

Reliability of fine needle aspiration cytology in the evaluation of palpable breast lumps – An institutional based study

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Abstract

Introduction: Fine needle aspiration cytology (FNAC) is a simple, minimally invasive, rapid, cost effective outpatient based diagnostic procedure for palpable breast lumps. The aim of present study was to evaluate the diagnostic performance of FNAC in the diagnosis of breast lesions.

Materials and Method: This is a retrospective study done in the Department of Pathology, All India Institute of Medical Sciences, Patna during the period of May 2014 to May 2017. It included all the patients who presented with breast lumps and in whom FNA was performed. Cytological diagnosis was compared with histopathological diagnosis.

Results: A total of 698 patients presented with breast lumps in this retrospective study of 3 years whose cytological findings were studied. Histopathological confirmations were obtained in 270 cases out of 272 cases in which histocytopathological correlation were done. The age of patients in the present study varied from 12-85 years. Fibroadenoma was the commonest breast lesion (206 cases, 29.5%), followed by carcinoma breast (106 cases, 15.2%) and fibrocystic diseases (97 cases; 13.9%). Sensitivity and specificity of FNAC in breast lesions were 98.11% and 100% respectively, with 100% positive predictive value and 98.81% negative predictive value. Diagnostic accuracy of FNAC in the present study was found to be 99.26%.

Conclusion: FNA is a highly reliable, cost effective, less traumatic, repeatable and simple diagnostic modality of breast lumps. When combined with physical examination and imaging studies (triple assessment), FNAC is a highly sensitive diagnostic tool and can reduce the need for open biopsy.

Keywords: FNAC, Breast lesions, Cyto-histopathological correlation

Introduction

Diagnosis of breast lesions is routinely performed by the combined assessment of (at least) a specialized surgeon, radiologist and pathologist to provide the best management plan. FNAC is one of the important components of “Triple approach” which has been recently widely accepted for the preoperative diagnosis of breast lesions.⁽¹⁾ All breast lesions are not malignant, and all the benign lesions do not progress to cancer. It is difficult to determine whether a suspicious breast lump is benign or malignant simply by doing a clinical and radiological assessment. FNAC plays an important role in determining the nature of the lump.⁽²⁾ FNAC is now the most popular, widely accepted, simple, accurate, cost effective single modality for diagnosing different breast lumps, which reduce the number of open breast biopsies.⁽³⁾

As breast lump is a common and serious problem, the study was conducted to find out the advantages of breast FNAC in our hospital set up along with derivation of accuracy, sensitivity and specificity of the procedure by correlation with histopathological findings and to co-relate the same with other studies with the following aims and objectives:

Aims and Objectives

1. To evaluate the diagnostic performance of FNAC.
2. To study the spectrum of cytomorphological patterns of various breast lesions.
3. Cyto-histopathological correlation of breast lesions.

Materials and Method

This is a retrospective study carried out in the Department of Pathology where data based on breast aspirates and histopathological reports in the last three years were retrieved from records. We assessed the accuracy of FNA finding by comparing the cytological diagnoses of breast masses to the diagnoses from histopathological reports, with core needle biopsy, excisional biopsy, or mastectomy specimens.

Demographic data including age, sex, site and clinical presentation were obtained from the requisition forms. Sensitivity, specificity and diagnostic accuracy were calculated using standard statistical methods. FNAC was performed with 22G needle with attached 10 ml syringe. Palpable lymph nodes were also aspirated to exclude metastasis. Air dried and wet fixed slides of cytology stained with MGG and Papanicolaou stains were reviewed along with histopathological slides stained with H&E stain.

Results

The records of 698 patients who had undergone FNA of breast lump during the study period were retrieved, whose cytological findings were studied. Histopathological confirmations were obtained in 270 cases out of 272 cases in which histocytopathological correlation were done. Rest cases were lost to follow up. The age of patients in the present study varied from 12-85 years. (Fig. 1) Out of 698 patients that presented with breast lumps, 660 patients were female and rest 38 patients were male.

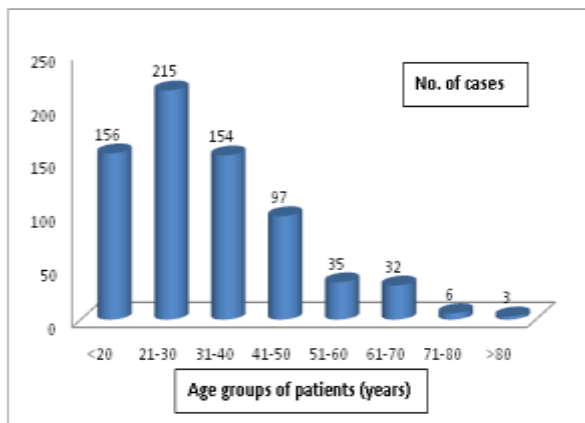


Fig. 1: Age distribution of patients with breast lumps

This study documented the fact that benign breast lesions were the most common lesions in young females while the malignant lesions were common in 5th & 6th decades of life among which infiltrating ductal carcinoma was the commonest lesion encountered. (Table 1) In the benign lesions, right breast was involved more frequently (345 cases; 49.4%) as compared to left breast (282 cases; 40.4%). 71 cases (10.2%) showed bilateral breast involvement. Upper outer quadrant of breast was the most frequently involved (39.8%) site irrespective of nature of lesion. Fibroadenoma was the commonest breast lesion (206 cases out of 698, 29.5%), followed by carcinoma breast (106 cases; 15.2%) and fibrocystic diseases (97 cases; 13.9%). Among the 106 malignant cases, upper outer quadrant of the breast was most commonly involved site (40 cases; 37.7%) followed by upper inner (28 cases; 26.4%) and central area of breast (18 cases; 17%).

Cytological diagnosis of breast lesions were categorized in our study in four headings; malignant, suspicious of malignancy, atypical/indeterminate and benign lesion with specific diagnosis. (Table 1)

Out of the total 698 cases that presented with breast lumps, histopathological correlation was done in 272 cases and 270 cases were confirmed histopathologically. (Table 2) 168 cases out of 272 were reported as benign, of which 166 cases were proven benign on histopathology as well. 104 cases were reported as malignant lesions on cytopathology and 106 cases were turned out to be malignant on histopathology. 2 cases which were reported as benign cystic lesion and cellular fibroadenoma respectively were turned out to be malignant (false negative cases). Rest of the cases showed similar findings in cytology as well as on histopathology. Amongst 106 cases of malignant aspirates, 38 cases showed lymph node metastasis. During our study we came across 4 rare cases of epidermal inclusion cyst and filariasis each in breast aspirates.

Using the standard statistical formulae, the sensitivity and specificity in this study were calculated to be 98.11% and 100% respectively. The positive predictive value of a test indicates the probability that the patient with a positive test has in fact the disease in question. The positive predictive value for malignancy was 100%. The negative predictive value of a test indicates the probability of patient with a negative test not having the disease in question. The negative predictive value for malignancy was 98.81%. Diagnostic accuracy was also calculated and was 99.26%. A comparative study of our study with other studies is shown in Table 3.

Table 1: Cytological diagnosis of breast lesions: (n = 698)

| Cytological Category | Cytological diagnosis | No. of cases | Percentage (%) |
|-------------------------------------|---------------------------------|--------------|----------------|
| Malignant | Ductal | 105 | 15.1% |
| | Lobular | 01 | 0.1% |
| Suspicious of malignancy | | 10 | 1.4% |
| Atypical / indeterminate | Atypical ductal hyperplasia | 12 | 1.7% |
| | Papillary lesion with atypia | 03 | 0.4% |
| Benign lesions – specific diagnosis | Acute mastitis / abscess | 20 | 2.8% |
| | Acute on chronic mastitis | 08 | 1.1% |
| | Granulomatous mastitis | 20 | 2.9% |
| | Tuberculous mastitis | 03 | 0.4% |
| | Fat necrosis | 03 | 0.4% |
| | Duct ectasia | 07 | 1.0% |
| | Fibroadenoma | 206 | 29.5% |
| | Fibrocystic disease | 97 | 13.9% |
| | Fibroadenomatoid hyperplasia | 15 | 2.1% |
| | Fibroadenosis | 10 | 1.4% |
| | Simple cyst | 22 | 3.1% |
| | Lactational changes | 23 | 3.3% |
| | Gynaecomastia | 28 | 4.0% |
| | Lipoma | 03 | 0.4% |
| | Usual epithelial hyperplasia | 10 | 1.4% |
| | Phyllodes tumour | 02 | 0.3% |
| | Papillary lesion without atypia | 03 | 0.4% |
| | Epidermal inclusion cyst | 04 | 0.6% |
| | Parasites | 04 | 0.6% |
| | Benign non specific | | 40 |
| Unsatisfactory | | 39 | 5.6% |

Table 2: The Diagnostic accuracy of FNAC in histologically correlated cases. (n = 272)

| FNAC ↓ | Histopathological Diagnosis → | | | | | | | | |
|----------------------|-------------------------------|------------|------------|------------|-----------------|-------------------------|-----------------|-----------|-------------|
| | Inflammatory lesion | FA | FCD | FA+FCD | Phyllodes tumor | Lactational hyperplasia | microfilariasis | EIC | CA |
| Inflammatory lesions | 22 (12.79%) | | | | | | | | |
| FA | | 72(26.67%) | | | | | | | 01(0.36%) |
| FCD | | | 30(11.11%) | | | | | | |
| FA+FCD | | | | 26 (9.62%) | | | | | |
| Phyllodes tumor | | | | | 02(0.73%) | | | | |
| Lactational changes | | | | | | 06(2.2%) | | | |
| Microfilariasis | | | | | | | 04(1.47%) | | |
| EIC | | | | | | | | 04(1.47%) | |
| Benign cystic lesion | | | | | | | | | 01(0.36%) |
| CA* | | | | | | | | | 104(38.23%) |

Fibroadenoma – FA, Fibrocystic disease – FCD, Fibroadenomatoid hyperplasia – FA + FCD, Epidermal inclusion cyst – EIC, Breast carcinoma – CA

*- six cases from the category “suspicious for malignancy” by FNAC are included in malignant lesions, as they were confirmed to be malignant by histopathological examination.

Table 3: Cyto-histopathological correlation and statistical evaluation of breast lumps with other studies

| Studies | No. of Benign lesion | Histological diagnosis | | No. of malignant lesion | Histological diagnosis | | No. of suspicious cases | Histological diagnosis | | Sensitivity | Specificity |
|-------------------|----------------------|------------------------|---------------|-------------------------|------------------------|---------------|-------------------------|------------------------|----------------|-------------|-------------|
| | | Benign | Malignant | | Malignant | Benign | | Malignant | benign | | |
| Tiwari M | 16 | 15 (93.75%) | 01 (6.25%) | 05 | 05 (100%) | 00 (0.0%) | - | - | - | 83.3% | 100% |
| O’ Neil S et al | 166 | 153 (92.17%) | 13 (7.83%) | 401 | 398 (99.25%) | 03 (0.75%) | 125 | 84 (67.20%) | 41 (32.80%) | 97.0% | 78% |
| Zhang Qin et al | 215 | 213 (99.07%) | 02 (0.93%) | 73 | 73 (100%) | 00 (0.0%) | 28 | 26 (92.86%) | 02 (7.14%) | 97.1% | 97.3% |
| MohammedAZ et al | 61 | 58 (95.08%) | 03 (4.92%) | 27 | 27 (100%) | 00 (0.0%) | 02 | 02 (100%) | 00 (0.0%) | 90.6% | 100% |
| Panjvani SI et al | 46 | 45 (97.83%) | 01 (2.17%) | 43 | 43 (100%) | 00 (0.0%) | 02 | 02 (100%) | 00 (0.0%) | 97.82% | 100% |
| Present study | 168 | 166 (98.80%) | 02 (1.2%) | 98 | 98 (100%) | 00 (0.0%) | 06 | 06 (100%) | 00 (0.0%) | 98.11% | 100% |

Discussion

FNAC of breast lumps is an accepted and established method for determining the nature of breast lumps with a high degree of accuracy.⁽⁴⁾ Martin and Ellis in 1930 first introduced the application of FNAC for the diagnosis of palpable breast masses. FNAC is a rapid, cost effective, easy and a safe procedure with only a few reported complications. It has been reported in the literature that the incidence of tumour translocation along the needle track by FNA procedure is only about 0.0045%.⁽⁵⁾

In the present study we have examined 698 patients presented with breast lumps who underwent FNA procedure. FNAC findings in our study (benign and malignant) are similar to other studies of Tiwari M et al, O'Neil S et al, Zhang Qin et al., Mohammad AZ et al and Panjvani SI et al.⁽⁶⁻¹⁰⁾

In our study benign breast lesions were seen predominantly in 2nd to 4th decades and malignant lesions were mostly in the 5th to 6th decades of life. The observations of this study regarding age distribution and location of breast lumps correlated with the study by Hussain et al., Homesh et al., Ariga et al.^(11,12) However both diagnoses can occur in all age groups and therefore every case should be treated on its own merit.

Inadequate cases in our study were 39 (well within the range mentioned in the literature 0-42%).⁽¹³⁾ In our study majority of the benign breast lesions were situated in the left breast (49.4%) in the upper outer quadrant (36.8%). In malignant cases, breast lumps were located in right breast (60.0%) and in upper outer quadrant (37.7%) and in only one case, malignant breast lesions were present in both breasts.

Total number of cases in our study that were diagnosed cytologically as fibroadenoma were 206 (29.5%), followed by fibrocystic disease in 97 cases (13.9%). In a study of 91 patients, Tiwari et al. reported Fibroadenoma as the commonest pathology (39.6%).⁽⁶⁾

Malik et al studied 271 cases of breast cancer, which comprised of 269 females and 2 males. Infiltrating ductal carcinoma was documented in 199 cases (71.0%).⁽¹⁴⁾ Our study documented 15.1% cases of breast carcinoma amongst which infiltrating ductal carcinoma was 99.0%.

Triple approach with correlation of cytology with clinical findings and imaging results are mandatory for the appropriate management of patients especially in cases of inadequate yield.⁽¹⁵⁾ Incorporating this data can actually categorize the breast lesions in most of the cases and can help in selecting the therapeutic protocol (i.e. surgery versus cosmetic treatment, enucleation versus wide resection).^(16,17)

A study conducted by Ahmad et al showed that when triple assessment is concordant, final treatment may be ensued without open biopsy. In non cordant

cases, FNAC stands as the single most important investigation.⁽¹⁸⁾

In our study 10 cases (1.4%) were suspicious of malignancy. Published literature mentioned a range of 3% to 9% for suspicious cases of malignancy.⁽¹⁹⁾

One of the main aims of our study was to determine diagnostic correlation between fine needle aspiration cytology and histopathological findings of the breast lesions. In our study there were 98 true positives, 2 false negatives, 166 true negatives and zero false positives cases. As shown previously, sensitivity and positive predictive value of FNAC in our study were calculated as 98% & 100% respectively, while specificity and negative predictive value for malignancy were 100% & 98.81% respectively. In this regard Franco et al. in his study of 300 patients on the utility of FNAC, reported a positive predictive value of 100% and negative predictive value of 92%.⁽²⁰⁾ A very large study of 1297 patients done by Choi et al., on correlation of FNAC and histopathology reports, found the positive predictive value to be 98.4% and negative predictive value of 88%.⁽²¹⁾ Thus, the findings in our study is quiet comparable with the findings of other studies.

Conclusion

The utility of FNAC in diagnosing and evaluating the breast lumps is quiet established and well proven with high degree of accuracy. Clinical examination with cytohistological correlation holds high significance in diagnosis of breast lumps. False negative results can be minimized by avoiding sampling errors and interpretation errors. Discrimination of benign and malignant lesions based on clinical suspicion alone may be challenging. FNAC, in conjunction with clinical judgment, is an accurate diagnostic tool and can be included in the standard work-up of patients with radiographically occult palpable breast lumps.

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