

Radiological and Cytological Correlation of Breast Lesions with Histopathological Findings in a Tertiary Care Hospital in Coastal Karnataka

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ABSTRACT

Introduction: Breast cancer is the leading cause of cancer deaths among women worldwide. Breast cancer clinically presents as breast lump. Fine needle aspiration cytology (FNAC) and breast ultrasound (sonomammography) is pivotal in characterization of a breast lump as benign and malignant lesion. There is a need to study radiological and cytological correlation of breast lesions with histopathological findings to evaluate the diagnostic accuracy of sonomammography and FNAC.

Material and Methods: A prospective, quantitative and descriptive study was conducted in the department of Radiology, Father Muller Medical College Hospital, Mangalore. Patients who were evaluated for suspicious breast lump with a breast ultrasound, FNAC and biopsy from January 2017 to December 2018 were included in the study.

Results: In this study, diagnostic accuracy for breast FNAC (98.7%) was found to be better than that of sonomammography (92.5%). Fine needle aspiration cytology of breast lump plays an important role when it is difficult to determine the nature of breast lump by clinical and radiological examination. In this study breast FNAC was found to have sensitivity of 98.4% and specificity of 95.7%. Sonomammography had a sensitivity of 90.6% and specificity of 97.8.

Conclusion: Present study confirms the higher combined sensitivity, specificity and accuracy for ultrasonography and fine needle aspiration cytology in categorisation of breast lump as benign and malignant. USG is better in detection of benign lesions whereas cytology is better in case of malignancies. The triple assessment is an accurate, simple and cost-effective method for the evaluation of breast cancer and can be applied at our centre as a safe alternative for open biopsy when it is concordant and open biopsy must be reserved only for discordant results. This will subsequently reduce the number of breast biopsies significantly.

Keywords: Radiological and Cytological Correlation, Breast Lesions with Histopathological

can be improved by a good aspiration technique⁴. Whenever there is discrepancy between clinical examination, breast FNAC and breast ultrasound, breast biopsy is recommended to arrive at a final diagnosis. There is a need to correlate the radiological and cytological findings of breast lesions with histopathological diagnosis to evaluate the diagnostic accuracy of sonomammography and breast FNAC. Study aimed to correlate radiological and cytological findings of breast lesions with histopathological diagnosis.

MATERIAL AND METHODS

A prospective, quantitative and descriptive study was conducted in the department of Radiology, Father Muller Medical College Hospital, and Mangalore. All patients who have been evaluated for a suspicious breast lump with a breast ultrasound, FNAC, biopsy from January 2017 to December 2018 were included in the study. Informed consent was taken from the patients. Inclusion criteria were all patients with clinically palpable breast masses, family history of first degree relatives with breast cancer, operated case of breast cancer with contralateral breast mass. Exclusion criteria were very tender breast, women with fungating mass, where performing ultrasonography and FNAC was difficult.

Ultrasound examination of the breast masses was done by a radiologist in the department of radio diagnosis. The transducer was gently applied and both transverse and longitudinal scans were taken. The scans included evaluating 4 features (i) Shape - Round/Oval or irregular. (ii) Margins- Circumscribed / noncircumscribed. (iii) Width- AP ratio > 1.4 or = 1.4 (iv) Echogenicity – Hyperechoic/Isoechoic or Hypoechoic. On the basis of these four features, diagnosis was made. The studies were reviewed and reported according to BIRADS protocol. The radiologist's report was recorded as radiological diagnosis. Fine needle aspiration cytology was done by Pathologist under aseptic precautions using 23 G needle and 5 ml syringe. Two to three passes were

INTRODUCTION

Breast cancer is the leading cause of cancer deaths among women worldwide.¹ According to WHO in India about 1 lakh new patients with breast cancer are diagnosed annually and an estimated 70,218 Indian women die due to breast cancer every year.² Early diagnosis of breast cancer remains to be pivotal in reducing the number of deaths due to breast cancer. FNAC of breast masses was first introduced by Martin and Ellis long back in 1930 and this can be used for diagnosis of breast lesions.³ The overall diagnostic accuracy of this test

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done from different directions of the breast lump. Cellular material was aspirated and expelled onto slides. 3 to 5 slides were prepared for each patient. A medium-sized drop of aspirate was placed near the labelled end of the specimen slide. A spreader slide was used to spread the aspirated material along the specimen slide. All the smears were fixed in alcohol and stained with Haematoxylin and Eosin stain. At least six clusters of ductal epithelial cells on each smear with each cluster comprising of at least 10 cells was considered as adequate material. Cytological categories for reporting of breast lesions were as follows.

1. Unsatisfactory
2. Benign- non specific
3. Benign – specific
4. Atypical/ intermediate
5. Suspicious
6. Malignant

The following cyto-morphological characteristics were used to distinguish benign from malignant

1. Dyscohesive cells
2. Variation in size and shape of cells
3. Changes in the nucleus
4. Increased/abnormal mitoses
5. Abnormal cytoplasmic inclusions.

Suspicious cases in FNAC were those with atypical cells without frank malignancy. In this study, all suspicious cases were regarded as malignant. Histopathology diagnosis was done on H & E stained, formalin fixed paraffin embedded tissue slides by an expert Pathologist. The results of breast ultrasound, FNAC and biopsy were entered in Microsoft excel worksheet. A correlation was done between cytology, sonomammography and histopathology results individually and combined, taking histopathology as gold standard.

Sensitivity, specificity, positive predictive value, negative predictive value and diagnostic accuracy were calculated.

STATISTICAL ANALYSIS

A p value less than 0.05 was considered statistically significant.

RESULTS

In present study 375 cases were examined on sonomammography amongst which 158 cases were included in the study, rest of the cases were normal or failed to follow-up with FNAC and biopsy or refused to consent. Age of the patients ranged from 18 to 75 years with mean age of 46 years. On breast ultrasonography 98 cases of the 158 cases included in our study were diagnosed as benign breast disease (BIRADS I, II and III). 60 cases were diagnosed as suspicious for carcinoma or carcinoma of the breast (BIRADS IV, V).

On FNAC 91 cases were diagnosed as benign and 67 cases were diagnosed as malignant.

On sonomammography 2 cases were misdiagnosed false positively as carcinoma. Of these one was a cellular fibroadenoma and other was a radial scar with proliferative breast disease on histopathology. Also in 6 cases diagnosis of malignancy was missed on breast ultrasound. These included 2 cases of metaplastic carcinoma, 3 cases of papillary carcinoma and one case of malignant phylloides.

Out of the 4 cases wrongly diagnosed as malignant in cytology 3 cases showed atypical ductal hyperplasia in histopathology and 1 turned out to be cellular fibroadenoma. Cytologically there were total of 91 benign cases, fibroadenoma being the commonest, followed by benign proliferative breast disease, fibrocystic disease, duct ectasia, mastitis and least being

Ultrasound breast	Histopathology diagnosis	
	Malignant	Benign
60	58 (true positive)	2 (false positive)
98	6 (false negative)	92 (true negative)

Sensitivity = TP/TP+FN = 90.6%, Specificity = TN/TN+FP = 97.8%, PPV = TP/TP+FP = 96.6%, NPV = TN/TN+FN = 93.8%, Diagnostic accuracy = TP+TN/TN+FP+FN+TN = 92.5%

Table-1: Breast Ultrasound (vs.) Histopathology in differentiating benign and malignant breast lesion

Breast FNAC	Histopathology diagnosis	
	Malignant	Benign
67	63 (true positive)	4 (false positive)
91	1 (false negative)	90 (true negative)

Sensitivity = TP/TP+FN = 98.4%, Specificity = TN/TN+FP = 95.7%, PPV = TP/TP+FP = 94%, NPV = TN/TN+FN = 98.9%, Diagnostic accuracy = TP+TN/TN+FP+FN+TN = 98.7%

Table-2: Breast FNAC (vs.) Histopathology in differentiating benign and malignant breast lesions

	Ultrasound		FNAC		Histopathology		P value
	No	%	No	%	No	%	
Benign	98	62.2	91	57.5	94	59.4	p>0.05
Malignant	60	37.8	67	42.5	64	40.5	

Table-3: Breast ultrasound (vs.) breast FNAC in differentiating benign and malignant breast lesions

phylloides. One case reported as benign proliferative breast disease without atypia on FNAC, turned out to be malignant papillary carcinoma on histopathology.

The sensitivity, specificity and accuracy of individual modality are derived based on Table -1, 2. There was significant difference between FNAC and breast ultrasound in detecting breast lesions, p-value > 0.05 (Table 3).

DISCUSSION

Breast cancer is the most common cancers in the world among women.¹ Fine Needle Aspiration Cytology (FNAC) for the diagnosis of breast masses was first introduced by Martin and Ellis in 1930.³ FNAC of breast lump is now a well-established modality for accurately determining the nature of breast lumps. Ultrasound is also useful in evaluation of breast lesions. The BIRADS score was first developed in 1993 for reporting mammography. Since its establishment, several studies have found that it can be helpful to physicians in predicting the likelihood of cancer. Breast ultrasound is now a well-established method and several studies have suggested that sonomammography can be useful in differentiating between benign and malignant lesions presenting as breast masses.⁵ The purpose of this study was to compare the result of breast FNAC and breast ultrasound with histological diagnosis to assess its diagnostic accuracy. Early screening and diagnosis of breast lesions and categorization into different groups of breast pathology can be helpful in accurate management of the breast lesions.

In a study done by Wasan et al⁶ breast ultrasound had a sensitivity of 100%, specificity of 91.6 which is comparable to our study in which the sensitivity was 90.6% and specificity was 97.8%. Benign lesions of the breast were more readily diagnosed by ultrasound than malignant lesions. According to Nandan Kumar et al⁷ the sensitivity and specificity of breast ultrasound in categorising breast lesions as benign and malignant was 85.4% and 89.31%, which is slightly lesser compared to our study.

Studies done by Puja B. Jarwani et al⁸ and Ambedkar Raj, Kulandai Velu et al⁹, showed that breast FNAC had a sensitivity ranging from 82% to 97.5% and specificity of more than 99%, which is comparable to our study. Study done by Shanmugasamy K et al¹⁰ showed that the sensitivity, specificity and diagnostic accuracy of breast FNAC in diagnosis of malignancy was 93.5%, 100% and 98.3% respectively.

Zhang Qin et al in their study reported a sensitivity and specificity of 97.1% and 97.3% respectively for FNAC in diagnosing breast lesions.⁽¹¹⁾ Tiwari M has also observed similar results in their studies with a sensitivity of 83.3% and specificity of 100%.⁽¹²⁾ The sensitivity, specificity, diagnostic accuracy, negative predictive value, and the positive predictive value of breast FNAC was 98%, 100%, 98%, 100%, and 97%, respectively in the study conducted by Bukhari et al.⁽¹³⁾

FNAC is not only useful in diagnosis and further planning of treatment without need for biopsy, but also helpful in prognostication of the tumour and knowing the hormone

receptor status.¹⁹ Breast biopsy should be reserved for diagnostically challenging cases and when the evaluation of the invasiveness is mandatory in cases such as in papillary neoplasms.¹⁴ The gold standard test used in our study was the histopathological report which is valid, reproducible and has been accepted as the gold standard internationally. For a good study, the reference test against which the diagnostic test in evaluation is compared should be gold standard.¹⁵

CONCLUSION

Breast ultrasound is a non-invasive imaging based technique and Breast FNAC is a tissue based minimally invasive technique. Both these diagnostic tools can complement each other. The results of our study showed that breast FNAC is more reliable method to diagnose breast lesions with high diagnostic accuracy compared to breast ultrasound. Furthermore, recent advances in both these techniques like Immunocytochemistry, imaging guided FNAC and Doppler in sonomammography may increase their accuracy. However in diagnostically challenging cases and clinically malignant masses histopathological examination should be done, which is the gold standard for tissue diagnosis.

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