

**Research Article****Differentiation of Benign Breast Lesions by Ultra Sonography to Defer Biopsy**

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**Abstract:** The objective of the study was to assess breast masses by ultra sonography as probably benign, so that biopsy can be deferred. We have evaluated 336 patients with sonographically visible solid breast masses, which were advised biopsy. Mammography and sonography features were recorded and all masses were characterized by American College of Radiology Breast Imaging Reporting and Data System classification (BIRADS) before biopsy. Of the 336 masses 34 were categorized as probably benign (breast imaging reporting and data system). Sonography guided biopsy or fine needle aspiration was performed for pathologic correlation. A total of 34 masses were selected that met the sonographic criteria for probably benign masses and there was 1 malignancy for a negative predictive value of 97.05%. Follow up can be an acceptable alternative to biopsy for sonographically probably benign masses.

**Keywords:** Breast, Biopsy, Malignant, Benign, Ultra sonography, BIRADS.

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**INTRODUCTION**

Mammography has been used for early detection of breast cancer. Biopsy positive breast cancers were found in less number of such lesions (21%-34%) [1]. Earlier studies also have shown the validity and cost effectiveness of choosing follow up than biopsy for masses that are probably benign. Ultra sonography also contributes in characterization of breast masses but can it characterize some solid masses for follow up rather biopsy [5-7, 10].

Starvos *et al.* [2] described sonographic criteria that could be used to reliably characterize solid breast masses as benign. However inter observer variability has been a concerning issue in the characterization of solid breast masses on sonography [3, 4]. Ranhbar *et al.* [3] confirmed that certain sonographic features can help differentiate benign from malignant masses, but because of inter observer severe variability, concluded that these features should not be generally applied to defer biopsy until additional investigations in a variety of practices are undertaken.

The purpose of this study was to further investigate the utility of previously described sonographic criteria for differentiating for benign from

malignant, which can be used to avoid immediate biopsy and recommend for follow up in future practice.

**MATERIALS AND METHODS**

The study was performed at Index Medical College Hospital and Research Centre, Nemawar Road, Indore. The study was approved by the approval board of Institute. A prospective study of 34 patients was selected from 1<sup>st</sup> Feb. 2014 to 31<sup>st</sup> march 2015, who were sonographically solid and probably benign. Biopsy was performed on all these patients. This group of masses were identified by prospective evaluation of 336 consecutive patients before image guided biopsy. Of the 336 patients evaluated, 215 (64%) were masses detected clinically or by mammography or by ultrasonography and 194 (90%) of these masses were visible on sonography. Out of these 194 masses 34 were characterized by real time sonography as probably benign (BIRADS category III). Patients either referred for biopsy at our institute from our own site or are referred after abnormal mammographic or sonographic findings in the community.

Because of outside referrals and patient or referring physician preference our biopsy population includes some probably benign lesions. We included both palpable and non palpable lesions in this series.

**Table 1: The characterization of biopsy population**

Characteristics	Total no. of patients	All masses	Mass visible on sonography	BIRADS category 3 masses on sonography
No.	336	215	194	34
Mean patient age	56 (18-89)	56 (18-89)	56 (18-89)	45(18-83)
Mean mass size cm	1.3(0.3-10)	1.3(0.3-10)	1.3(0.3-10)	1.2(0.4-4.0)
No. malignant	115(34.2%)	87(40.4%)	80(41.2%)	1(2.9%)

**Mass characterization**

All the patients with breast masses were examined by 1 of 3 radiologists and characterized immediately before biopsy. All radiologists are specialist with extensive clinical experience. Each mass

was examined in real time by the radiologist performing the biopsy using high resolution 10-12 MHz linear array transducer on sonographic equipment Acuson 300, Siemens. All the masses were characterized according to characteristics listed in Table 2.

**Table 2: Sonographic criteria for probably benign solid masses**

Characteristics	Description
Shape	Round, oval or loculated (<4), irregular, architectural distortion
Margins	Circumscribed, obscured, poorly defined, microlobulated, spiculated
Echogenicity	Isoechoic, mildly hypoechoic or hyperechoic
Axis	Parallel (wider than tall), Not parallel
Posterior echoes	Increased or no change (non shadowing), shadowing

The study was performed before BIRADS included a lexicon for sonographic findings and the description used were those that were the most useful and least variable in prior studies [2, 3]. The radiologist then assigned final BIRADS category, taking into account the prior imaging studies and both

mammographic (when available) and sonographic features. Determination of final weightage of sonography or mammography was decided when features differed and depend on how the lesion was best visualized. However, sonographic features were more likely to guide final assessment category.

**Table 3: Lists the sonographic criteria for placement in BIRADS category 3 as probably benign**

Characteristics	Description
Shape	oval or loculated (<4)
Margins	Well circumscribed
Echogenicity	Isoechoic, mildly hypo echoic or hyper echoic
Axis	Parallel (wider than tall)
Posterior echoes	Increased or no change (non shadowing)

A mass could either be oval or be macro lobulated with one to two large gentle lobulations. The margins should be well circumscribed with abrupt interface with surrounding tissue. The echogenic pseudo capsule was not considered as criteria. The mass considered were wider than tall that is the axis was parallel to skin. In other words AP diameter was less than transverse diameter of mass [2]. The echogenicity was isoechoic, hyper echoic or mildly hypo echoic without posterior shadowing. Any malignant characteristics like ductal extension, thick echogenic halo and increased vascularity were not considered in our study.

**Biopsy Technique**

Sonographically guided large-core needle biopsy of breast masses was performed after taking

informed consent and using a 14 gauge cutting needle with a long throw spring loaded automated gun (BARD). In 1 case fine needle aspiration was performed with a 22 gauge needle. The choice of FNA over biopsy was based on the preference of the radiologist as the patient is taking anti platelet drugs. Informed consent was obtained before each procedure.

**RESULTS**

14 gauge core biopsy was performed in 33 masses and fine needle aspiration was performed in 1 case. The cytologic and pathologic results are listed in Table 4. There was 1 malignancy (2.9 %) which was a 13x11 mm medullary carcinoma in a 65 year old woman. This mass was characterized sonographically as circumscribed and was placed prospectively as probably benign category.

**Table 4: Pathologic and cytologic results of probably benign masses**

Core pathologic results	N
Fibroadenoma	24
Fibrocystic changes	3
Focal fibrosis	1
Lipoma/fat/fibrofatty breast tissue	1
Fat necrosis	1
Sclerosing adenosis	1
Atypia	1
Intramammary lymph node	1
Medullary carcinoma	1



**Fig. 1:** A 23 year old female with typical sonographic features of probably benign breast lesion showing hypoechoic oval mass with well circumscribed margins, wider than tall and no posterior shadowing. Biopsy report was fibroadenoma.



**Fig. 3:** A biopsy probed case of fibrocystic lesion in 25 year old female showing septate cystic mass with well circumscribed margins.



**Fig. 2:** A 65 years female showing well defined well circumscribed mass wider than tall with posterior enhancement. Biopsy report was medullary carcinoma.

#### DISCUSSION

Sonography is used as screening for characterization of palpable breast masses and for mammographically detected lesions. It is very useful in dense breast as masses are better visualized on ultrasonography. The appropriateness of short-interval follow-up for mammographically circumscribed masses has been well documented, with a low rate of malignancy in these cases of less than 2% [6, 7]. Although in some centres sonography is used in deciding whether to recommend follow-up or biopsy for solid masses [8], this use of sonography has remained controversial [9]. A series of 3184 mammographically probably benign lesions in a study by Sickel [6] included 589 non-calcified, non-palpable, well-defined masses, with a malignancy rate of less than 2% in these masses, and a subsequent study included 1403 probably benign masses, with a rate of malignancy of less than 1.4% [10].

Although our series of 34 palpable and nonpalpable sonographically probably benign solid masses was smaller, the false-negative rate of 2.9% compares favourably. Our findings therefore suggest that short interval follow up can be an acceptable management strategy for sonographically benign appearing solid masses.

Previous studies evaluating the ability of sonography to distinguish benign from malignant breast masses have included both palpable and nonpalpable masses [2, 4]. In the study by Rahbar *et al.* [3] the younger women who underwent sonography but not mammography for the evaluation of a palpable mass would have benefited the most from the application of sonographic criteria for benign versus malignant solid masses.

In addition, in a study by Skaane and Endgedal [11] the negative predictive value of sonography was 96% in nonpalpable breast masses and 100% in palpable masses. The number of palpable masses in that series was small, but the only malignancy in the series was nonpalpable. Because palpable masses have traditionally been treated differently than non-palpable masses [12] Additional studies of palpable probably benign masses are needed before biopsy is deferred in this population.

Strict adherence to benign criteria is essential in minimizing the false-negative rate [18]. The single malignancy in our series was considered to have poorly defined margins on mammography but circumscribed margins on sonography (Fig. 2) by the same observer, showing that the presence of suggestive features on mammography should prompt biopsy despite an apparently benign sonographic appearance. The new BI-RADS edition for ultrasound points out the need for considering all imaging features of a lesion by noting that progressive integration of ultrasound and mammographic findings improves the assessment and management of abnormalities [13].

Our study was designed to determine the results that can be expected from assessing the likelihood of malignancy based on combined mammographic and real-time sonographic findings, as is done in routine clinical practice. One limitation of this design is that we were not able to address intra observer and inter observer variability. Second, all radiologists participating in the study were specialists in breast imaging. Further studies including radiologists with a wider range of expertise are needed to determine, whether these results are reproducible among general radiologists. In addition to our knowledge there is no study of follow-up of probably benign masses by sonography. Assessing the likelihood of malignancy for lesions that are about to undergo biopsy may be different from situations when the commitment to a benign assessment must be made by recommending follow-up in clinical practice. Additional investigations are recommended to confirm that the false-negative rate remains low when follow-up is performed in clinical practice.

Stavros *et al.* [2] suggested that benign sonographic criteria were widely applicable in the evaluation of solid masses, because 57% of solid

masses in their study met these criteria. That more than half of the masses in their series could be classified as benign on sonography suggests that the use of these criteria could considerably decrease the biopsy rate for benign lesions. However, these results may not be generalizable to daily clinical practice because this series did not include all masses referred for biopsy. By choosing to evaluate all masses undergoing biopsy, we are able to determine the actual impact of choosing short interval follow up rather than biopsy for these masses in a clinical practice. In our series, 17.5% of masses (10% of all lesions) met the benign sonographic criteria, a much smaller number than the 60% reduction of unnecessary biopsies suggested in the study by Stavros *et al.* [2], despite the fact that we routinely perform biopsies of all solid masses visualized best or only on sonography. The differences reflect differences in patient populations and may reflect inter observer variability. If the probably benign solid masses in our series had not undergone biopsy, the positive predictive value of biopsy in our 13 month period would have increased to 41.2 % (80 of 194) from 34% (115 of 336). Because percutaneous breast biopsy is associated with very little morbidity, a major reason to choose follow-up rather than biopsy for probably benign lesions is that it is a more cost-effective management strategy. Because we performed biopsies rather than following the lesions in this series, we cannot compare the actual costs of the 2 strategies. However, for masses that can be better visualized or only visualized with sonography, imaging follow-up is likely to be more costly than has been reported for mammographic follow up. Although there has been some debate about the best algorithm for follow-up of probably benign masses [14], most recommend at least 1 follow-up at 6 months [12].

## CONCLUSION

We found, that in the absence of suggestive mammographic features, sonographically probably benign masses have an acceptably low likelihood of malignancy such that follow up can be an acceptable alternative to biopsy. Further studies confirming a low false negative rate and addressing the cost-effectiveness of sonographic follow up in clinical practice are needed.

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