1% in screening group.

Conclusion: Analysis of diagnostic mammography examinations yields different results compared with those of screening examinations, including different patient demographics; higher number of positive findings; and possibly higher cancer detection rates. Diagnostic and screening data should be segregated during record keeping and analysis of combined results should be based on known differences between diagnostic and screening outcomes.

Key words: BI-RADS, diagnostic, mammography, screening

Introduction

Breast cancer remains major health problem all over the world. According to the American Cancer Society (ACS), breast cancer is the 2nd leading cause of death after lung cancer in women. A woman's chance of developing invasive breast cancer at her life is approximately 1 in 8 (12%).[1] In a country data published by WHO (1998), breast cancer is the third most common cancer in Nepal accounting for 6.3% of cancers.[2] In a study done in Nepal, frequency of breast cancer is estimated to be 16.9% and it is the second most common cancer in females.[3]

All mammography practices in the United States (US) are required by the Mammography Quality Standards Act (MQSA) to perform an annual medical analysis of selected clinical outcomes.[4] In addition to facilitating regulatory compliance, the analysis is also beneficial to measure the success of a mammography practice in detecting early-stage breast cancer, and to suggest the presence of any deficiencies in technical performance and image interpretation.[5] The analysis outcome may also helpful to increase compliance with screening guidelines among patients and referring doctors by offering convincing evidence of the success. On the basis of published mammography analysis data from large screening mammography practices and population based screening mammography programs, desirable goals have been put forth for the detection of breast cancer in asymptomatic women.[6-8]

The typical mammography practice in general hospitals includes a mix of screening and diagnostic examinations. Diagnostic mammography is performed for a variety of problem-solving indications, including workup of screening examinations abnormal findings, evaluation of abnormalities found on clinical examination, short-term follow-up examinations for probably benign lesions (BI-RADS category 3) and for patients with cancer who have been recently been treated with breast preservation.

Other special breast problems, such as the presence of implants or the evaluation of extent of disease of a known malignancy also may represent indications for diagnostic mammography. Because diagnostic examinations involve different patient populations from that of screening mammography, one might expect the clinical outcomes as measured by one center to be different from another center.

In this study we separately analyzed our diagnostic and screening mammography outcomes into the mechanisms by which diagnostic outcomes differ from those encountered at screening.

Methodology

It was a prospective cross-sectional study involving 497 females presented for mammography in the department of Radiology and Imaging, Mammography unit at Tribhuvan University Teaching Hospital (TUTH), Kathmandu, Nepal from July 4th, to October 15th, 2012.

Standard medio-lateral oblique (MLO) and cranio-caudal (CC) views were obtained in mammography machine "LORAD Affinity" (Hologic inc., US).

BI-RADS category 0 to 6 were used for the final assessment of the reports by radiologists.[9] Details of data from original mammography requisition forms and mammography BI-RADS final assessment report by experienced radiologists were recorded daily on Mammographic patient record register. From the register, detail information was recorded in a pre-designed data collection sheet. SPSS 5.0 software was utilized for the data compilation, tabulation, analysis and graphic representation.

Screening examination findings were considered to be abnormal if either breast was assessed as BI-RADS category '4' (suspicious), or category 5 (highly suggestive of malignancy). Diagnostic examination findings were considered to be abnormal if either breast was assessed as BI-RADS category '4', category '5' or category '6'(biopsy proven malignancy). Category 1 (normal), category 2 (benign) and category 3 (probably benign) were considered negative for malignancy in both screening and diagnostic groups. Examinations where additional diagnostic imaging modalities were recommended were considered as inconclusive (category 0).

Results

Patient Population

This study included 497 consecutive mammography examinations, of which 369 were classified as diagnostic and 128 as screening examinations. The mean age of total cases was 46.3 years (range 26-83 years).

Table 1 shows the age distribution of diagnostic and screening mammography populations. Maximum number of patients (46.9%) was in the age group of 40-49 years, 12.1% in screening group and 34.8% in the diagnostic group. Only 12 patients (9.3%) were below 40 years in screening mammography in comparison to 90 (24.3%) in diagnostic mammography.

Table 1 Age distribution of patients in Screening and Diagnostic Mammography

Age (year)	Screening (%)	Diagnostic (%)	Total (n =397)
<30	1 (0.2%)	6 (1.2%)	7 (1.4%)
30-39	11 (2.0%)	84 (16.9%)	95 (19.1%)
40-49	60 (12.1%)	173 (34.8%)	233 (46.9%)
50-59	37 (7.4%)	74 (14.9%)	111 (22.3%)
60-69	14 (2.8%)	30 (6%)	44 (8.9 (%)
70-79	3 (0.6%)	1 (0.2%)	4 (0.8%)
80+	2 (0.4%)	1 (0.2%)	3 (0.6%)
Total	**128 (25.8%)**	**369 (74.2%)**	**497**

Mammography Interpretation

Distribution of different BI-RADS categories were evaluated in both types of mammograms [Table 2, 3]. Highest numbers of mammograms comprising 193 patients (38.83%) were normal (category 1). In total mammograms, only 5% (27 cases) had positive mammograms while 84% (417cases) had negative results and 11% (53 cases) were inconclusive requiring additional imaging [Fig. 1].

Table 2 BI-RADS score of all mammograms by age in years

AGE GROUP		<30	30-39	40-49	50-59	60-69	70-79	>80	Total
BIRADS	**Description**								
0	Incomplete	1	20	27	5	-	-	-	53
1	Normal	3	37	100	39	13	1	-	193
2	Benign	3	28	72	51	19	2	2	177
3	Probably benign	-	6	25	9	6	1		47
4	Suspicious	-	3	6	4	5	-	-	18
5	Suggestive of malignancy	-	1	2	2	1	-	-	6
6	Biopsy proven malignancy	-	-	1	1	-	-	1	3
Total negative findings*		6	71	197	99	38	4	2	417
Total with positive findings**		0	4	9	7	6	-	1	27

*Total negative =BIRADS category 1+2+3; **Total positive = BIRADS category 4+5+6

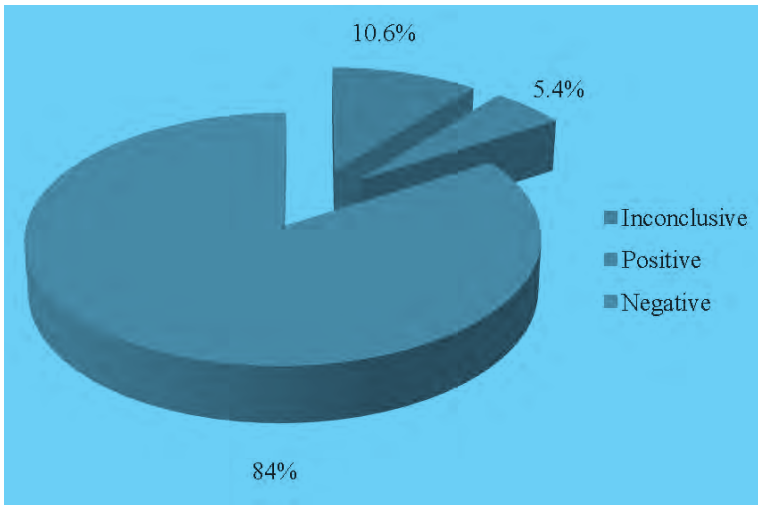

Figure 1 Pie chart displaying final result of all mammograms

Table 3 Overall Outcomes: Screening Versus Diagnostic Mammography

Outcome	Screening		Diagnostic		Total	
	No. of patients	%	No. of patients	%	No. of patients	%
Negative	117	23.5%	300	60.4%	417	83.9%
Positive	0	0%	27	5.4%	27	5.4%
Inconclusive	11	2.2%	42	8.4%	53	10.6%
Total	**128**	**25.7%**	**369**	**74.2%**	**497**	**100%**

Age wise distribution of the BI-RADS score and results are shown in table 4. In both screening and diagnostic groups, most of the patients were in 40-59 age group and most had normal mammogram (category 1). In total 27 abnormal mammograms, highest number was in category 4 comprising 66.7%.

Table 4 Age wise findings of Mammography examinations

		Age range (Years)							
	BIRADS Score	<30	30-39	40-49	50-59	60-69	70-79	> 80	Total
Diagnostic	0	1	18	19	4	-	-	-	42
	1	2	31	72	18	10	-	-	133
	2	3	25	50	36	12	1	-	127
	3	-	6	23	9	2	-	-	40
	4	-	3	6	4	5	-	-	18
	5	-	1	2	2	1	-	-	6
	6	-	-	1	1	-	-	1	3
	T	**6**	**84**	**173**	**74**	**30**	**1**	**1**	**369**
Screening	0	-	2	8	1	-	-	-	11
	1	1	6	28	21	3	1	-	60
	2	-	3	22	15	7	1	2	50
	3	-	-	2	-	4	1	-	7
	4	-	-	-	-	-	-	-	-
	5	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-
	Tl	**1**	**11**	**60**	**37**	**14**	**3**	**2**	**128**
All Total		7 (1.4%)	95 (19.1%)	233 (46.9%)	111 (22.3%)	44 (8.9%)	4 (0.8%)	3 (0.6%)	497 (100%)

Discussion

The comprehensive analysis of a mammography practice is a powerful tool in assessing the ability of mammography to detect breast cancer. The analysis serves primarily as a self assessment device, revealing both successes and deficiencies in the practice, thereby facilitating enhancements that improve patient care. Many large-scale analyses on screening mammography have been reported, from academic and community based practices as well as from population based mammography programs.[6-8] This study reports many clinical outcomes from a series of consecutive diagnostic mammography examinations compared with screening outcomes. Results of the study show major differences in diagnostic versus screening outcomes in different age group females.

The demographics of patients undergoing diagnostic mammography appear to be somewhat different from those of screened women. Diagnostic patients are, on average, several years younger. In our study, only 12 patients (9.3%) were below 40 years in screening mammography in comparison to 90 (24.3%) in diagnostic mammography.

This is due, at least in part, to the more widespread use of diagnostic mammography among patients in their 20s and 30s, many of whom have palpable masses. Since there is negligible trend of routine screening mammography examinations in Nepal, there are less numbers of data available for the comparison with diagnostic mammography.

In many studies, the detection of abnormality among diagnostic mammography patients was much greater than that in screened women[5, 10]. Our study also showed similar results. In our study, abnormal results were found in 5.4 per 100 diagnostic mammography while none of the patient had abnormal findings in screening examination ($p < 0.001$). This result is different from the other studies and is probably due to less sample size in the screening group. In a study, Katherine E. Dee et al found malignancy in 55 per 1000 diagnostic mammography examinations, which was 11 times more than the five per 1000 cancer detection rate observed in their screening population.[5]

There are a variety of clinical indications for performing diagnostic mammography. One common reason is to work up screening-detected abnormalities. Another indication for diagnostic mammography examination is short-interval follow-up, either for mammographic lesions previously assessed as probably benign (BI-RADS category 3) or for more frequent than annual surveillance of patients with cancer treated with breast preservation surgery.

There are many other indications for which diagnostic mammography is performed, the spectrum ranging from indications similar to screening (patients with breast implants or breast pain), to patients in whom carcinoma is a certainty (patients with a known non-palpable breast malignancy being evaluated for the extent of disease or response to neo-adjuvant chemotherapy).

In our study, the maximum numbers (46.9% or 233 out of 497) of mammographic examinations were performed in age group 40-49 years. Similarly, 95 (19.3%) cases were in 30-39 and 111 (22.3%) were in 50-59 age groups. If these 3 age groups combined, the number would be 68.2% (339 cases out of 497). By the same reason, the abnormal findings were found in higher rates in same age groups. Since the increasing age is a major high risk to develop breast cancer, which more likely to speed up during premenopausal following postmenopausal period, we had more positive cases in these groups. We also found that there are so many results which falls under the category 0 (total 53= Diagnostic 42 and screening 11). Majority of the cases assessed in category 0 were under the age range 30-49 years, most of the times that was due to dense breast.

Because the observed clinical outcomes for diagnostic mammography are different from those found for screening mammography, we believe that it is important to analyze the data from diagnostic mammography examinations separately from screening data. The combined analysis of a mammography practice involving 90% screening and 10% diagnostic examinations can be expected to show a cancer detection rate twice as great as that of a screening-only patient population[10]. However, for logistic reasons, many mammography practices do not have the ability to perform detailed analysis of total mammograms in a segregated manner.[1,10]

Conclusion

In this study we analyzed and compared results of diagnostic and screening mammography examinations performed in TUTH. Analysis of diagnostic mammography examinations yielded different results compared with those of screening examinations, including different patient demographics; higher number of positive findings; and possibly higher cancer detection rates. Thus diagnostic and screening data should be segregated during record keeping and analysis of combined results should be based on known differences between diagnostic and screening outcomes. Small sample size and selected variables might be insufficient to conclude exact situation of the breast cancer and mammographic outcomes in Nepal.

Conflict of interest: None declared.

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