Journal of Cardiovascular Disease Research

ISSN: 0975-3583,0976-2833 VOL14, ISSUE 03, 2023

Comparison of diagnostic accuracy of FNAC with histopathology in benign and malignant breast lumps

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Received Date: 13/01/2023 Acceptance Date: 24/03/2023

Abstract

Background: For an accurate diagnosis of the breast lump FNAC (Fine Needle Aspiration Cytology) has gained wide popularity and acceptance as a quick, simple and reliable diagnostic procedure that can be carried as outpatient service.[5] Present study was aimed to compare diagnostic accuracy of FNAC with histopathology in benign and malignant breast lumps. **Material and Methods:** Present study was comparative, observational study, conducted in female patients having unknown primary diagnosis of breast lumps and had undergone FNAC followed by excision biopsy/surgery. **Results:** In present study, 68 female patients having unknown primary diagnosis of breast lumps and had undergone FNAC followed by excision biopsy/surgery. Mean age was 49.5 ± 21.43 years & majority were from <30 years (32.35 %) & 30-39 years (19.12 %). Diagnosis by FNAC was of benign pathology in 46 cases (67.65 %) & malignant in 22 cases (32.35 %). Among benign cases majority were had fibroadenoma (42.65 %) followed by fibrocystic disease (11.76 %), benign cystic lesion (7.35 %) & benign cytological pattern (5.88 %). Among malignant cases majority were had atypical ductal hyperplasia (22.06 %) followed by intraductal carcinoma (5.88 %), ductal hyperplasia without atypia (2.94 %) & phyllodes tumour (1.47 %). When FNAC examination findings were compared with histopathological examinations findings (as standard), sensitivity was 95.45 %, specificity was 97.83 %, positive predictive value was 95.45 %, negative predictive value was 97.83 % & diagnostic accuracy was 94.5 %. **Conclusion:** Fine needle aspiration cytology is a comfortable, easy, reliable, rapid and simple diagnostic test with sensitivity, specificity, positive predictive value, negative predictive value & diagnostic accuracy of 95.45 %, 97.83 %, 95.45 %, 97.83 % & 94.5 % respectively compared to histopathology as standard.

Keywords: Fine needle aspiration cytology, histopathology as standard, breast lump, malignant lesions.

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Introduction

In clinical practice breast lump is a very common presentation of numerous breast diseases which ranges from benign cysts to malignant lesions. Evaluation of this breast lump involves the rational use of a detailed history, clinical breast examination, imaging modalities, and tissue diagnosis, i.e., TRIPPLE ASSESSMENT.[1,2] Various diagnostic modalities available for the breast lump evaluation, includes ultrasound Doppler scanning, fine needle aspiration cytology (FNAC), mammography (MMG), and recently, magnetic resonance imaging (MRI) and contrast enhanced ultrasound.[3]

ISSN: 0975-3583,0976-2833 VOL14, ISSUE 03, 2023

Early diagnosis and subsequent early treatment are the most important determinants of mortality reduction in breast cancer cases. Conventional open biopsy is considered as the gold standard for confirming the diagnosis, however, it has significant morbidity, it is costly, invasive, time consuming and exposes the patient to unnecessary anxiety and more than one surgical procedure.[4]

For an accurate diagnosis of the breast lump FNAC (Fine Needle Aspiration Cytology) has gained wide popularity and acceptance as a quick, simple and reliable diagnostic procedure that can be carried as outpatient service.[5] Present study was aimed to compare diagnostic accuracy of FNAC with histopathology in benign and malignant breast lumps

Material And Methods

Present study was comparative, observational study, conducted in Department of Pathology, at Dr. N Y T Tasagaokar Medical College &Raigad Hospital, Karjat, India. Study duration was of 1 year (January 2022 to December 2022). Study approval was obtained from institutional ethical committee.

Inclusion criteria

- All the female patients having unknown primary diagnosis of breast lumps and had undergone FNAC followed by excision biopsy/surgery.

Exclusion criteria

- Patients with infective breast pathology.
- Inconclusive smears, nondiagnostic/inconclusive reports
- Diagnosed cases of breast pathology
- Patients with suspected or proven carcinoma lesions
- Patients with Benign breast diseases operated earlier
- Pregnant and lactating mothers

Study was explained to patients in local language & written consent was taken for participation & study. Study was explained to patients in local language & written consent was taken for participation & study. Detailed history of patients was recorded that included age, marital status, parity, age of menarche, age at first pregnancy and age at menopause. Family history of breast diseases especially breast cancer, history of contraception use was recorded. Detailed examination of lump and axilla was made with especial attention to any clinical signs of malignancy. Ultrasonography or mammograms was done when required necessary.

The Patient were explained about the FNAC procedure in complete detail. The procedure was performed without any anaesthesia by a trained pathologist. The FNAC was carried out using 23 Gauge needle and 10 ml disposable syringe for aspirating the material from the breast lump. Three or four dry clean slides were used for preparing the smear. The slides were labelled with glass pencil and were air dried. The cytological smears were fixed in 95% alcohol and stained with Haematoxylin and Papanicolaous stains. The slides were seen under the microscope and graded accordingly.

The surgical specimens for histopathological examination were fixed in 10% formal saline. The grossing and the cut section findings were noted. Several sections were taken from appropriate sites for processing and paraffin embedding. The section from each block were cut in 04 micron thickness and stained with Haematoxylin and Eosin.

Data was collected and compiled using Microsoft Excel, analysed using SPSS 23.0 version. Statistical analysis was done using descriptive statistics.

Results

ISSN: 0975-3583,0976-2833 VOL14, ISSUE 03, 2023

In present study, 68 female patients having unknown primary diagnosis of breast lumps and had undergone FNAC followed by excision biopsy/surgery. Mean age was 49.5 ± 21.43 years & majority were from <30 years (32.35 %) & 30-39 years (19.12 %).

Table 1: General characteristics

	No. of patients	**Percentage**
Age groups (in years)		
<30	22	32.35
30-39	13	19.12
40-49	9	13.24
50-59	12	17.65
60-69	9	13.24
70-79	3	4.41
Mean age (mean ± SD)	49.5 ± 21.43	

Diagnosis by FNAC was of benign pathology in 46 cases (67.65 %) & malignant in 22 cases (32.35 %). Among benign cases majority were had fibroadenoma (42.65 %) followed by fibrocystic disease (11.76 %), benign cystic lesion (7.35 %) & benign cytological pattern (5.88 %). Among malignant cases majority were had atypical ductal hyperplasia (22.06 %) followed by intraductal carcinoma (5.88 %), ductal hyperplasia without atypia (2.94 %) & phyllodes tumour (1.47 %).

Table 2: Diagnosis by FNAC

Diagnosis by FNAC	**No of cases**	**Percent**
Benign		
Fibroadenoma	29	42.65
Fibrocystic Disease	8	11.76
Benign Cystic Lesion	5	7.35
Benign Cytological Pattern	4	5.88
Malignant		
Atypical Ductal Hyperplasia	15	22.06
Intraductal carcinoma	4	5.88
Ductal Hyperplasia Without Atypia	2	2.94
Phyllodes Tumour	1	1.47

In present study, diagnosis by histopathology was of benign pathology in 46 cases (67.65 %) & malignant in 22 cases (32.35 %). Among benign cases majority were had fibroadenoma (44.12 %) followed by fibrocystic disease (13.24 %), benign cystic lesion (5.88 %) & benign cytological pattern (4.41 %). Among malignant cases majority were had atypical ductal hyperplasia (22.06 %) followed by intraductal carcinoma (4.41 %), ductal hyperplasia without atypia (2.94 %), borderline phyllodes (1.47 %) & phyllodes tumour (1.47 %).

Table 3: Diagnosis by Histopathology

Diagnosis by Histopathology	**No of cases**	**Percent**
Benign		
Fibroadenoma	30	44.12
Fibrocystic Disease	9	13.24
Benign Cystic Lesion	4	5.88
Benign Cytological Pattern	3	4.41
Malignant		
Atypical Ductal Hyperplasia	15	22.06
Intraductal carcinoma	3	4.41
Ductal Hyperplasia Without Atypia	2	2.94

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Borderline Phyllodes	1	1.47
Phyllodes Tumour	1	1.47

When FNAC examination findings were compared with histopathological examinations findings (as standard), sensitivity was 95.45 %, specificity was 97.83 %, positive predictive value was 95.45 %, negative predictive value was 97.83 % & diagnostic accuracy was 94.5 %.

Table 4: Result of FNAC Examination Compared with Histopathological Examinations

FNAC	**Histopathological Examination**		**Total**
	Malignant	**Benign**	
Malignant	21	1	22
Benign	1	45	46
Total	22	46	68

Sensitivity	95.45
Specificity	97.83
Positive predictive value	95.45
Negative predictive value	97.83
Diagnostic accuracy	94.5

Discussion

Clinical examination, radiological imaging, and breast cytopathology with or without core needle biopsy (CNB) comprise the 3 key modalities employed for diagnosing breast lumps. These modalities aim to maximize the preoperative identification of malignancy so that early, definitive, one-stage surgery or appropriate treatment can be offered to the patient.[6,7]

There is increasing awareness with associated anxiety and stress among women, who perceive every symptom in breast as cancer, compelling them to seek medical advice. It is sometimes difficult to determine whether a suspicious lump is benign or malignant simply from clinical assessment. A definitive diagnosis of benign lesion not only saves the patient from unnecessary stress, but also relieves the health services from undue burden. On the contrary, a definitive preoperative diagnosis of malignant lesion provides many opportunities for patient's counseling and planning of possible single-stage surgical treatment.[8] Triple assessment provided quick diagnosis and it alleviated unnecessary anxiety from patients about breast cancer

In study by Tripathi K et al.,[9] majority of the patients (78.6%) were from the age group of 31-50 years. FNAC showed a sensitivity, specificity, PPV, NPV, and diagnostic accuracy of 74.1%, 76.9%, 87.0%, 64.7%, and 75% respectively.

Bisht DS et al.,[10] studied 101 fine needle aspiration cytology findings. The cytological and histological correlation was found in 51 cases (50%) out of 101cases. The commonest benign lesion was fibroadenoma, which was noted in age group of 15-35 years and the commonest malignant lesion was infiltrating ductal carcinoma, which was noted in the age group of 50-70 years. FNAC had Sensitivity of 50%, Specificity of 100%, Positive predictive value 100%, Negative predictive value 95.9% and the overall accuracy of the study was 96.1%.

In study by Khushbu C[11] fibroadenoma was the most common lesions. Malignancy was reported in 16 cases. Sensitivity, specificity, positive predictive value, negative predictive value and accuracy were found to be 90%, 100%, 100%, 95.83% and 96.96% respectively. The FNAC of breast is cheap, safe, and highly accurate method for diagnosis of breast lump preoperatively to avoid surgery. An occasional false negative case makes it mandatory to

ISSN: 0975-3583,0976-2833 VOL14, ISSUE 03, 2023

biopsy and subject it for histopathological examination before mastectomy where the diagnosis of malignancy on cytology is suspicious.

Vishnu VK et al.,[12] noted that, clinically 64% were categorized as benign lumps and 36% malignant. On FNAC 64% were fibroadenoma, 30% suggestive of malignancy and 6% suspicious of malignancy. On Histopathology 60% were fibroadenoma, 33% turned out to be carcinoma and 7% benign phyllodes. 4% of benign lesions on FNAC turned out malignant on histopathology. FNAC was found to have sensitivity of 96.6% and specificity of 100% and can be a reliable tool for early diagnosis in the case of breast lumps.

Nishantkumar T et al.,[13] studied 50 cases of breast lesions where FNAC was done, 20 were diagnosed with benign lesions, 27 as malignant lesions and 3 as suspicious. Out of 49 patients in which histopathology were done 28 patients had infiltrating ductal carcinoma, and 12 patients had fibroadenoma. Sensitivity, specificity, positive and negative predictive values of FNAC were 81%, 100%, 100%, 72% respectively. FNAC and histopathology are 100% specific in diagnosing malignant breast lesion.

Cytologic grading has shown a positive correlation with the histological grade and hence cytograde is important in predicting the histopathologic grade preoperatively. Cytologic grade would thus provide relevant information on the tumor biologic behavior and could be a useful parameter to take into consideration when selecting neoadjuvant therapy.[14]

FNAC is associated with certain drawbacks. For instance, It can potentially mask radiological assessment when done prior to radiological investigation.[15,16] It is also possible that the smears may be acellular, making cytological analysis impossible, and these are described as inadequate aspirates. Also, its inadequacy rates vary markedly, especially since the technique is operator-dependent.[17]

FNAC has been used extensively for the diagnosis of breast lesions over the past 25 years. Advantages of FNAC include its easy availability, simplicity of the technique, low cost, and most of all, low risk of complications. It requires no anesthesia, is minimally invasive, and is relatively patient-friendly.[14] The routine use of FNAC would greatly reduce the number of unnecessary biopsies and frozen sections for histopathologic evaluation, especially in case of suspected malignancies. It is also less invasive and less traumatic procedure, and better results are obtained in the hands of an experienced pathologist.

Conclusion

Fine needle aspiration cytology is a comfortable, easy, reliable, rapid and simple diagnostic test with sensitivity, specificity, positive predictive value, negative predictive value & diagnostic accuracy of 95.45 %, 97.83 %, 95.45 %, 97.83 % & 94.5 % respectively compared to histopathology as standard. Timely excision, evaluation and confirmation of histological findings helps us to differentiate benign from malignant lesions.

Conflict of Interest: None to declare
Source of funding: Nil

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