

Correlation of fine needle aspiration cytology and histopathological examination in palpable breast lumps

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Abstract

A palpable breast lump is defined as a dominant mass if it is 3-dimensional, distinct from surrounding tissues and asymmetrical relative to the other Breast. A method of definitive diagnosis of patients who present with palpable breast lump at the outpatient department is needed. It must be accurate, easy to perform affordable and acceptable to the patient. This study was conducted to correlation of the diagnostic accuracy of Fine Needle Aspiration Cytology (FNAC) in differentiating the benign and malignant lesions of palpable breast lump with histopathological correlation.

A Prospective descriptive study done in 50 patients presenting with palpable lump in the Breast to Surgery department, history taken, clinically examined and sent to Central Diagnostic Lab, cytopathology section for FNAC. Patient underwent Surgical procedure after correlating with clinical examination and radiological investigations. Post-operative specimen sent for Histopathological examination. Cytological diagnosis was compared with Histopathology. Specificity, sensitivity, accuracy, and predictive values were calculated using standard formulas. Diagnostic accuracy of FNAC was 94% and overall sensitivity of FNAC in diagnosing the palpable breast lump was 94%, specificity was 100%, positive predictive of 100% and negative predictive value of 93%. Study concludes that the diagnostic efficacy, sensitivity and specificity of FNAC were comparable to Histopathological examination. Hence FNAC becomes a very important diagnostic tool in palpable breast lumps as it shows a high degree of correlation with the final histopathology report.

Keywords: FNAC, breast lumps, HPE, correlation, benign lesion, malignant lesion, MRM

1. Introduction

Carcinoma of the Breast is the most common malignancy in women worldwide representing nearly a quarter (25%) of all cancers ^[1] and is the leading cause of death from cancer in women ^[2]. A woman who lives to age 90 years has a one in eight chance of developing Breast cancer. The preoperative evaluation of breast lumps is an essential part of the management of Breast lesions ^[2].

Although an accurate history and clinical examination are important methods of detecting breast disease, there are a number of investigations that can assist in the diagnosis. Fine needle aspiration cytology (FNAC) is increasingly being used for preoperative diagnosis of breast cancer in order to determine various prognostic parameters so that the best therapy can be offered to the patients ^[3]. FNAC provides a rapid and accurate diagnosis and also has therapeutic value in cystic conditions ^[3]. It has been shown that FNAC may provide added

information such as nuclear grading, mitotic index and DNA contents the intrinsic features of tumor and hence be helpful in prognostication of the tumor^[4]. Cytologic grading has shown a positive correlation with the histological grade and hence cytologic grade is important in predicting the histopathologic grade preoperatively. Fine needle aspiration cytology (FNAC) of breast lump is an accepted and established method to determine the nature of the lump and it may play an important role when it is difficult to determine the nature of breast lump by clinical examination. It has been shown that, FNAC can reduce the number of open breast biopsies^[5]. This study was undertaken to see how well a preliminary FNAC in a breast lump correlated with the final histopathology report to which every excised specimen would invariably be subjected.

Fibroadenoma is the most common benign breast mass and invasive ductal carcinoma is the most common malignancy. The incidence of the breast lump has shown a steep rise in women younger than 40 years of age.

Triple test includes clinical assessment, mammography or ultra-sonography and fine needle aspiration (FNA)^[6, 7]. The highest levels of diagnostic accuracy in the non-operative diagnosis of breast disease are achieved by using a triple approach^[8], which combines the results of imaging and clinical examination with fine needle aspiration cytology (FNAC) and/or core biopsy. When the results of all three modalities agree, the level of diagnostic accuracy exceeds 99%^[9]. It is of interest to note that similar levels of accuracy have been obtained in the case of impalpable lesions, in which clinical examination is non-contributory^[10].

FNAC Technique

“Fine needle aspiration cytology is defined as the study of cells obtained by a fine needle under vacuum. The specimen consists of a minute quantity of tissue or fluid” The lesion is surrounded by normal tissue zone. It may be a palpable superficial mass or a deep mass only visible by radiological tools. Any accessible area of the body is a suitable target for aspiration biopsy cytology^[5].

Cyto-histological correlation

The clinical laboratory improvement amendments of 1988 mandated that, laboratories perform cyto-histological correlation as an effort to improve the quality of an atomic pathology. But the optimal methods and the value of performing the correlation have not been determined.

Correlation is a useful method for detection of errors, errors attributable either to sampling or to interpretation. Correlation allows to determine if the grades assigned on cytological aspirates correspond well with the histological grades. This information is of clinical use and of prognostic value since it enables assessment of biological aggressiveness of the cancer without removing it^[11].

Thus, by resorting to the system which closely reflects the histological grade, biological behavior of the tumor is assessed and systemic adjuvant treatment is instituted before surgery, in conventional regimens^[12].

2. Methods

A prospective descriptive study was carried out over period of 18 months from August 2019 to February 2021. Patients presenting with palpable lump in the breast undergoing FNAC followed by excision biopsy, lumpectomy or Mastectomy were included, detailed history was taken, thorough physical examination carried out and entered in the proforma. The patient was informed about the procedure and informed consent was obtained from the patient before subjecting to FNAC of the breast lump.

Patients with

1. Acute surgical conditions like mastitis/abscess.
 2. Recurrent breast lump in the previously operated.
 3. Patients unwilling to give consent to participate in the study.
 4. Age less than 12 years.
- Were excluded from the study.

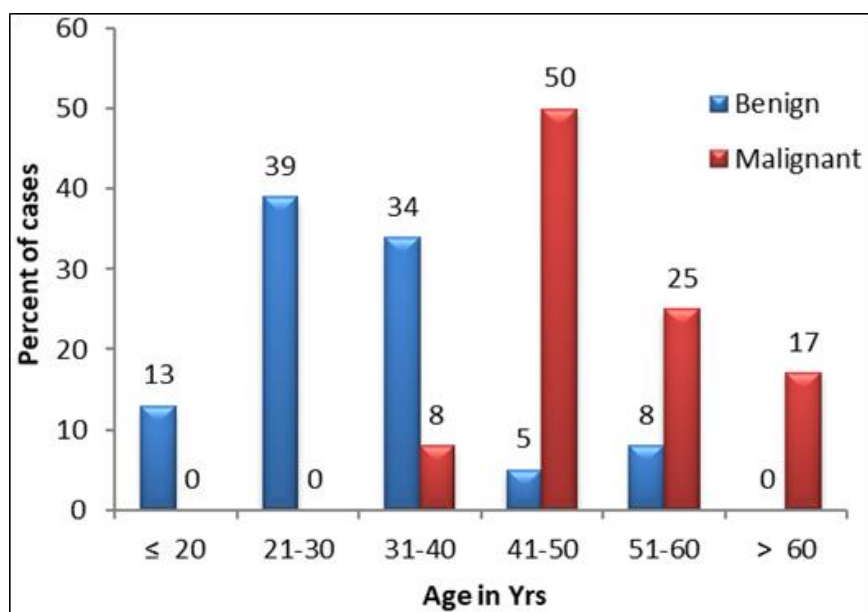
Fine Needle Aspiration Cytology (FNAC)

The standard procedure was followed, making use of a 10ml syringe bearing a 23- gauge needle (external diameter of 0.6mm). The mass was located clinically and fixed in position with free hand. The skin over the puncture site was sterilized with spirit. The needle was placed over the skin and its direction was determined before it was introduced in the mass in one swift motion. This minimized the discomfort to the patient.

Once the tumour was engaged (as indicated by the resistance to the needle), the needle was moved back and forth in the mass with short strokes. The syringe was observed for appearance of any material. When this appeared, the syringe was slowly removed. The needle was temporarily removed from the apparatus, the syringe was filled with air by pulling back the plunger. The needle was reattached. The specimen was expressed on to a glass slide or more depending on the quantity of sample collected. It was then immersed in a fixative 95% methyl alcohol. The slides were stained with H&E or Leishman stain. The interpretation of the slide was made by cytopathologist.

3. Results

In this study of 50 patients, the age incidence of benign lesions ranged from 17 to 60 years and most common age group is 21-30 years (39%). The incidence for the malignant lesions ranged from 30-65 years and most common age group 41-50 years (50%).



Graph 1: Age wise distribution of benign and malignant lesions

Of the 50 patients with palpable breast lump, FNAC of 38 patients (76%) were diagnosed as benign and 12 patients (24%) were diagnosed as malignant disease.

Table 1: Distribution of patients based on FNAC findings

Benign/Malignant	No of cases	Percent
Benign	38	76.0%
Malignant	12	24.0%
Total	50	100.0%

Of the 50 patients 38 patients were diagnosed as benign lesion and in benign diseases Fibroadenoma was the most common (21 patients) 42% and Fibrocystic disease was the second most common. 12 patients were diagnosed malignant disease which were Infiltrating Ductal Carcinoma.

Table 2: Diagnosis of breast lump by FNAC

Diagnosis by FNAC	No of cases	Percent
Fibroadenoma	21	42.0
Fibrocystic Disease	4	8.0
Benign Cystic Lesion	2	4.0
Benign Cytological Pattern	2	4.0
Atypical Ductal Hyperplasia	6	12.0
Ductal Hyperplasia Without Atypia	2	4.0
Phyllodes Tumour	1	2.0
IDC-I	4	8.0
IDC-II	6	12.0
IDC-III	2	4.0
Total	50	100.0

Of the 50 patients, on Histopathological examination the most common benign lesion was Fibroadenoma 46% (23 cases) and second most common benign disease was fibrocystic disease 12% (6 cases). Most common malignant lesion was infiltrating ductal carcinoma Not otherwise specified 26% (13 cases).

Table 3: Diagnosis by Histopathology

Diagnosis by Histopathology	No of cases	Percent
Fibroadenoma	23	46.0
Fibrocystic Disease	6	12.0
ADH	7	14.0
Borderline Phyllodes	1	2.0
IDC-WD	3	6.0
IDC-MD	6	12.0
IDC-PD	4	8.0
Total	50	100.0

4. Discussion

This study was done to correlate the cytological findings with Histopathological examination in palpable breast lumps and assess the diagnostic accuracy of FNAC in differentiating the benign and malignant breast lump. Histopathological diagnosis is considered to be the Gold Standard.

Our study was conducted on 50 female patients with palpable breast lump. Each of them underwent Fine Needle Aspiration Cytology of the lump followed by surgery either in the form of an excision or a definitive surgical procedure like a Modified Radical Mastectomy, depending on the diagnosis at aspiration cytology combined with Radiological and Clinical

examination findings. In patients with inconclusive diagnosis on FNAC, patient was advised incisional or true cut biopsy for confirmation. The aspiration cytology findings were then matched with the final Histopathology report to see how accurate FNAC was as compared to open biopsy.

In our study, the cases of breast lump ranged from 17 years to 65 years with an average of 36.4 years. The age at incidence for the benign lumps ranged from 17 years to 60 years. The incidence for the malignant lesions ranged from 30 to 65 years. The most common age group for benign lesions was between 21 to 30 years and that of malignant lesion was 41 to 50 years. In the study done by A. Khemka *et al.*^[12], the age range was 14 to 61 years with overall mean age was 37.5 years, peak incidence for benign lesion in 2nd and 3rd decade of life and malignant lesions above the age of 40 years and peak incidence in between 40-44 years. Studies done by Aziz M *et al.*^[13], Tiwari *et al.*^[14] and Alam *et al.*^[15] showed similar age distribution.

Table 4: Correlation of FNAC and HPE in Benign lesions

Study	Total no. of patients	Number of benign lesions		% of correlation
		FNAC	HPE	
A. Khemka <i>et al.</i> ^[12]	50	39	37	94%
Tiwari <i>et al.</i> ^[14]	91	85	84	98%
Aziz M. <i>et al.</i> ^[13]	89	60	55	91%
Alam <i>et al.</i> ^[15]	76	47	43	91%
Our study	50	38	37	97%

From the above table, it is evident that our study has a correlation of 97% between FNAC and HPE for benign lesions in similar to other studies such as A. Khemka *et al.*^[105] with 94%, Tiwari *et al.*^[106] with 98%, Aziz M. *et al.*^[110] with 91% and Alam *et al.*^[107] with 91% respectively.

Table 5: Correlation of FNAC and HPE for malignant lesions

Study	Total no. of patients	Number of malignant lesions		% of correlation
		FNAC	HPE	
A. Khemka <i>et al.</i> ^[12]	50	11	13	84%
Tiwari <i>et al.</i> ^[14]	91	6	7	85%
Aziz M. <i>et al.</i> ^[13]	89	29	34	85%
Alam <i>et al.</i> ^[15]	76	29	33	87%
Our study	50	12	13	92%

From the above table, we can see that our study has a correlation of 92% between FNAC and HPE for malignant lesions, slightly better than other studies such as A. Khemka *et al.*^[12] with 84%, Tiwari *et al.*^[14] with 85%, Aziz M. *et al.*^[13] with 85% and Alam *et al.*^[15] with 87% respectively.

In our study Fibroadenoma was most common lesion picked up on FNAC, (42% patients), which was comparable to the study done by Tiwari *et al.*^[14] and A. Khemka *et al.*^[12]. Ashwin *et al.*^[5] in their studies found Fibroadenoma cases to be 30% which was in contrast to our study and the second most common lesion being Fibrocystic disease which was similar to our study. This can be because of the number of cases, population considered, and other confounding factors.

Table 6: Comparison of Most common benign diagnosis on FNAC

Study	Total no. of patients	Number of Fibroadenoma cases	% of cases
Ashwin Hebbar <i>et al.</i> ^[5]	100	30	30%
Tiwari <i>et al.</i> ^[14]	91	36	39.6%
A. Khemka <i>et al.</i> ^[12]	50	29	58%
Our study	50	21	42%

Table 7: Comparison of FNAC and HPE correlation in malignant cases

Study	Total no. of patients	Number of malignant lesions		No. of false negative
		FNAC	HPE	
A. Khemka <i>et al.</i> ^[12]	50	11	13	2
Hussain M.T <i>et al.</i> ^[16]	50	20	22	2
Aziz M. <i>et al.</i> ^[13]	89	29	34	5
Ashwin Hebbar <i>et al.</i> ^[5]	100	54	58	4
Our study	50	12	13	1

In our study false positive cases on FNAC was zero and false negative cases was 1, which was Atypical Ductal Hyperplasia on FNAC turned out to be Infiltrating Ductal Carcinoma well differentiated on Histopathology. On FNAC 4 cases were misclassified under benign category itself. 2 Cases which were diagnosed as benign cytological pattern on FNAC turned out to be Fibroadenoma on Histopathological examination. 2 cases which were diagnosed as Benign cystic disease on FNAC was diagnosed as Fibrocystic disease on HPE.

In A. Khemka *et al.* ^[12], 2 cases did not match with Histopathological examination, one was Atypical Ductal Hyperplasia which turned out to be Ductal carcinoma, which was similar to our study. Another case was Benign proliferative disease turned out to be Ductal carcinoma.

Study by Hussain M.T *et al.* ^[16], 20 patients (50 patients) were diagnosed as Malignant lesion on Fine Needle Aspiration Cytology and on Histopathological examination 22 malignant cases diagnosed, so 2 cases were missed on FNAC.

From Ashwin Hebbar *et al.* ^[5], 4 cases were diagnosed as false negative. 2 cases of Benign proliferative disease on FNAC turned out to be Infiltrating Ductal Carcinoma.

Study by Aziz M *et al.* ^[13], Out of 89 patients, 29 patients were diagnosed as malignant and where as 34 patients were malignant on Histopathological examination. In his study 5 cases were misinterpreted as benign on FNAC.

This could be due to inadequate sampling, missing the lesional site, cystic lesions being aspirated etc.

The conditions which have a risk of false positive results are papillary lesions. Atypical epithelial hyperplasia, regenerating epithelial atypia and atypia of ductal epithelium in a cyst, false negative results exists in low grade malignancy, small or complex proliferative lesions as in tumors with central necrosis or small cell carcinoma.

Table 8: Comparison of False negative and false positive cases

Study	False negative (%)	False positive (%)
Reshma Ariga <i>et al.</i> ^[17]	9%	<1%
Hussain M.T <i>et al.</i> ^[16]	9.1%	0
Aziz M <i>et al.</i> ^[13]	14.1%	0
Ours study	1%	0

Our study is comparable to the majority of the studies previously conducted. On FNAC ADH and well differentiated IDC can at times be very confusing. This could have been overcome by repeat aspirate.

Table 9: Validity tests by various studies

Name of the study	Sensitivity	Specificity	Positive Predictive value	Negative Predictive value
Hussain MT ^[16]	90.9%	100%	—	—
Aziz M <i>et al.</i> ^[13]	85.29%	100%	100%	98.79%
Reshma Ariga <i>et al.</i> ^[17]	98%	99%	99%	86%
Homesh <i>et al.</i> ^[18]	66.6%	81%	100%	90%
A. Khemka <i>et al.</i> ^[12]	96%	100%	100%	95.12%

Tiwari <i>et al.</i> ^[14]	83%	100%	—	—
Nggada HA <i>et al.</i>	95.7%	98.7%	—	—
Our study	94%	100%	100%	93%

In our prospective study of Correlation between Fine Needle Aspiration Cytology and Histopathology, the diagnostic accuracy of FNAC was 94% and the sensitivity of 94%, specificity was 100%, positive predictive of 100% and negative predictive value of 93%.

Our study showed values similar to several other studies.

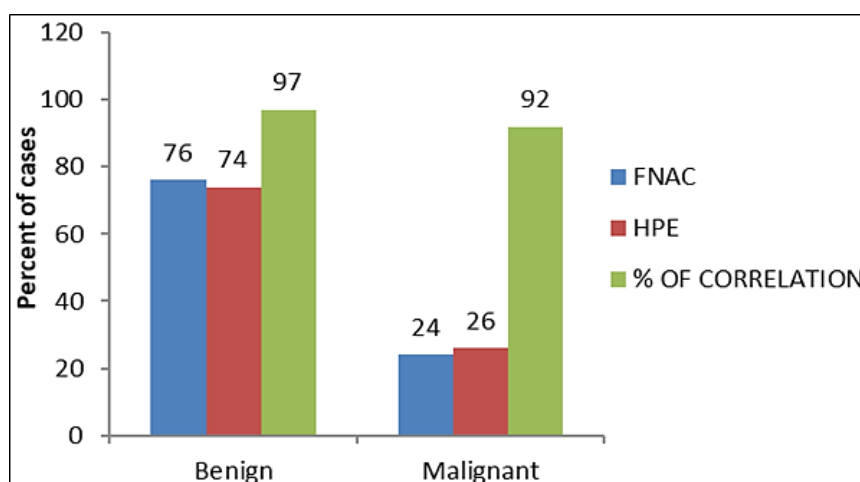
According to study done by Hussain M T *et al.* ^[16], Reshma Ariga *et al.* ^[17], A Khemka *et al.* ^[12] and Naggada *et al.* shows similar sensitivity, specificity, positive predictive value and Negative predictive value, with respect to our study.

This study documented the fact that the benign lesions of breast are the most common lesions. Increase in the incidence of benign lesion is probably due to increased awareness among the patients, early detection and ease of availability of minimally-invasive/non-invasive modalities of diagnosis in the present era. In such lesions there assurance is the main line of treatment though close follow up is mandatory.

The use of Fine Needle Aspiration Cytology as the main and direct indicator for Mastectomy (without the core needle biopsy) remains controversial. The major concern is the danger of a false positive diagnosis, leading to unwanted Mastectomy. Since the false positive diagnosis is very rare (in our study it was zero), in the centres where the Surgical staff is accustomed to performing Mastectomy on the basis of Fine Needle Aspiration Cytology for diagnosis of malignant breast lump, there is necessity for a higher level of confidence and rapport with Cyto-pathologist.

5. Conclusion

In conclusion detailed history, proper clinical examination along with FNAC can be considered as the first line of management in cases of breast lump. Correlation between FNAC and Histopathological examination for benign breast lump was 97% and for malignant lump was 92%. 2 Cases diagnosed as benign cytological pattern on FNAC turned out to be Fibroadenoma on Histopathological examination. This is possibly due to inadequate sampling. 2 cases of Benign cystic disease on FNAC was confirmed as Fibrocystic disease. These cases were missed because of scanty cellularity and possibly as only the cystic area was sampled. One case of Atypical Ductal Hyperplasia on FNAC turned out to be Infiltrating Ductal Carcinoma well differentiated the diagnostic accuracy of fine needle aspiration cytology was 94%. Overall specificity of Fine needle aspiration cytology in diagnosing palpable breast lumps in this study was 100%, sensitivity was 94%, positive predictive value of 100% and Negative predictive value was 93%. False negative rate in our study was 1%.



Graph 2: Correlation of FNAC and Histopathological examination

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