A Comparative Study of Fine Needle Aspiration Cytology (FNAC) and Core Needle Biopsy in Palpable Breast Lesions

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ABSTRACT

Breast is a host to many diseases which present as lumps in the breast. Fine Needle Aspiration Cytology' (FNAC) and 'Core Needle Biopsy' (CNB) are commonly used to obtain pathologic diagnosis. Total 104 patients presenting with palpable breast lumps were subjected to FNAC, then Core needle biopsy in a single sitting. Finally the results of FNAC and Core Needle biopsy were compared in the light of excision biopsy results. Sensitivities of FNAC and Core Needle biopsy were 83.33 % and 95.83 % and specificities were 96.55 % and 100 % respectively showing that Core Needle biopsy was more accurate than FNAC.

Introduction

Breast is a host to many diseases which range from benign and malignant neoplasms, inflammatory conditions to infections, most of which present as lumps in the breast. It is important to differentiate between benign and malignant conditions before treating it. Various diagnostic methods have been developed to evaluate the breast lumps as breast cancer is the second most common cancer in the women in India. [1,2] An effective and accurate method of breast cancer diagnosis will help to reduce the patient's morbidity and mortality as early diagnosis is life saving, cost-effective and requires less aggressive therapy.[3]

Physical examination, mammography, ultrasonography, FNAC, Core needle biopsy (Tru-cut biopsy), open excisional biopsy are all used to greater or lesser extent in diagnostic workup of a palpable breast masses.

Despite the imaging techniques, pathological characterization still plays an essential role for differential diagnosis and for avoiding surgical over-treatment in case of breast lesions with suspicious features.[4] Two modalities commonly used to obtain pathologic diagnosis are 'Fine Needle Aspiration Cytology'(FNAC) and 'Core Needle Biopsy'(CNB).[5] In our setup, almost all patients with palpable breast lumps are subjected to fine needle aspiration cytology and their further management is planned accordingly. Fine Needle Aspiration Cytology has proved to be of great value in the diagnosis of breast lumps, apart from being cost effective, it is also simple and quick while providing the cytological diagnosis. However, the success of FNA requires not only an excellent aspirator to obtain satisfactory aspirates but also breast cyto-pathologic expertise in interpreting the breast aspirates. [3, 6-8] Also, fine needle aspiration cytology is inadequate or inconclusive in many cases. [9] These patients with inconclusive/inadequate results are then subjected to excisional biopsy for diagnosis. Core needle biopsy also known as Tru-cut biopsy is now one of the useful means of obtaining histopathological diagnosis. It is relatively easy and can be performed on an outpatient basis. It also avoids unnecessary excisional biopsy.

This study was carried out to define better diagnostic approach for palpable breast lumps in present setup with the goal of identifying a sensitive, specific, efficient and economical approach to diagnose breast lesions by comparing the results of FNAC and CNB taken from the same breast lesion by the same operator in the same sitting.

Materials and Methods

Total 104 patients were studied in a span of two years in the Department of Pathology of our college hospital. Statistical Analysis was done using Chi-square test using Open-Epi software.

All OPD and IPD patients with a well-defined palpable breast lump were included in the study. Patients with cystic lesions and local skin infections were excluded from the study. After taking the informed consent of the patient, under aseptic precautions, each patient was subjected to both FNAC and Core Needle Biopsy in a single sitting by the same operator and sent for cytological and histopathological examination respectively. FNAC was done using 22 gauge needles and Core Biopsy was done using BARD Max-Core disposable biopsy instrument with 14-gauge needle. Reporting of FNAC and CNB were done using NHSBSP Guidelines.

Table 1. Reporting categories for FNAC and for CNB [10]

Cytology reporting	CNB reporting
C1 Unsatisfactory	B1 Unsatisfactory/Normal breast tissue only
C2 Benign	B2 Benign
C3 Atypia probably benign	B3 Benign but of uncertain malignant potential
C4 Suspicious of malignancy	B4 Suspicious of malignancy
C5 Malignant	B5 Malignant

Histopathological follow-up of excised specimen was done wherever available.

Results

In the present study total 104 cases were included out of which maximum i.e. 37 (34.61%) cases were of Invasive Ductal Carcinoma (NOS) followed by 28 (26.92%) cases of Fibroadenoma.

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Table 2. Histological classification of cases

Histological Classification	Frequency	Percentage
Invasive Ductal Carcinoma (NOS)	36	34.61%
Invasive Lobular Carcinoma	4	3.84%
Invasive Ductal and Lobular Carcinoma	1	0.96%
Mucinous Carcinoma	2	1.92%
Metaplastic Carcinoma	1	0.96%
Ductal Carcinoma In-situ (DCIS)	1	0.96%
Non-Hodgkin's Lymphoma (NHL)	1	0.96%
Fibroadenoma	28	26.92%
Fibrocystic disease	15	14.42%
Mastitis	4	3.84%
Phyllodes tumour	3	2.88%
Others	8	7.69%
Total	104	100

Table 3. Findings of FNAC vs CORE BIOPSY

	FNAC	CNB
Benign	49 (47.11%)	47 (45.19%)
Malignant	40 (38.46%)	46 (44.23%)
Suspicious/Inconclusive	15 (14.42%)	11 (10.57%)
Total	104	104

Chi-square = 1.076; df = 2; p = 0.5840
p-value < 0.05, so it is not significant

In the present study suspicious/inconclusive cases were more i.e. 15 (14.42%) with FNAC as compared to 11 (10.57%) with CNB.

Table 4. Distribution of Cases According to Grade on CNB

Grade on CNB	No. of Cases	Percentage
Grade I	00	00 %
Grade II	38	86.36 %
Grade III	6	13.63 %
TOTAL	**44**	**100%**

* One case of NHL and one case of DCIS were excluded for grade assessment.

In the present study out of total 104 cases grading was done in 44 malignant cases, out of these 38 (86.36%) cases were Grade II tumors and 6 (13.63%) were Grade III tumors.

Table 5. Hormone Receptor (ER, PR) Status and HER2/NEU Expression on CNB

	Positive	Negative	Total Cases
Hormone Receptor Status (ER,PR)	27 (60.00%)	18 (40.00%)	45
Her2/Neu Status	13 (28.88%)	32 (71.11%)	45

*One case of NHL was excluded for triple IHC assessment.

In the present study, out of total 104 cases triple marker IHC assessment(ER, PR and HER2/neu) was done in 45 cases. Triple marker IHC was not done on one case of Non Hodgkin's lymphoma. Only those cases which were both ER Positive and PR Positive were considered and were labelled as Hormone receptor positive cases. Out of 45 cases, 27 (60.0%) were hormone receptor positive and 18 (40%) were negative for hormone receptor expression. Out of 45 cases only 13 (28.88%) showed positivity for Her2/neu expression and 32 (71.11%) cases were negative for Her2/neu expression.

Table 6. Correlation of FNAC And Histopathology

		Histopathology		
		Malignant	Non-malignant	Total
FNAC	Malignant	20	1	21
	Non- malignant	4	28	32
	Total	24	29	53

In the present study, out of total 104 cases histopathologic follow-up of 53 cases could be obtained.
As per the table above:
• Sensitivity of FNAC is 83.33%.
• Specificity of FNAC is 96.55%.
• Positive Predictive value of FNAC is 95.24%.
• Negative predictive value of FNAC is 87.5%.
• Diagnostic Accuracy of FNAC is 90.56%.

Table 7. Correlation Of CNB And Histopathology

		Histopathology		
		Malignant	Non-malignant	Total
CNB	Malignant	23	0	23
	Non- malignant	1	29	30
	Total	24	29	53

In the present study, out of total 104 cases histopathologic follow-up of excised specimen of 53 cases could be obtained.
As per the table above:
• Sensitivity of CNB is 95.83%.
• Specificity of CNB is 100%.
• Positive Predictive value of CNB is 100%.
• Negative predictive value of CNB is 96.66%.
• Diagnostic Accuracy of CNB is 98.11%.

Discussion

In the present study total 104 cases were included out of which maximum i.e. 37 (34.61%) cases were of Invasive Ductal Carcinoma (NOS) followed by 28 (26.92%) cases of Fibroadenoma. Findings of **present study** correlate with the findings of **Chauhan et al 2012, [11] Wolfgramm et al 2013 [12]** and **Moschetta et al 2014 [13]** showing most cases of Invasive Ductal Carcinoma (NOS).

In the **present study** on FNAC, of the total 104 cases studied, 49 (47.11%) were benign, 15 (14.42%) were suspicious/inconclusive and 40 (38.46%) were malignant. Findings of present study correlate with the findings of **Chauhan et al 2012** [11] in which suspicious/inconclusive cases are around 12-14%.

In the present study on CNB, out of total 104 cases studied, 47 (45.19%) were benign, 11 (10.57%) were suspicious/inconclusive and 46 (44.23%) were malignant. Findings of present study correlate with the findings of **Andreu F et al 2007** [14] in which suspicious/inconclusive cases are around 10-12%.

In the present study, 104 cases were studied out of which grades were obtained in 44 cases, of which 38 (86.36%) tumors were grade II and 6 (13.63%) were grade III. Findings of present study correlate with the findings of **Dutta et al 2008** [15], **Ahmed et al 2011** [16] and **Bhagat et al 2012** [17], showing most cases of tumor having grade II.

In the present study we studied 104 cases. Out of these, 45 were submitted for triple marker IHC assessment(ER, PR and HER2/neu). Out of these 45 cases, 27 (60.0%) cases were hormone receptor positive and 18 (40.0%) were hormone receptor negative. These 45 cases were also studied for HER2/neu expression and it was found that out of 45 cases 13 (28.88%) were positive for HER2/neu expression and 32 (71.11%) were negative for HER2/neu expression.

Shet et al 2009 [18] study from Mumbai showed that hormone expression in India is lower as compared to west. **Munjal et al** 2009 [19] also revealed similar findings. The findings of present study correlate with findings of **Moses Ambroise 2011**.[20]

In the **present study** total of 104 cases were studied and histopathological follow-up was available in 53 cases.

Sensitivity of FNAC was found to be 83.33% and specificity 96.55%. Findings of present study correlate with the findings of **Wang (1981)** [21] and **Tiwari M (2007).** [22]

Table 8. Sensitivity and Specificity of FNAC in different studies

Author	No. of cases	Sensitivity	Specificity	Diagnostic Accuracy
Present Study	53/104	83.33%	96.55%	90.56%
Wang (1981)	1024	88.1%	91.7%	-
Nicosia et al (1993)	1875	93.2%	99.5%	95.6%
Tiwari M (2007)	91	83%	100%	-

Table 9. Sensitivity and Specificity of CNB in different studies

Authors	No. of cases	Sensitivity	Specificity	PPV	NPV	Diagnostic Accuracy
Present study	53/104	95.83%	100%	100%	96.66%	98.11%
Gukas et al (2000)	112	88.90%	96.80%	-	-	93.50%
Brunner et al (2009)	120	95%	100%	100%	90%	-
Lacambra et al (2011)	464	96%	99%	99%	94%	-

In the **present study** a total 104 cases were studied and histopathological follow-up was available in 53 cases. Sensitivity of CNB was found to be 95.33% and specificity 100%. Findings of present study correlate with the findings of **Brunner et al (2009)** [23] and **Lacambra et al (2011).** [24]
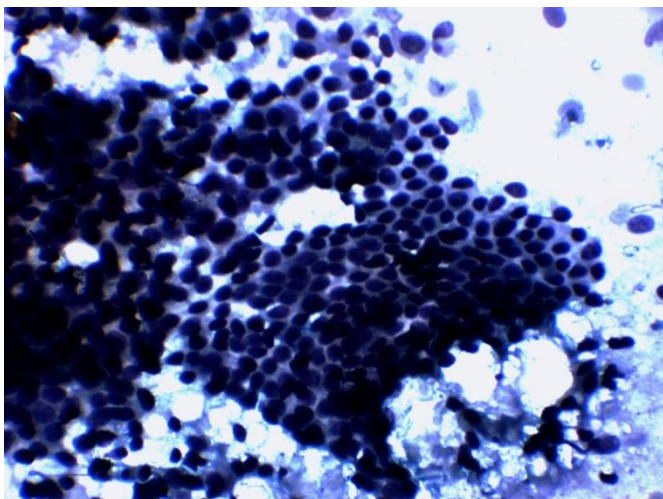
Conclusion

• FNAC is quick but is less accurate and suspicious rates are more as compared to CNB and so a CNB is often required.

• Core biopsy for the preoperative diagnosis of breast lesions has more sensitivity as compared to FNAC. Benign changes or a normal breast by CNB can reassure the patient about the absence of malignancy as specificity of CNB was found to be 100% and thus a lot of expenses can be saved by avoiding unnecessary surgical procedures.

• Also the grading and typing of tumours and assessment by immunohistochemistry is possible in CNB, thereby increasing diagnostic information available when considering treatment options.

• Thus, this study has shown that a combination of FNAC and CNB in a single sitting, if applied, for each breast lump would go a long way in the benefit of the patients so far as time, accuracy, utility and cost effectiveness are concerned. Hence, these kinds of studies are further necessary to endorse the findings and conclusions of the present study.
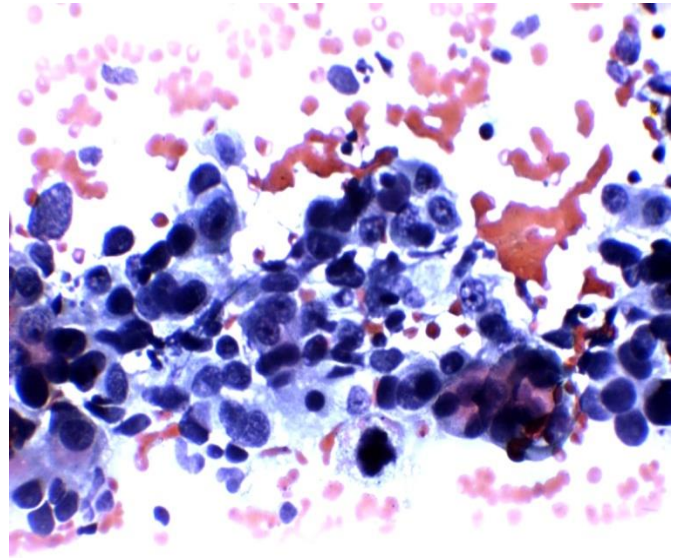
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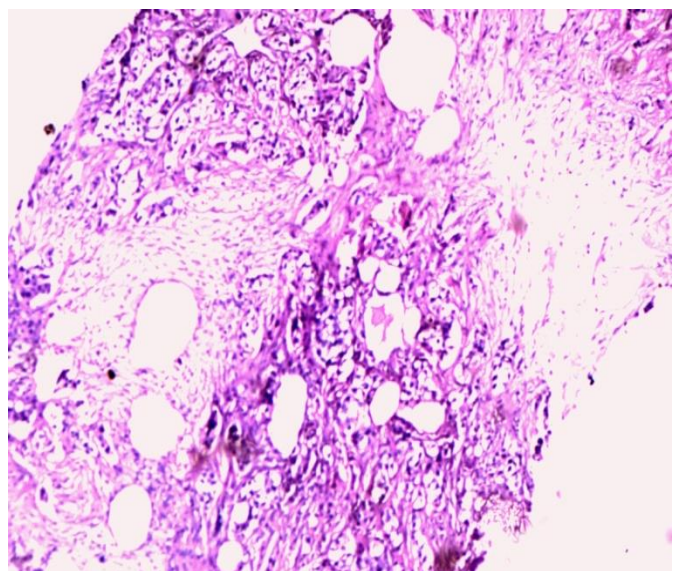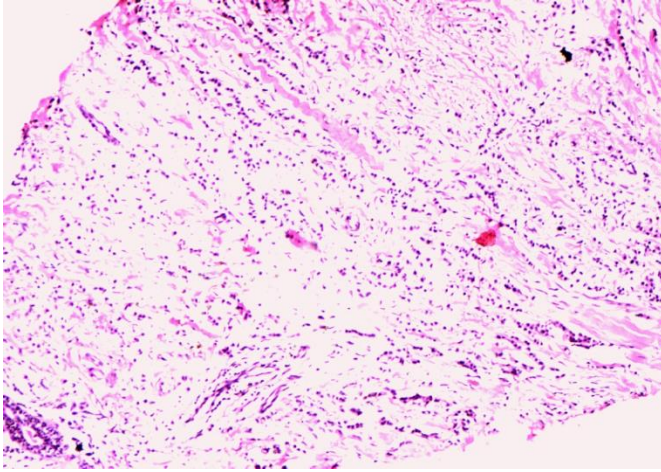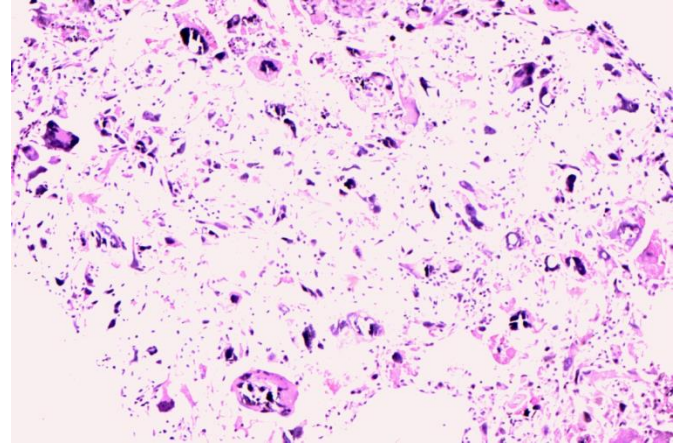**Photomicrograph 2. PAP stained smear of Epithelial Malignancy on FNA 10x**
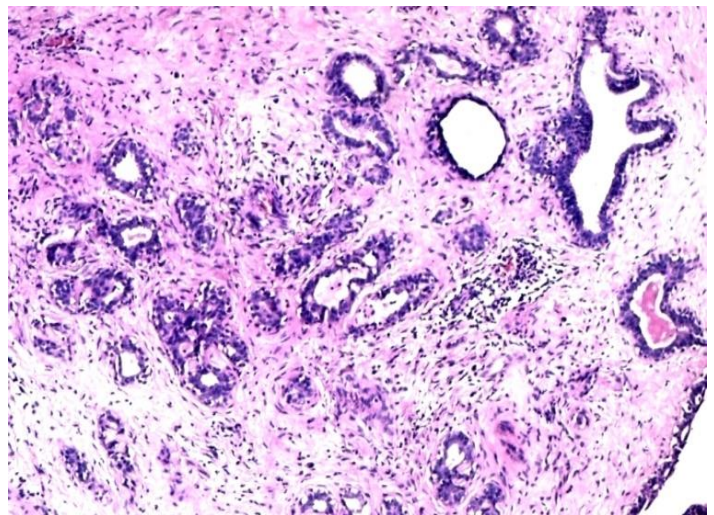
Photomicrograph 3. Paraffin section of Fibroadenoma of Breast on CNB (H&E, 10x)
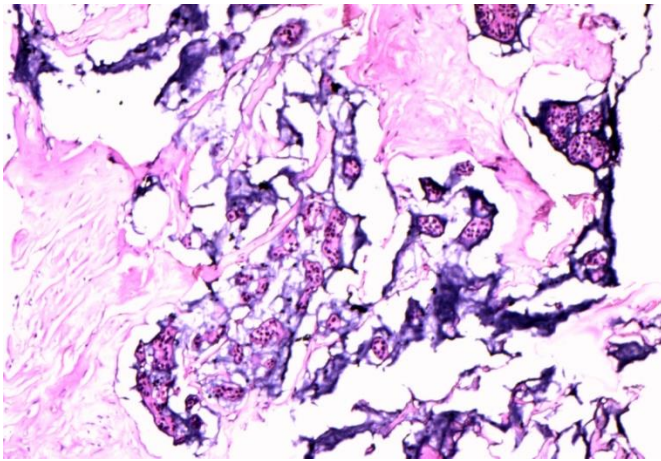

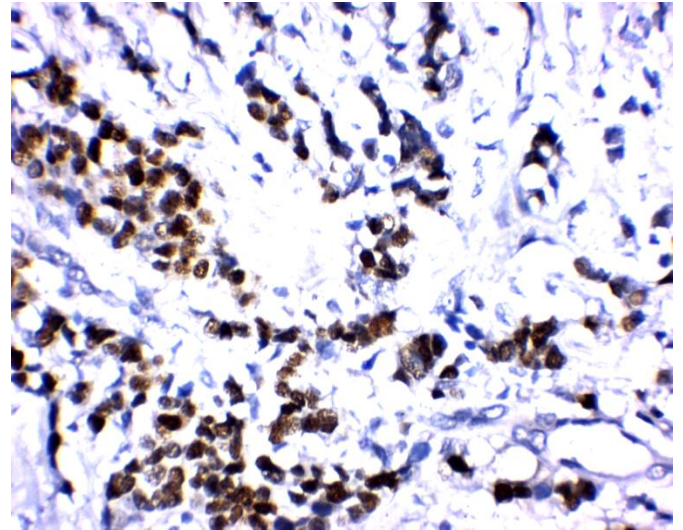**Photomicrograph 4. Paraffin section of Invasive Ductal Carcinoma (NOS) of Breast on CNB (H&E, 10x)**

Photomicrograph 1. PAP stained smear of Fibroadenoma breast on FNA 10x

Photomicrograph 5. Paraffin section of Invasive Lobular Carcinoma of Breast on CNB (H&E, 10x)

Photomicrograph 6. Paraffin section of Mucinous Carcinoma of Breast on CNB (H&E, 40x).

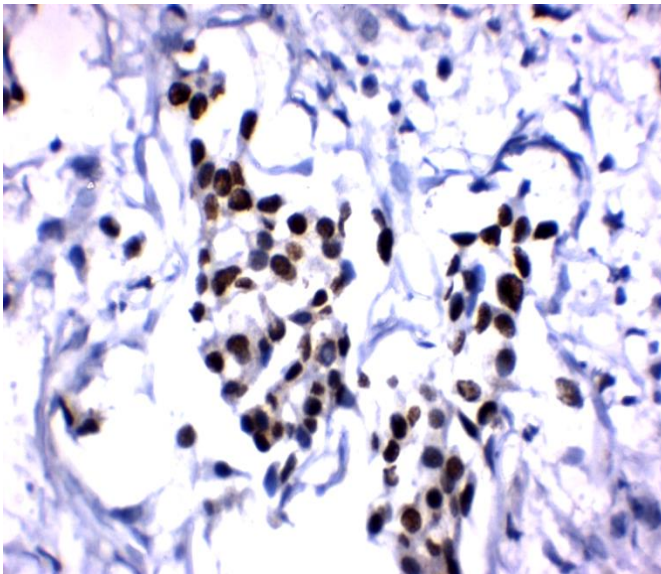**Photomicrograph 7. Paraffin section of Metaplastic Carcinoma of Breast on CNB(H & E,40x)**

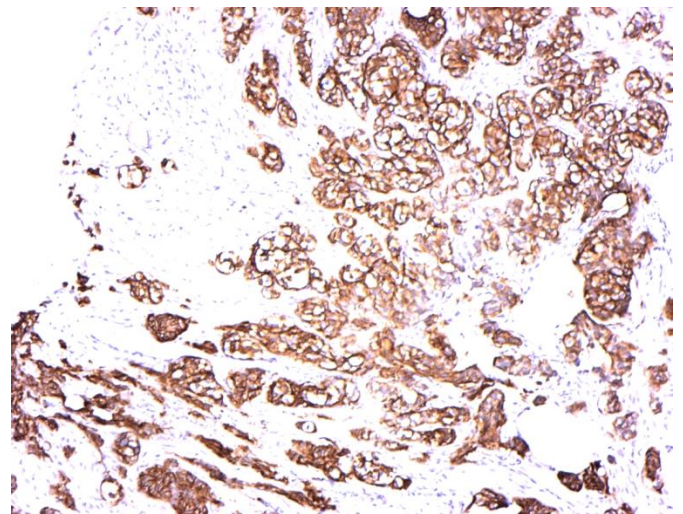**Photomicrograph 8. ER positive breast tumour showing nuclear staining on CNB (DAB chromogen, 40x).**

Photomicrograph 9. PR positive breast tumour showing nuclear staining on CNB (DAB chromogen, 40x)

Photomicrograph 10. HER2/neu positive breast tumours on CNB score 3+ (DAB chromogen, 40x).