Dr. Ruhisalma Naagar
Assistant Professor,
Department of Pathology,
Basaveshwara Medical College
& Hospital, Chitradurga,
Karnataka, India

Dr. Sunil Kumar Y
Additional Professor,
Department of Pathology, K S
Hegde Medical Academy,
Mangalore, Karnataka, India

Dr. Sajitha K
Assistant Professor,
Department of Pathology, K S
Hegde Medical Academy,
Mangalore, Karnataka, India

Dr. Kishan Prasad HL
Additional Professor,
Department of Pathology, K S
Hegde Medical Academy,
Mangalore, Karnataka, India

Dr. Jayaprakash Shetty K
Professor and Head,
Department of Pathology, K S
Hegde Medical Academy,
Mangalore, Karnataka, India

Diagnostic accuracy of core needle biopsy of breast lesions

Dr. Ruhisalma Naagar, Dr. Sunil Kumar Y, Dr. Sajitha K, Dr. Kishan Prasad HL and Dr. Jayaprakash Shetty K

Abstract
Breast cancer is the most common cancer in women both in the developed and developing world. In India, the age adjusted incidence of breast cancer in urban areas ranges between 20-30 per 1,00,000 population. Core needle biopsy (CNB) has been the first approach in cases of large lesions clearly malignant at mammogram. Therefore, CNB enables more definitive diagnosis than FNAC to differentiate benign and malignant tumors. A sample size of 60 cases are included in this study. The specimens sent to the department of pathology will be processed by routine histopathological techniques. Data is entered in SPSS and analyzed. Chi-square test is used to find sensitivity, specificity, NPV and PPV of core needle biopsy. Among benign lesions, mastitis comprising of 5 cases (11.5%). Among malignant cases IDC –NST was most common type comprising of 27 cases, 8 cases were inconclusive. Out of 60 cases 50 cases underwent mastectomy/lumpectomy, 7 were benign and 43 were malignant. All 50 cases were correlating with core needle biopsy diagnosis. 8 cases which were inconclusive in CNB underwent mastectomy/lumpectomy as BIRADS/FNAC were showing carcinoma features. The sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) are 86.6%, 100%, 86.6% and 100% respectively.

Keywords: Diagnostic Accuracy, Core Needle Biopsy, Breast Lesions

Introduction
Breast cancer is the commonest malignancy in women both in developed and developing world. About 1.7 million cases were reported in 2012 and 50% of deaths occur in developing countries. In India, the age adjusted incidence of breast cancer in urban areas ranges between 20-30 per 1,00,000 population [1]. The risk factors include estrogen exposure (75%), radiation (20-30%), first degree relatives with breast cancer (15-20%), germline mutations (5-10%), smoking and obesity. Parker *et al*., first reported the use of sonographically guided core needle biopsy with a 14-gauge automated core needle biopsy (CNB) for the breast. When compared to FNAC, core needle biopsy has the advantage that a larger tissue is obtained with preservation of the architecture making assessment easier [2]. CNB has been the first diagnostic approach in larger lesions which are clearly malignant at mammogram where the future treatment will be neoadjuvant therapy. Therefore, CNB enables more definitive diagnosis than FNAC to differentiate benign and malignant tumors [3]. According to world literature, the sensitivity, specificity and diagnostic accuracy of core needle biopsy of breast lesions is 96.1%, 96% and 95.4% respectively. Hence, we are conducting this study to determine the histomorphological features and to know the diagnostic accuracy of core needle biopsy in breast lesions

Methodology
Source of data- All the patients presenting with breast lesions to hospital.
Sample size- A two year time bound study with a minimum of 50 cases.
Inclusion criteria-
• All palpable breast lesions.
• All mammogram detected non-palpable breast lesions.

Exclusion criteria-
• Patient not willing to give consent

Corresponding Author:
Dr. Ruhisalma Naagar
Assistant Professor,
Department of Pathology,
Basaveshwara Medical College
& Hospital, Chitradurga,
Karnataka, India

- Palpable breast masses in males.
- All trucut biopsy cases in which excision/lumpectomy/mastectomy is not done.

Method of collection of data: All patients undergoing core needle biopsy of breast were selected for the study. An informed consent will be taken for the procedure. Under local anesthesia using 14 G needle, ultrasound guided core needle biopsy will be performed by radiologist. The biopsy specimen will be sent to histopathology department in 10% formalin. The tissue will be processed, stained with haematoxylin and eosin and examined microscopically. Special stains will be done whenever required. Microscopic diagnosis in the core biopsy will be correlated with the diagnosis offered in excision/lumpectomy/mastectomy. IHC (ER, PR and HER2-NEU) will be done whenever required. Sensitivity, specificity and diagnostic accuracy will be calculated.

Results

Table 1: Distribution of all lesions on CNB

CNB DX	Frequency	Distribution
MALIGNANT	36	69%
BENIGN	16	31%
TOTAL	52	100%

Table 2: Distribution of benign lesions on CNB

Benign Lesions	Frequency	Distribution
Acute Mastitis With Udh	1	6.25
Borderline Phyllodes Tumor	1	6.25
Complex Sclerosing Lesion	1	6.25
Ductal Papilloma	2	12.5
Fibrocystic Disease	4	25
Mastitis	2	12.5
Sclerosing Adenosis	2	12.5
Granulomtous Mastitis	2	12.5
Fibroadenomatoid Hyperplasia	1	6.25
Total	16	100

In the present study most common benign lesion observed was mastitis comprising of 5 (30.7%) cases followed by 4 cases of fibrocystic disease, 2 cases of ductal papilloma,1 case of complex sclerosing adenosis, 1 case of borderline phyllodes tumor and 1 case fibroadenomatoid hyperplasia

Table 3: Distribution of malignant lesions on CNB

Malignant Lesions	Frequency	Distribution
IDC-NST	23	63.88
ILC	8	22.22
CA With Medullary Carcinoma	2	5.56
Mucinous Carcinoma	1	2.78
ILC-Pleomorphic Variant	1	2.78
Invasive Carcinoma(NOS)	1	2.78
Total	36	100

In the present study most common malignant lesion diagnosed was IDC-NST comprising 23 cases (63.88%) followed by ILC comprising 8 cases (22.22%), 1 case of mucinous carcinoma (2.78%), 1 case of ILC-Pleomorphic variant (2.78%), 2 of carcinoma with medullary carcinoma (5.56 %) and 1 case of invasive carcinoma – NOS type

(2.78%) were detected on CNB.

Table 4: Distribution of all lesions on mastectomy/lumpectomy

Mastectomy/Lumpectomy	Frequency	Distribution
Benign	07	14%
Malignant	43	86%
Total	50	100%

In the present study total 50 cases underwent surgical excision out of which 43 where malignant and 7 were benign. 8 cases which were inconclusive underwent mastectomy/lumpectomy as mammography and cytological findings were positive for malignancy. All 8 cases showed malignancy on mastectomy/lumpectomy.

Table 5: Distribution of benign lesions on mastectomy/lumpectomy

Benign lesions	Frequency	Distribution
Fibrodenoma	1	14
Borederline phyllodes tumor	1	14
Granulomatous mastitis	2	29
Mastitis	1	14
Intraductal papilloma with ADH	2	29
Total	7	100

In present study common benign lesion diagnosed on mastectomy/lumpectomy was intraductal papilloma and granulomatous mastitis comprising 2 cases each (29%).
1 case of borderline phyllodes tumor (14%), 1 case of mastitis (14%) and 1 case of fibroadenoma (14%) were also diagnosed.

Table 6: Distribution of malignant lesions on mastectomy/lumpectomy

Malignant Lesions	Frequency	Distribution
IDC-NST	27	63%
ILC	11	26%
IDC With Medullary Features	01	3%
ILC Pleomorphic Variant	01	2%
Invasive Carcinoma-NOS	01	2%
Atypical Medullary CA	01	2%
Invasive Papillary CA	01	2%
Total	43	100%

Out of 50 cases who underwent mastectomy/lumpectomy, 43 cases were malignant common lesion was IDC-NST comprising of 27 cases (63%).
11 cases of ILC were diagnosed (26%), 1 case of ILC-pleomorphic variant (3%), 1 (3%) case of IDC with meduallry carcinoma,1(2%) case of invasive carcinoma (NOS), 1(2%) case of atypical medullary carcinoma and 1 case of invasive papillary carcinoma (2%)
In 24 cases axillary L.N status was known,19 out of 24 had lymphnode metastasis and 5 cases were free of tumor mets on mastectomy specimen.

Table 7: Distribution of axillary lymphnodes

Axillary L.N	Frequency	Distribution
Present	24	40%
Absent	36	60%
Total	60	100%

Table 8: Comparison of CNB with mastectomy specimens

CNB DX	No. of Cases	Mastectomy/Lumpectomy	No. of Cases
Sclerosing adenosis	2	-	
Mastitis	2	-	
Granulomatous mastitis	2	Granulomatous mastitis	2
Borderline phyllodes tumor	1	Borderline phyllodes tumor	1
Complex sclerosing lesion	1	Intraductal papilloma with ADH	1
Ductal papilloma	2	Intraductal papilloma with ADH	1
Acute mastitis with UDH	1	Mastitis	1
Fibrocystic disease	4		
Fibrodenomatoid hyperplasia	1	Fibroadenoma	1
IDC-NST	23	IDC-NST	28
ILC	08	ILC	08
CA with medullary features	02	Atypical medullary ca	01
MUCINOUS CA	01	-	-
ILC-pleomorphic variant	01	ILC-Pleomorphic variant	1
Invasive ca(NOS)	01	Invasive ca-NOS	1
INCONCLUSIVE	08	3ILC,5IDC	3
TOTAL	60		50

In the present study, total 60 biopsy cases were included out of which 16 were benign and 36 were malignant, 8 were inconclusive. Out of 60cases 50 underwent mastectomy/lumpectomy, 7 are benign lesions and 43 are malignant lesions. Out of 8 inconclusive cases all showed malignancy on mastectomy/lumpectomy. No major discrepancies noted on comparison.

Table 9: Overall accuracy of CNB

Sensitivity	86.6%
Specificity	100%
PPV	86.6%
NPV	100%

Sensitivity, specificity, PPV and NPV was calculated using chi square test and is 86.6%, 100%, 86.6% and 100% respectively.

Discussion

Table 10: Comparison of spectrum of benign lesion

Benign lesions	R.M. Pijnappel et al. (1997) [5]	Youk et al. (2008) [6]	S. Bianchi et al. (2015) [7]	Kothari et al. (2016) [8]	Present study
Fibroadenoma	2	266	2(4.6%)	1(2.3%)	2
Mastitis	-	-	-	3(6%)	5
Phyllodes tumor	-	45	-	2(4.6%)	1
Sclerosing adenosis	-	-	-	--	3
FCD	3(4.6%)	244	3(6%)	-	3
Ductal papilloma	-	-	-	-	2

In study conducted by R.M. Pijnappel *et al*. 5 cases were benign out of 5, 2 were fibroadenoma and 3 were diagnosed as fibrocystic disease.

In study conducted by Youk *et al*. most common benign lesion was fibroadenoma followed by fibrocystic disease.

S. Bianchi *et al*. (2015) study showed 2 and 3 cases of fibroadenoma and fibrocystic disease respectively.

Kothari *et al*. (2016) study shows 6 benign cases out of 6, 3 were diagnosed as mastitis, 2 as benign phyllodes tumor and 1 as fibroadenoma.

In present study out of 60 CNB 16 diagnosed as benign with 5 cases diagnosed as mastitis, out of 5 two cases diagnosed as granulomatous mastitis.

8 cases in CNB were inconclusive most probably due to sampling error. Hence, all CNB has to be mammogram guided done by an experienced radiologist to improve the efficacy of diagnosis.

Table 11: Comparison of spectrum of malignant lesions

Malignant Lesions	R.M. Pijnappel et al. (1997) [5]	Youk et al. (2008) [6]	Kothari et al. (2016) [8]	Present study
IDC-NST	24	1013	27	20
ILC	4	26	-	9
IDC-With DCIS High Grade	3	126	-	3
Medullary CA	-	5	-	2
Mucinous CA	-	33	1	1
Invasive carcinoma(NOS)	-	-	-	01

In a study conducted by R.M. pijnappel *et al*. Youk *et al*., Zohu *et al*., Alikhassi *et al*. and Kanchan Snehal Kothari *et al*. most common malignant lesion was IDC- NST which is correlating with the present study.

In the present study, 3 cases were diagnosed as IDC with DCIS HIGH GRADE which is correlating with study conducted by R.M.Pijnappel *et al*. (1997).

2 cases are diagnosed as medullary ca in our present which is almost correlating with study conducted by Youk *et al*. & Zhou *et al*.

1 case of mucinous carcinoma is diagnosed in present study and is correlating with study conducted by Kothari *et al*. (2016).

In present study most common malignant lesion was IDC-NST which is comparable with most of the studies.

In study conducted by krishenbaum *et al*., Abhijit Saha *et al*., Alikhassi *et al*., Kothari *et al*. specificity and PPV are in the range of 90-100 % and 80-100% respectively. Which is correlating with the present study.

In study conducted by Krishenbaum *et al*., Abhijit Saha *et al*., Alikhassi *et al*. and Kothari *et al*. Shows sensitivity and NPV in the range of 86-98% and 53-99% respectively.

In present study sensitivity, specificity, PPV and NPV are correlating with the above study.

Conclusion

In the present study, most of the cases diagnosed on core needle biopsy were correlating with mastectomy/lumpectomy specimen.

Core needle biopsy is a safe, easy, accurate and specific test in diagnosing both benign and malignant breast lesions preoperatively thus reducing the risk of surgery.

Variety of lesions like fibroadenoma, fibrocystic disease, sclerosing adenosis, ductal papilloma, mastitis, IDC, mucinous carcinoma, ILC and medullary carcinomas can be diagnosed on core needle biopsy. The Sensitivity, Specificity, PPV and NPV of present study is 86.6%, 100%, 86.6% and 100% respectively.

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