Cyto-Histopathological Correlation of Breast Lesions - A Study at Tertiary Care Centre

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Abstract

Background: To study the cytomorphological spectrum of various breast lesions in patients with a palpable breast lump

Methods: The present prospective study was conducted in the Department of Pathology, Jhalawar Medical College & Hospital, Jhalawar (Rajasthan), India. The study was conducted for one year from July 2019 to June 2020. All females with breast mass/lump undergoing FNAC were included and evaluated. A written informed consent was taken from every patient. The study was approved by institutional ethical committee.

Result: In present study, a total of 141 cases were observed. Correctly detected in 133 cases with 132 true positive and 1 false negative diagnosis. 8 cases were missed with 6 cases true negative and 2 false positive. A total of 132 cases were observed with true positive diagnosis and 2 shows false positive diagnosis. 6 cases show true negative and 1 show false negative. Sensitivity of FNAC was observed to be 99.25%, specificity was 85.71%,PPV was 99.25%, NPV was85.71% and Accuracy was 98.58%.

Conclusion: FNAC is a reliable, fast and accurate diagnostic method for the assessment of breast lumps. It has few manageable complications and can be done on outpatient basis. It is our conclusion therefore that the surgeons and pathologists should continue to deploy the procedure towards the early detection of breast cancer. This will also significantly reduce patient's waiting time for incision/excision biopsy.

Keywords: FNAC, PPV,NPV.

Introduction

Breast lesions are a heterogeneous group of disorders ranging from inflammatory lesions to invasive cancers.[1] Diseases of the breast are showing a rising trend worldwide.[2]All breast lesions are not malignant, and all the benign lesions do not progress to cancer; however, the accuracy of diagnosis can be increased by a combination of preoperative tests (like physical examination, mammography, fine-needle aspiration cytology, and core needle biopsy). These modalities are

more accurate, reliable, and acceptable when compared with a single adopted diagnostic procedure despite of having their own technical limitations.[3,4]

Breast lesions most commonly present as lump. About 5-55% of all females suffer from breast diseases in their lifetime. Benign lesions of the breast are usually seen in the reproductive age, these are thought to be hormone induced and there is drastic fall in incidence, after menopause due to absence of ovarian stimulation.[5,6]Benign Breast diseases are more common than malignant ones. Benign breast lesions deserve attention because of their high incidence, their impact on women's life and due to cancerous potential of some histological types. Carcinoma of breast is the most common malignant tumor, an estimated20.8 lakh women were detected with breast cancer in the year 2018 worldwide.[7]In India, 1,62,468 women were newly detected, and 87,090 women died due to breast cancer in year 2018.[8]

True fine needles for breast aspirations were first introduced in the beginning of 1960s by Franzen and Zajicek at the Karolinska Hospital in Stockholm. Many countries performing breast cancer screening programs aimed at detecting early disease in asymptomatic women.[9]"Triple diagnostic technique" which includes Clinical examination, Mammography and FNAC, which determines the diagnosis and assess the need for open biopsy, was suggested by Kreuzer and Boquoi and Hermansen *et al.*[10,11]Excision biopsy was practiced in the past, but presently, imaging and needle biopsy makes it possible to reduce surgical excision of breast lesions to a minimum. FNAC is a relatively simple, reliable, atraumatic, economical and complication-free technique for the evaluation of mass lesions. FNAC is now a well-established technique for the investigation of women with suspected breastcarcinoma.[12] FNAC has become one of the most important diagnostic tools for palpable breast masses and false- negative results have become a major concern. Different studies have determined that FNAC has a sensitivity ranging from 80% to 98% and a specificity of 99% to 100%.[13]

Materials & Methods

This study was hospital based prospective study, including all the female patients with breast lump who were attended hospital over a period of one year between July 2019 to June 2020.

Selection of study sample-

Material was included

➤ All female patients presenting with palpable breast lump in the cytopathology department of JMC, Jhalawar during this period.

➤ All excision biopsy/ lumpectomy/ mastectomy/ Tru-cut biopsy specimen of respective cases received in histopathology department of JMC, Jhalawar during this period.

Inclusion Criteria

All female patients presented with breast mass/lump undergoing FNAC followed by excision biopsy/lumpectomies Tru-cut biopsy or mastectomy.

Exclusion Criteria

Palpable breast masses in males.

Methodology

After obtaining approval and clearance from the institutional ethical committee, only those patients meeting the inclusion and exclusion criteria were enrolled for the study.

The patients were explained in detail about the procedure and complications.

Informed consent was obtained from each participant. After enrollment parameters were considered and/or measured in all patient's according to proforma.

Investigations Required For Study

1. Fine needle aspiration cytology:
2. Biopsy whenever possible.

Study Design

This study was prospective study from July 2019 to June 2020.This study was carried out in department of pathology, Jhalawar medical college, Jhalawar.

Sample Size

All case available during the period of one year will be taken for study.

Results

Total 351 patients were included in study; Maximum number of patients (29.63%) were of age group 31-40yrs of age and minimum number of patients were of age group >70yrs (0.28%). 65.53% masses in breast were observed on left side, followed by 30.77% on right side and 3.7% bilateral masses were discovered. 46.72% masses in breast were observed in upper outer quadrant, followed by 15.38% in upper inner quadrant and minimum 0.28% in retro areolar area.

Table 1: Breast lumps –cytomorphologicalspectrum (according to 5 tier Yokohama system classification)

Presenting category	Interpretation	No. of cases	Percentage
C1	Insufficient Aspirate	6	1.71
C2	Benign	272	77.49
C3	Atypical	6	1.71
C4	Suspicious for malignancy	4	1.14
C5	Malignant	63	17.95
Total		351	100

Out of 351 cases maximum number of cases were C2 (benign) 77.49%, followed by C5 (malignant) 17.95%, C1 (insufficient aspirate) 1.71%, atypical (C3) 1.71%& 1.14 % were of C4 (suspicious for malignancy) category.

Total 6 cases were of this category, in which 3 cases were reported with Proliferative Benign Breast Diseasewith atypia, followed by 2 cases of phyllodes tumor with atypia& 1 case of intraductal papilloma.

Table 2: Cyto-histopathological correlation of breast lesions

Cytocategory	Cytopathological diagnosis	No	Histopathological diagnosis	No
C2 Benign	Acute mastitis	3	Acute on chronic NS mastitis	3
	Chronic nonspecific inflammatory lesion	1	Chronic nonspecific inflammatory lesion	1
	Granulomatous mastitis	4	Granulomatous mastitis	4
	Duct ectasia	5	Duct ectasia	5
	Fibroadenoma	86	Fibroadenoma	81
			Mammary Hamartoma with fibrocystic disease	4
			Benign Phyllodes tumour	1

	Fibrocystic Disease	6	Fibrocystic Disease	4
			Fibroadenoma with cystic changes	2
	Lipoma	3	Mammary hamartoma	3
	Benign Phyllodes tumour	4	Benign Phyllodes tumour	4
C3 Atypical	Proliferative Breast Disease with atypia	3	Infiltrating Lobular Carcinoma	1
			Borderline Phyllodes tumour	2
C4 Suspicious for malignancy	Atypical ductal hyperplasia with cystic changes	2	Ductal Carcinoma InSitu - low grade	2
	Low grade carcinoma	1	Infiltrating Ductal Carcinoma- NOS	1
C5 Malignant	Malignant breast	23	Infiltrating Ductal Carcinoma- NOS	12
			Infiltrating Lobular Carcinoma	6
			Invasive tubulo-lobular carcinoma	3
			Medullary breast carcinoma	1
			Chronic inflammatory lesion with Foreign body giant cell Reaction	1
Total		141		141

Table 3: Sensitivity, specificity, PPV, NPV and Accuracy for cytological diagnosis

	Detected	Missed	Total
Positive	TP-133 (A)	FP-1 (B)	Test Positive
Negative	FN-1 (C)	TN-6 (D)	Test Negative
Total	134	7	141

Calculations

Sensitivity = [True positive / (True positive + False negative)] × 100%

Specificity=[True Negative / (True Negative+False positive)]×100%

Positive Predictive Value (PPV) =[True Positive / (True Positive+False Positive)]×100%

Negative Predictive Value (NPV) =[True Negative / (True Negative+False Negative)]×100%

Accuracy = (True Positive + True Negative)/ (True Positive + True Negative + False Positive + False Negative) ×100%

Sensitivity=A/(A+C) × 100= 99.25%

Specificity= D/(D+B) × 100 = 85.71%

Positive Predictive Value (PPV) = A/(A+B) × 100= 99.25%

Negative Predictive Value (NPV) = D/(D+C) × 100= 85.71%

Accuracy = (A+D)/A+B+C+D) × 100 = 98.58%

Discussion

Sensitivity of FNAC is the ability of a test to correctly identify all those who have the disease. From this study Sensitivity is calculated as = [True positive / (True positive + false negative)] $\times$ 100%= 133/ (133+1)= 99.25%.

The specificity of FNAC is the ability of the study to correctly identify the candidates who do not have the disease. From this study Specificityis calculated as=[True Negative / (True Negative+False positive)]$\times$100%=[6/(1+6)]$\times$100=85.71%.

The positive predictive value (PPV) of FNAC was calculated as the probability that the patient with a positive test has the disease in question.

From this study positive predictive value (PPV) is calculated as:PPV=[True Positive / (True Positive+False Positive)]$\times$100%=[133/(133+1)]$\times$100=99.25%.

The negative predictive value (NPV) of FNAC is the probability of a patient with a negative test not having the disease in question (malignancy). From this study negative predictive value (NPV) is calculated as: NPV=[True Negative / (True Negative+False Negative)]$\times$100%=[6/(6+1)]$\times$100=85.71%.

Accuracy expresses the ability of a test to separate or distinguish those who have the disease from those who do not.From this study accuracy is calculated as= (True Positive + True Negative)/ (True Positive + True Negative + False Positive + False Negative) $\times$100%= (133+6)/133+1+1+6) $\times$ 100% = 98.58%

In present study, A total of 141 cases were observed. Out of 133 cases with 132 true positive and 1 false negative diagnosis. 8 cases were missed with 6 cases true negative and 2 false positive. A total of 132 cases were observed with true positive diagnosis and 2 shows false positive diagnosis. 6 cases show true negative and 1 show false negative. Sensitivity of FNAC was observed to be 99.25%, specificity 85.71%, PPV 99.25%, NPV85.71% and accuracy 98.58%.

Mohan BP et al.[14] observed similar findings. The sensitivity of FNAC was 98.8% in benign lesions and 96.3% in malignant lesions in the present study. The specificity and positive predictive value of benign cases were 96.3% and 95.6% respectively. The specificity and positive predictive value of malignant lesions in FNAC were 98.8% and 99% respectively. The diagnostic accuracy of FNAC in our study was 97.45%. Similar results were obtained in study conducted by Anand V et al.[15] Sensitivity, specificity and accuracy are 90.1%, 96.5% and 94.1% which proves the efficacy and reliability of FNA in the field of breast lesions.

The sensitivity and specificity of the results have made management of breast lumps easier for the surgeon and more beneficial to the patients.

Technical skills of the cytopathologist performing FNA can very much influence the sampling yield. Unsatisfactory cytological smears can be due to faulty FNA technique resulting in poor cell yield and sampling errors due to the nature of lesion itself. False negative results can be due to misinterpretation, hemorrhagic aspiration, scanty material or drying artefact. Provision of adequate sample by an experienced pathologist can prove FNAC as a highly reliable diagnostic tool. Diagnostic efficacy of physical examination, imaging and FNAC (triple test) when combined together, is still higher.

FNAC is a very important technique for preoperative evaluation of patients with breast lesions. 5 tier system of grading breast lesions aids cytopathologists in diagnostic clarity. It also helps surgeons in deciding further patient management. FNAC has become more reliable in the diagnosis of biological behavior of breast

masses. Although its use has led reduction in the use of frozen-section histology by about 80%, erroneous diagnosis is still commoner with FNAC than with histopathology.

Furthermore, recent advances in both these techniques like Immunocytochemistry, imaging guided FNAC and Doppler in sonomammography may increase their accuracy. However, in diagnostically challenging cases and clinically malignant masses histopathological examination should be done, which is the gold standard for tissue diagnosis.

Conclusion

FNAC is a reliable, fast and accurate diagnostic method for the assessment of breast lumps. It has few manageable complications and can be done on outpatient basis. It is our conclusion therefore that the surgeons and pathologists should continue to deploy the procedure towards the early detection of breast cancer. This will also significantly reduce patient's waiting time for incision/excision biopsy.

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