Sonography of Palpable Breast Lumps in a Tertiary Health Care Centre in Nepal

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ABSTRACT

Background: With a palpable lesion in the breast, the goal is to diagnose malignancy at the earliest. Ultrasonography is used for evaluating symptomatic patients especially those with dense breasts where mammography gives limited information. The objective of this study was to evaluate the sonographic pattern of the palpable breast lumps and correlate with the final pathological diagnosis.

Methods: This was a retrospective study done at our tertiary health care center, from July 2016 to March 2017, including 121 patients presenting to the ultrasound department with complaint of palpable breast lump and whose pathological reports could be followed up. Various sonographic features were studied, sonography and final diagnosis compared.

Results: On sonography, about 46% of the cases were benign, 35 % malignant and 18 % indeterminate while tissue diagnosis revealed 63% to be benign, 34% malignant. The most common lesions in each group and sonographic characteristics were evaluated. Of the benign lesions, fibroadenoma was the most common. Most of the indeterminate lesions on sonography were histologically mastitis. We found nearly 58% of the malignant lesions had microlobulated margins. The sensitivity of sonography was 92.9% and specificity 97.5% with diagnostic accuracy 94.8%.

Conclusions: Most of the palpable lumps were benign in our study, most common being fibroadenoma. We had a relatively higher percentage of malignancy which may be due to patients with obviously benign lesions not undergoing tissue diagnosis in our setting. The sonographic features and diagnosis correlated well with the histological diagnosis.

Keywords: Breast cancer; lumps; ultrasonography.

INTRODUCTION

Breast cancer is the second leading cause of cancer related female mortality around the world with 6.6% diagnosed at less than 40, 2.4% at less than 35, and 0.65% at less than 30 years of age.[1,2] With a palpable lesion in the breast, the goal is to diagnose malignancy at the earliest as they have a good prognosis and to alleviate the anxiety associated with the presence of a breast lump.

Ultrasonography is used for evaluating symptomatic patients especially in younger patients (less than 40 years) with dense breasts where mammography gives limited information. With its inherent advantages of non-invasiveness, easy availability, less cost and ease, sonography has become a convenient first modality for evaluating palpable breast lesions. It not only confirms the presence of a lesion but also further characterizes it. In this study, we evaluated the spectrum of sonographically visible breast lesions in patients with palpable lumps.

METHODS

This was cross-sectional study which involved retrospective evaluation of the data collected from July 2016 to March 2017 over a period of nine months. All the patients with palpable breast lumps who came for breast sonography in the Department of Radiology were included in the study. Patients where pathological diagnosis was not available were excluded. A total of 121 patients with breast lump having pathological diagnosis were finally analyzed. Ethical guidelines were followed as needed for human studies maintaining patient's confidentiality without any additional risk.

Grey scale breast sonography was done using high frequency (5-13 MHz) transducer (MEDISON ACCUVIX A30). Both breasts were systematically scanned with overlapping scans in a radial and antiradial pattern from the nipple to the periphery including axillae.

Sonographic categorization of breast lesions into various

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BIRADS (Breast Imaging Reporting and Data System) categories as per the BIRADS Atlas 5th edition.[3] BIRADS 2 and 3 were taken as benign, 4a and 4b as indeterminate, 4c and 5 as malignant lesions. Sonographic features – shape, margins, posterior acoustic features, orientation, echogenicity and microcalcification were evaluated. Final pathological diagnosis of all lesions were obtained from the department of Pathology, which was taken as the gold standard. Based on final pathological report, lesions were categorized as benign and malignant.

Benign lesions were categorized as- a) neoplastic which included fibroadenoma, benign phylloides tumor, benign lipomatous lesions, b) non-proliferative or proliferative disease including hyperplasia, fibrocystic changes, sclerosing duct adenosis, intraductal papilloma, and c) inflammatory like acute mastitis, abscess, foreign body granuloma, chronic granulomatous mastitis, periductal mastitis, inflammatory mastitis, lymphocytic mastitis, galactocele. The malignantlesions included ductal carcinoma, lobular carcinoma, sarcoma, carcinoma of no specific type, etc.

Data analysis was done using SPSS 16 and simple statistical tools.

RESULTS

The mean age of the study group was 39.6, that in the benign was 34.3 and malignant group 49.9, range being 17 to 86 years. The pathological diagnosis was obtained with fine needle aspiration cytology (FNAC) in 76% case, core biopsy in 14 %, both FNAC and biopsy in 10%. On sonography, 46% cases (n=56) were benign, 35 % (n=43) malignant and 18 % (n=22) indeterminate while final histopathology revealed 65.5% to be benign and 34% malignant (table 1). The sensitivity of sonography was 92.9%, specificity 97.5%, positive predictive value 98.1%, negative predictive value 90.7% with diagnostic accuracy 94.8%.

Sonographic classification	Pathologically benign	Pathologically malignant	n
Benign	55	1	56
Indeterminate	21	1	22
Malignant	4	39	43
Total	80	41	121

Table1. Table showing the benign, indeterminate and malignant diagnosis on sonography and final pathological diagnosis.

The final tissue diagnosis is summarized in the pie chart (figure 1). In the benign neoplastic group, there were 42 lesions (35%) of which fibroadenoma was the most common. There were 21 non-proliferative/ proliferative

lesions most of which were fibrocystic changes, three sclerosing adenosis and three intraductal papillomas. Only one of the lesions (< 2%) categorized as benign on sonography was found to be malignant. Majority of lesions categorized as indeterminate by sonography were benign (> 91%), among which the most common diagnosis was mastitis which included one rare case of lymphocytic mastitis (figure 2).
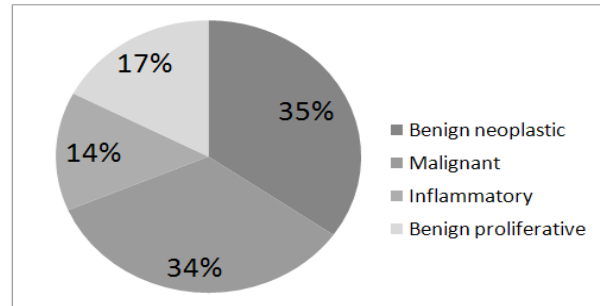

Figure 1. Pie chart showing the percentage distribution of final pathological group.
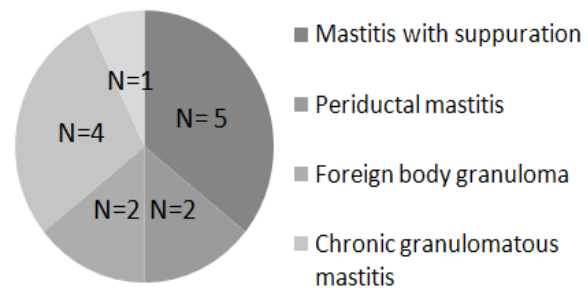

Figure 2. Pie chart showing the types of mastitis (total cases = 14) in this study.
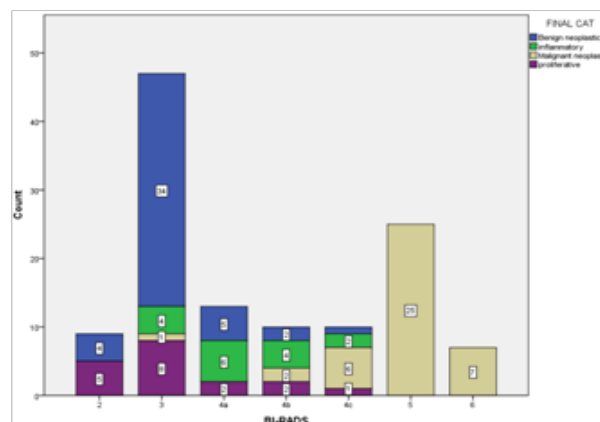

Figure3. Bar diagram showing the sonographic BIRADS distribution and final pathological diagnosis.

41 lesions were malignant (34%), most of which were ductal carcinoma with one sarcoma and two lobular carcinomas. Four lesions (11%) were falsely categorized

as malignant on sonography, two of which were mastitis and two sclerosing duct adenosis on tissue diagnosis. The age range of malignant patients was 27 to 86 years with eight patients (19%) younger than 40 years. A comparison of the sonographic BIRADS category and the pathological diagnosis showed increasing number of malignancies with the BIRADS category (figure 3).

Table 2. Table showing the prevalence of the various sonographic features in the benign and malignant lesions.

Sonographic characteristics		Number (%) of malignant cases	Number (%) of benign cases
Shape	Irregular	32 (78%)	13 (16.2%)
	Oval	9 (22%)	66 (82.5%)
	Round	0	1 (1.2%)
Echogenicity	Complex cystic/ solid	1 (2.4%)	5 (6.2%)
	Hypoechoic	40 (97.6%)	55 (68.7%)
	Hyperechoic	0	2 (2.5%)
	Heterogenous	0	15 (18.7%)
	Isoechoic	0	3 (3.7%)
Margins	Angulated	1 (2.4%)	0
	Circumscribed	1 (2.4%)	63 (78%)
	Indistinct	6 (14.6%)	9 (11.2%)
	Microlobulated	24 (58.6%)	5 (6.2%)
	Spiculated	9 (22%)	3 (3.7%)
Orientation	Parallel	16 (39%)	74 (92.5%)
	Not parallel	25 (61%)	6 (7.5%)
	Combined pattern	6 (14.6%)	2 (2.5%)
Posterior acoustic feature	Absent	7 (17.1%)	27 (33.7%)
	Enhancement	11 (26.8%)	47 (58.7%)
	Shadowing	17 (41.5%)	4 (5%)
Microcalcifica-tion	Present	10 (24.4%)	0
	Absent	31 (75.6%)	80 (100%)

The most common location of the malignant lesions was upper outer quadrant, more on the right side than left. Nearly 82% of benign lesions had oval shape and circumscribed margins while 78% of malignant masses were irregular in shape. In this study, nearly 58% of

the malignant lesions had microlobulated margins followed by spiculated margins. 50 % of benign lesions showed posterior acoustic shadow while 41.5% of the malignant lesions had significant posterior shadowing. The evaluated sonographic features of benignity or malignancy showed significant correlation with pathological diagnosis (p value<0.001) and are described in table 2.

DISCUSSION

Breast cancer is the second leading cause of cancer related female mortality around the world with the disease incidence of 6.6% in patients under 40 years of age.[1,2] Not only has the breast cancer increased in number but recent data also shows a shift of the disease to younger population. In Nepal, women under 40 years of age account for nearly a quarter of all female breast cancers, which is much more compared to the world statistics.[4] The prognosis of breast cancer is remarkably good especially with early diagnosis having an overall five year survival rate of more than 90% in newly diagnosed patients.[5]

While most of the palpable breast lumps are benign, 30 % of patients with benign breast disease need treatment.[6] To alleviate the stress caused by the presence of a possibly malignant lump by confirming the benign nature of some lesions like simple cysts and early diagnosis of cancer, sonography is a convenient, easily available modality especially in young females with dense breasts.

Various studies have evaluated the sonographic features of benign and malignant lesions. The remarkable study of Stavros et al, established the criteria for sonographic characterization of solid breast lesions.[7] The sonographic findings of benign and malignant solid breast lesions of various studies are summarized in table 3.[7-9]

Table 3. Sonographic findings of benign and malignant solid breast lesions.

Malignant lesion	Benign lesion
Spiculated / angular margins	Smooth and circumscribed margins
Marked internal hypoechogenecity	Hyperechoic, isoechoic or mildly hypoechoic
Irregular shape / More tall than wide	Ellipsoid shape / more wide than tall
Microlobulation	Gentle bi or tri lobulations
Microcalcification	Thin echogenic pseudocapsule
Duct extension	Absence of any malignant findings
Branch extension	
Posterior shadowing	

In our study, all but one sonographically benign (BIRADS 2 or 3) and malignant lesions were confirmed to be so on histology. Most of the sonographic indeterminate lesions were being, majority being mastitis. Most of the sonographically malignant lesions were confirmed on tissue diagnosis. In a research on the prevalence of benign breast diseases in western India, the commonest lesion found was fibroadenoma (77.62%), followed by fibrocystic change (4.3%).[10] We also found fibroadenoma to be the commonest among benign diseases.

The diagnostic accuracy of ultrasound is 71.42% for benign, 30.76% for borderline and 75% for malignant lesions.[11] A study found the overall sensitivity of ultrasound in detecting breast lumps as 92.5% which is comparative to our study.[12] Significance and ease for differentiating solid from cystic masses with sonography is well known.

Fibroadenomas are benign tumors found more commonly in younger patients. These are usually categorized as BIRADS 2 or 3 lesions on sonography, appearing ascircumscribed, elliptical, parallel, homogenous and hypoechoic or isoechoic texture with variable posterior acoustic features. Phylloides tumor may be benign or malignant and appear as circumscribed solid lobular mass with round or cleft like cystic components on ultrasound.[13]Lipoma of the breast is usually a solitary lesion with circumscribed margins and homogenously echogenic on ultrasound. [14]

Fibrocystic changes includes proliferative and non-proliferative diseases and may have variable appearance ranging from simple, cluster or complicated cysts, mastopathic nodules, architectural distortion or duct ectasia.[15] Papilloma may be of central or peripheral types appearing as an intraductal mass with or without ductal dilatation, intracystic mass or a predominantly solid pattern of intraductal mass totally filling the duct.[16] Sclerosing adenosis is a benign proliferative disease of the breast which originates in glandular lobules with most common sonographic appearance being masses with or without calcification.[17] In our study, two of the lesions which were diagnosed as sclerosing adenosis on histopathology had imaging findings simulating malignancy and another appeared as a complex cystic lesion with coexisting fibrocystic disease.

Mastitis may be puerperal or non-puerperal which includes bacterial or non-bacterial infections, plasma cell mastitis, granulomatous mastitis, lymphocytic mastitis etc with varyingsonographic features varying from irregular, heterogenous or mass like, clustered, continuous or tubular hypoechoic lesions to sometimes even normal.[19] In our study, a case of granulomatous

mastitis was misinterpreted as malignant on sonography while most of the others were indeterminate on sonography. Our cases of chronic granulomatous lesions mostly appeared as irregular heterogenous masses with hypoechoic bands extending into adjacent parenchyma with surrounding fat islands. One of these lesions also showed the band extending up to the subcutaneous tissue (Figure 4). Galactoceles are retention cysts and the most common benign lesions in lactating women and have variable appearance on sonography, depending upon the fat and water contents.
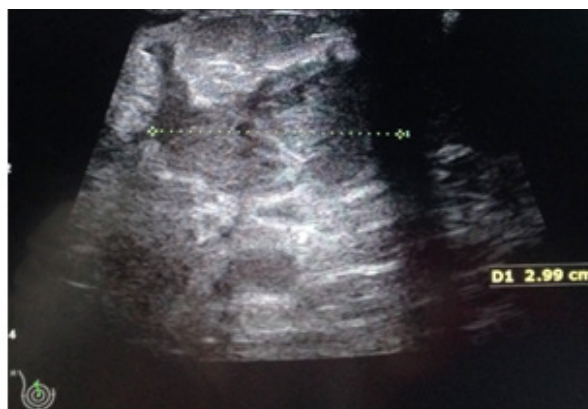

Figure 4. 25 year old lady with granulomatous mastitis. Sonography shows an irregular lesion with hypoechoic band like extensions. Note the extension to subcutaneous region.

Our study is limited by the sample size. We recommend further studies focusing on sonographically indeterminate lesion to identify any features which may favor a benign cause like mastitis over malignancy and possibly avoid biopsy in favor of a short term follow up. We also recommend further studies to evaluate sonographic and histological correlation of the different types of mastitis.

CONCLUSIONS

Majority of the palpable lumps were benign in our study, most common being fibroadenoma. We had a relatively higher percentage of malignancy which may be due to patients with obviously benign lesions not undergoing tissue diagnosis in our setting. Sclerosing duct adenosis and inflammatory or granulomatous mastitis may mimic malignancy on sonography. Sonography has high sensitivity and diagnostic accuracy for diagnosis of palpable breast lumps.

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