Original Research Article

Comparison of the diagnostic accuracy of fine needle aspiration cytology and core needle biopsy in patients with ultrasound detected breast lesions as well as the cost effectiveness of the screening modalities in the poor population visiting our institution

Nishi Tandon[1], Neema Tiwari[2]*, Tanya Tripathi[1], Amrisha Jaiswal[1], Nirupma Lal[1], Osman Musa[3]

[1]Department of Pathology, Eras Lucknow Medical University, Lucknow, Uttar Pradesh, India
[2]Department of Hematology, King George Medical University, Lucknow, Uttar Pradesh, India
[3]Department of Surgery, Eras Lucknow Medical University, Lucknow, Uttar Pradesh, India

*Correspondence:
Dr. Neema Tiwari,
E-mail: nehaneemat@yahoo.co.in

ABSTRACT

Background: Breast cancer is the leading cause of cancer relayed mortality and morbidity among women and the incidence of the disease is rising all over the world. Despite the imaging techniques, histopathological diagnosis still plays an essential role for differential diagnosis and for avoiding surgical over-treatment in case of breast lesions with suspicious features (10). Fine-needle aspiration cytology (FNAC), core needle biopsy (CNB) and vacuum assisted breast biopsy(VABB) represent the current methods of choice for pathological diagnosis, both with their specific advantages and limitations. The purpose of this study is to compare the diagnostic accuracy of FNAC and CNB in patients with US-detected breast lesions as well as the cost effectiveness of the screening modalities in the poor population visiting our institution.

Methods: It was a retrospective study done using the department register data where we compared the FNAC findings and compared it with CNB findings in the same cases. This was a short study done for a period of 3 months only from January 2017-March 2017. We collected 50 cases of breast carcinomas where both FNAC and CNB findings as well as the clinical information and follow up were available for the patients. We compiled the data for these cases and slides were reviewed by two independent pathologists to remove observer bias. Authors tabulated clinical information, FNAC diagnosis, CNB diagnosis as well as the stage at presentation and follow up for each case.

Results: As is seen in this study that 7 cases which were benign on FNAC were benign on CNB also. As for malignancy while CNB diagnosed 43 cases as malignant FNAC diagnosed 5 cases as suspicious [which were malignant on CNB] and 37 cases as malignant which came out to be malignant in CNB too. So, the while the NPV is 100% the PPV is comparable to CNB.

Conclusions: In conclusion, FNAC and CNB represent accurate methods for the characterization of US-detected breast nodules, with similar values of diagnostic accuracy, sensitivity, specificity and NPV. In experienced hands, FNAC could be still considered the first method to evaluate breast lesions being less invasive. CNB has a higher PPV and should be performed for uncertain diagnostic cases and when the evaluation of the invasiveness or histological type of breast lesion is mandatory.

Keywords: Breast, CNB, FNA, Sensitivity, Specificity

INTRODUCTION

Breast cancer is the leading cause of cancer relayed mortality and morbidity among women and the incidence of the disease is rising all over the world.[1,2] In India it is the second common cause of cancer in females post cervical cancer and is slowly increasing in males. One of the troubling findings especially in India is the increase in breast carcinoma in young females less than 40yrs with high grade and stage at presentation. The 5-year survival rate of breast carcinoma in USA as per American cancer association is 85% and more while in India its less than 56%.[3,4] Many etiological factors have been implicated in its pathogenesis, from absence of breast feeding, hyper-estrogenimea to genetic mutations and hereditary factors and syndromes.[5]

The most common radiological modality for screening and detection of breast carcinomas is mammography.[6,7] However, its sensitivity is decreased in young women with radiologically dense breast.[8] Another limitation of mammography is a consequent superimposition of tissue due to 2D visualization of a 3D structure. Recently, positron emission tomography (PET), PET CT and, ultimately, positron emission mammography (PEM) have been introduced in the field of diagnosis.[9]

Despite the imaging techniques, histopathological diagnosis still plays an essential role for differential diagnosis and for avoiding surgical over-treatment in case of breast lesions with suspicious features.[10]

Fine-needle aspiration cytology (FNAC), core needle biopsy (CNB) and vacuum assisted breast biopsy (VABB) represent the current methods of choice for pathological diagnosis, both with their specific advantages and limitations.

FNAC is a well-established method for the diagnosis of breast lesions. It has the advantages of being highly accurate in experienced hands, cost effective, and useful for small lesions not eligible for CNB.[11] Its limitations are the lack of experienced cytologists in many institutions, the inability to reliably distinguish invasive from in situ carcinoma and the difficulty in precisely evaluating cytologic and morphologic features in breast aspirates with the histological classification system used as the "gold standard", particularly in benign lesions.[12]

CNB has been reported to achieve better sensitivity and specificity especially in non palpable lesions that appear as not definitively benign or malignant. US-guided CNB is currently recognized as a reliable alternative to surgical biopsy for the histological diagnosis of breast lesions.

The purpose of this study is to compare the diagnostic accuracy of FNAC and CNB in patients with US-detected breast lesions as well as the cost effectiveness of the screening modalities in the poor population visiting our institution.

METHODS

This study was under taken in the department of pathology and dept. of surgery of Eras Lucknow Medical University in 2017. It was a retrospective study done using the departments records from which data was compiled on as a table in which we compared the Fine needle aspiration cytology (FNAC) findings and with core needle biopsy (CNB) findings in the same cases. This was a short study done for a period of 3months only from January 2017-March 2017. Authors collected 50 cases of breast carcinomas where both FNAC and CNB findings as well as the clinical information and follow up were available for the patients. No distinction was made on the morphological subtype of breast carcinoma.

Inclusion criteria

Authors included all breast carcinoma cases which we received during the study period. The cases should have complete clinical detail as well as a core needle biopsy specimen for comparison. Exclusion criteria includes all cases which were post chemotherapy were excluded.

Authors compiled the data for these cases and slides were reviewed by two independent pathologists to remove observer bias. Authors tabulated the clinical information, the FNAC diagnosis, CNB diagnosis as well as the stage at presentation and follow up for each case. No consent was obtained from the patients as we only used the specimen submitted to us for the routine diagnosis. No intervention was performed specifically for the study. No special statistical tool was applied in this study.

RESULTS

Authors know from previous literature that, CNB has both higher sensitivity and specificity than FNAC in diagnosing benign and malignant lesions.[13,14] The studies which reported high sensitivity (97.1%), specificity (99.1%), PPV (99.3%) and NPV (96.2%) included only definitive benign and malignant lesions and excluded the atypical and suspicious categories.[15,16] In this results, authors saw that 37 (of 50) 74% cases diagnosed as malignant on FNAC were characterized as IDC/ILC on core needle biopsy, 3 (60%) cases diagnosed as suspicious on FNA were also diagnosed as IDC/ILC or CNB. All the cases diagnosed as benign on FNA turned out to be benign on CNB. Hence, we can see that FNAC has a very good sensitivity in diagnosing the breast malignancy (Table 1). However, it is well known and has been cautioned that one can never be definite about the morphology or the type of breast carcinoma on simply cytology hence commenting on ductal versus lobular in not a wise thing to do. Very rarely we get patterns like Indian file pattern which is characteristic of a lobular carcinoma breast. Here it would be wise to mention the pattern in description and keep the diagnosis as positive for malignancy with a note saying ductal or lobular type.

Table 1: Clinical history and pathology report compiled for the samples under study.

| Age/sex	Stage	FNAC diagnosis	CNB diagnosis	Treatment	Follow-up
42/F	2	Malig-Adeno	IDC	MRM	1year
38/F	2	Malig	IDC	MRM	6 months
44/F	2	Suspicious	IDC	MRM	10 months
56/F	2	Malig	IDC	MRM	1 year
48/F	2	Malig	IDC	MRM	1.5 yrs
32/F	3	Malig	IDC	MRM	1
28/F	4	Malig	IDC	MRM	Yr
32/F	-	Benign	Complex FA	lumpectomy	1 month
55/F	3	Malig	IDC	MRM	1 yr
60/F	3	Malig	IDC	MRM	1 yr
25/F	2	Malig	IDC	MRM	1.5yrs
28/F	2	Malig	IDC	MRM	1yr
33/F	2	Malig	IDC	MRM	1 yr
36/F	2	Suspicious	ILC	MRM	8 months
41/F	3	Malig	IDC	MRM	1 year
48/F	2	Malig	MIXED	MRM	1.5 years
29/F	3	Malig	IDC	MRM	1 yr
33/F	3	Malig	IDC	MRM	1yr
35/F	3	Malig.	Medullary CA.	MRM	2 yr
48/F	-	Benign	Lactating adenoma	lumpectomy	1 month
37/F	3	Malig	IDC	MRM	1 yr
20/F	3	Malig	IDC	MRM	10 mo
28/F	2	Malig	MIXED	MRM	18 mo
35/F	2	Malig	IDC	MRM	13mo
50/F	2	Malig	IDC	MRM	1 yr
62/F	2	Suspicious	IDC	MRM	6 mo
65/F	2	Malig	IDC	MRM	1 yr
55/F	3	Malig	IDC	MRM	1 yr
58/F	1	Malig	IDC	MRM	1yr
53/F	2	Malig	IDC	MRM	1yr
43/F	-	Benign	BPD	MRM	8mo
42/F	2	Malig	IDC	MRM	1 yr
48/F	2	Malig	IDC	MRM	15 mo
50/F	-	Benign	FA	-	-
60/F	3	Malig	IDC	MRM	1yr
30/F	3	Malig	IDC	MRM	1yr
32/F	3	Malig	IDC	MRM	1yr
30/F	1	Malig	IDC	MRM	1yr
36/F	1	Malig	IDC	MRM	1yr
47/F	2	Malig	IDC	MRM	8mo
55/F	-	Benign	FCD	MRM	12mo
58/F	3	Malig	MIXED	MRM	14mo
43/F	1	Malig	IDC	MRM	15mo
44/F	2	Suspicious	IDC	MRM	1 yr
45/F	2	Malig	IDC	MRM	1yr
52/F	-	Benign	FA	-	-
68/F	3	Malig	IDC	MRM	13mo
70/F	-	Benign	FA	-	-
48/F	2	Malig	IDC	MRM	1yr
21/F	3	Malig	IDC	MRM	1yr
54/F	3	Suspicious	ILC	MRM	1.5yrs
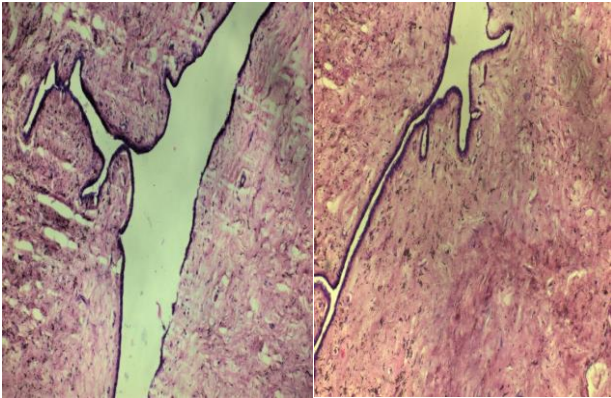
Figure 1: Photomicrographs of breast. A) 10X view of H&E stained phyllodes showing leaf like pattern. B) 10X H&E view of compressed ducts with stromal proliferation.
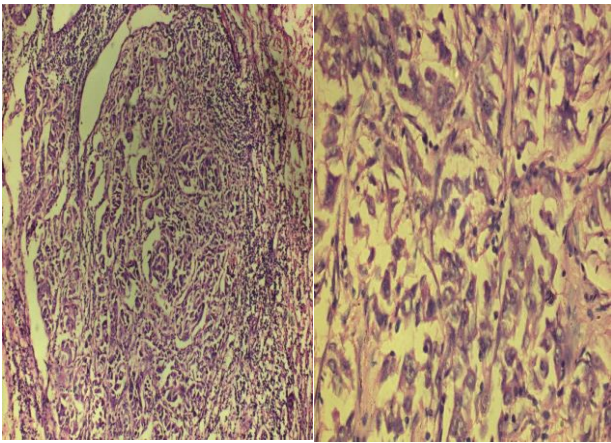

Figure 2: Solid pappilary breast carcinoma. A) Well formed tumor area of a solid papillary breast carcinoma. B) high power view with high grade malignant cells.

DISCUSSION

FNAC and CNB represent the most widely used methods for pathological diagnosis of breast nodules, both with their specific advantages and limitations. The overall sensitivity and specificity of FNAC and CNB in the classification of breast lesions depend on the radiological and histological features and on specific variables intrinsic to the technique.

In most cases, CNB has both higher sensitivity and specificity than FNAC in diagnosing benign and malignant lesions.[13,14] The studies which reported high sensitivity (97.1%), specificity (99.1%), PPV (99.3%) and NPV (96.2%) included only definitive benign and malignant lesions and excluded the atypical and suspicious categories.[15,16] A study reported that the PPV of FNAC for malignancy was comparable with CNB, but decreased for suspicious lesions and in case of atypia.[17]

As is seen in this study that 7 cases which were benign on FNAC were benign on CNB also. As for malignancy while CNB diagnosed 43 cases as malignant FNAC diagnosed 5 cases as suspicious (which were malignant on CNB) and 37 cases as malignant which came out to be malignant in CNB too. So, the while the NPV is 100% the PPV is comparable to CNB. Also, the advantage of FNAC is ease of performance cost effectiveness and easy availability with less expertise. FNAC is more suitable for lesions close to the chest wall, vessels and implant, for very small or deep and difficult to reach lesions and for patients on anticoagulants. As a general feature of cytology, good quality FNAC depends on the competence of the aspirator, and its interpretation is primarily determined by the experience of the pathologist.[18-20] The main advantages of FNAC are minimal invasiveness, reduced cost, pathological assessment of small lesions, which are not amenable to CNB. Moreover, it allows same day diagnosis of breast cancer and the identification and management, on the same day, of those patients with benign disease. Therefore, FNAC should be considered as the first method to evaluate breast lesions, recognized by means of imaging techniques; CNB should be performed for unanswered diagnostic cases (C1-C3) and when it is necessary to have such information as invasiveness or histological type of breast lesion.

Advantage of CNB is that it allows the discrimination between in situ and invasive lesions and is a more accurate method to distinguish between invasive lobular and invasive ductal carcinoma, based on histological and immuno-histochemical features.[21] The success rate of FNAC for obtaining a definite diagnosis also depends both on the palpability and size of the lesion. FNAC has average success rates of 75-90% for palpable and 34-58% for non-palpable breast lesions, whereas success rates reported for CNB are 97% and 94%, respectively.[22,23]

In a study comparable results for FNAC and CNB were obtained in terms of sensitivity (97% vs 97%), specificity (94% vs 96%), diagnostic accuracy (95% vs 96%) and NPV (98 vs 96). As for any diagnostic procedure, a higher NPV is important to minimize undertreatment and it was achieved by CNB.[24]

In this study, the PPV was 91% for FNAC and 97% for CNB; therefore, basing on our results, the risk of over-treatment could tend to be higher for FNAC as compared with CNB.

However, despite advances in biopsy devices and techniques, false-negative diagnoses still remain unavoidable and may delay the diagnosis and treatment of breast cancer. The most common reasons for false-negative diagnosis are represented by technical or sampling errors, failure to recognize or act on radiologic-histological discordance, and the lack of imaging follow-up after a benign biopsy result. Technical difficulties (poor lesion or needle visualization, especially after the

injection of local anesthetic drug, deeply located lesions, dense fibrotic tissue) cause inaccurate sampling but can be reduced by using modified standard techniques.

This study has some important limitations, mainly represented by the small number of sample size, the lack of a direct confrontation between FNAC and CNB for each lesion.

CONCLUSION

In conclusion, FNAC and CNB represent accurate methods for the characterization of US-detected breastnodules, with similar values of diagnostic accuracy, sensitivity, specificity and NPV. In experienced hands, FNAC could be still considered the first method to evaluate breast lesions being less invasive. CNB has a higher PPV and should be performed for uncertain diagnostic cases and when the evaluation of the invasiveness or histological type of breast lesion is mandatory.

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