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Evaluation of accuracy of cytological diagnosis with the histopathological diagnosis of breast on FNAC

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Abstract
Aim: To document the diagnostic accuracy of FNAC of palpable breast lesions and its correlation with the histopathologic diagnosis.
Materials and Method: This was a prospective study carried out in the Department of Pathology over a period of 2 years. Total number of patients who underwent fine needle aspirations was 198. Histopathological examination (lumpectomies and/or mastectomies) was done in 103 patients out of the total 198 cases.
Results: In our study, sensitivity of FNAC in diagnosing a breast malignancy was 96%.Specificity was 100% as there was no false positive case reported. The positive predictive value was 100% and negative predictive value was 94.44%. The accuracy of FNAC as a diagnostic procedure was 97.64%.
Conclusion: FNAC is a simple, rapid and cost effective procedure with minimal discomfort to the patient, almost free of complications and thus is an ideal first line diagnostic procedure.

Keywords: cytological, histopathological diagnosis, breast lesions

Introduction
Lump in the breast is a source of anxiety to the patient because of the fear of cancer and the potential cosmetic disfigurement following surgery. Medical treatment is often ineffective and the indications for the surgery remain controversial [1] Cancer breast is the most important malignant disease affecting women in the industrialized world. There are several competing approaches to breast lesions like surgical excision, core needle biopsy and Fine needle aspiration cytology.
The biopsy obtained for routine histopathological processing and interpretation caused problem of delay in interpretation, surgical trauma to the patient and high cost of the operative setup. So an easy, simple, least traumatic, less expensive and fairly reliable procedure of obtaining cellular material was developed. This procedure FNAC is presently popular and extensively practiced in all centers.
The FNAC, therefore has become popular, and is now the first investigation for a breast lump in an outpatient setup [2]. Several studies have been done to prove the efficacy of FNAC in diagnosing the breast lesions.
In view of above context the present study was undertaken to document the diagnostic accuracy of FNAC of palpable breast lesions and its correlation with the histopathologic diagnosis.

Materials and Method
This was a prospective study carried out in the Department of Pathology over a period of 2 years from May 2008 to May 2010. The patients presenting with palpable breast lump attending the outdoor as well as indoor departments of our Hospital were selected for the present study. Fine needle aspiration cytology material and specimens of excised breast lesions such as open biopsy, lumpectomy, wide excision of breast masses, and various types of mastectomies, formed the basis of the study.
Total number of patients who underwent fine needle aspirations was 198. Histopathological examination (lumpectomies and/or mastectomies) was done in 103 patients out of the total 198 cases. 5 cases were inadequate on aspiration cytology and were excluded from the present study. Thus comparison of cytological and histopathological findings was possible in 103 cases only. This was utilized to evaluate the accuracy of the FNAC.
Clinical history of symptoms related to the breast disease such as lump, duration, nipple discharge, pain during menses were asked and noted. Breast was examined for lump with reference to site, size, tenderness, consistency, mobility and fixation to skin and underlying

chest wall, nipple changes such as retraction were noted.
The patient was well explained with the procedure and the anxiety of the rocedure was allayed and consent was obtained.

Procedure for FNAC
Aspiration site is prepared with an alcohol swab. The mass is fixed with the free hand. Needle is introduced in the lump; plunger is pulled to create negative pressure. Then the needle is moved to and fro within the lump in various directions while maintaining the negative pressure. Suction is released after appearance of sample at the junction of the needle and syringe, and the needle is withdrawn from the lump, after placing sterile cotton over the site to stop bleeding, if any. The aspirated material is expressed onto the labelled glass slides and smears were prepared with the flat of second slide, exerting a light pressure to achieve a thin and even spread. Few smears were immediately wet fixed by placing them in Coplin jar with cytofixative. While others were air-dried.

Stainning
Wet fixed smears were stained by hematoxylin and eosin. Air dried smears were stained with Leishman‟s stain Special stains like Ziehl Neelsen (20%) stain, PAS stains were used wherever necessary.
The FNAC smears were studied microscopically. The smears were labeled as „inadequate" if even after repeated aspiration they failed to yield a representative and adequate sample. Inadequate samples were excluded from the study.
To obtain best results for histopathological assessment, the specimens were sliced immediately after resection and then immersed in 10% buffered formalin. Grossing and sectioning of the specimens were done according to the standard procedure The tissue bits were processed by routine paraffin embedding techniques [3]. Sections were cut at 4-5 microns thickness and stained with hematoxylin and eosin.
The sections were studied microscopically. The lesions were classified as Non-neoplastic and Neoplastic. Non-neoplastic lesions were further subcategorized as per the Bombay Breast Group Classification [4]. This is based on the recent histogenetic concepts and practical application. Neoplastic lesions were broadly classified as benign and malignant tumors. Further sub categorization was done using the recent W.H.O Histological Typing of Breast Tumors.

Results
Of the total 198 cases 5 cases had inadequate aspirates. Therefore the adequacy of the FNAC procedure was 97.47% (193/198). Inadequate cases were excluded from the present study. Out of 193 cases, 42 were non-neoplastic lesions and 151 cases were neoplastic on cytology. Histopathological diagnosis was available in total 103 cases, of which 14 were non-neoplastic and 89 were neoplastic. In the present study, youngest patient was 12 years old and oldest patient was 85 years old. Maximum number of cases with breast lump were seen in the 4th decade followed by 5th decade. Frequently encountered lesions were fibrocystic change 40.47 % and abscess of breast 30.95% followed by gynecomastia, granulomatous mastitis and fat necrosis. All the patients presented with lumps in the breast. Gynecomastia presented as bilateral breast lumps in 2 cases. Lumps of fibrocystic change were vague and diffuse to palpate. All thirteen patients of abscess had painful tender lump and eleven patients also had fever. Table 1 states Comparison of cytological and histological diagnosis of non-neoplastic lesions

Table 1: Comparison of cytological and histological diagnosis of non-neoplastic lesions

Cyto- Diagnosis	Total = 42 cases of Cytology	Histopathology available total=14 cases	Cyto-Histopathologic correlation Total 14 cases.
Fibrocystic change	17	4	4(100 %)
Abscess	13	2	1 (50 %)
Gynecomastia	7	4	4 (100 %)
Granulomatous mastitis	4	3	3 (100 %)
Fat necrosis	1	1	1 (100 %)
Total	42	14	13/14= 92.85%

Total benign tumors reported on cytology were 83 in the study and histopathologic correlation was available in 36 cases. Four cases were reported as suspicious of malignancy on FNAC and excision was advised. Histopathology was available in all 4 cases for correlation. Positive for malignancy was reported on cytology in 64 cases. Out of which surgical resections and histopathological findings were available in 49 cases. Thus cytohistological correlation was studied in total 89 cases having neoplastic disorder.
All four cases reported as suspicious of malignancy excision was advised. Histopathology revealed one case as Atypical ductal hyperplasia, other as Ductal carcinoma in situ and two cases of Infiltrating ductal carcinoma. All 49 cases (100%) diagnosed as positive for malignancy on cytology were correlated with histopathology. There was no false positive case. An attempt was done to apply probabilistic approach for epithelial neoplastic lesions. (Total -149)

Discussion
Most diseases of the breast present as palpable breast masses, inflammatory lesions, nipple secretions or mammographic abnormalities. FNAC plays an important role in the diagnosis of various palpable lesions of the breast and is now widely used. Although the primary role of FNAC of the breast is to distinguish between benign and malignant lesions, in many cases additional information may be obtained [5-8].
We studied a total of 198 cases of palpable breast lumps over a period of two years (May 2008 - April 2010). The lumps varied in size from 1 cms to as large as 15 cms in greatest diameter. Some were well circumscribed while others were ill-defined.
Out of 198 cases 5 samples were inadequate and were excluded from the study and 193 cases were studied cytologically. Out of these 103 cases underwent subsequent various types of surgical resections ranging from excision, lumpectomy and mastectomies. Hence cyto-histo correlation was possible in 103 cases only. The cytological and histopathological features in these 103 cases were analyzed in order to evaluate the efficiency of FNAC to accurately diagnose and subtype the breast lesions

Age incidence
In the present study, the youngest patient was 12 years old and the oldest was 85 years old. In the non-neoplastic lesions the age range was 15 to 75 years. Breast abscess was common in 3rd decade. Fibrocystic disease was commoner in 4th decade. Cases of fibroadenoma were most common in 3rd and 4th

decades. Age range of breast carcinoma was 24 to 85 years, youngest patient being of 24 years old. There was peak incidence of carcinoma in the 5th decade [9, 10].

Sex distribution

In the present study 95.34% (184/193cases) were females and 4.66% (9/193cases) were males. Lesions of the breast are preponderantly confined to the females. In the male, the breast is a rudimentary structure, relatively insensitive to endocrine influences and apparently resistant to neoplastic growth.

Location of the breast lump:

In the present study it was found that the neoplastic lesions were more common in the left side of the breast (57.6%) and the non-neoplastic lesions were common in the right side of the breast. Among 5 bilateral cases 2 cases were invasive carcinomas, one having IDC NOS type and the other was invasive lobular carcinoma, 2 cases with bilaterality were gynecomastia and a single case was of bilateral juvenile fibroadenoma. Tulinius *et al*. 78 noted the lesions in left breast were 63 %. Bilaterality is often seen in cases of lobular carcinoma, the figure can be as high as 25 -50% [11].

FNAC of the breast complications- nil

Fine needle aspiration of the breast is a safe, simple, rapid and less traumatic way of diagnosing palpable breast lesions. The risk of complications is extremely low. In our study no complications were noted and patients tolerated the procedure of FNAC well. Occasional ecchymosis at the FNAC site in his study.

Adequacy of FNAC procedure

In the present study, overall sampling adequacy of the FNAC procedure was 97.47% (193/198 cases). Out of 5 hypocellular aspirates, three patients were lost for follow up. Two patients had a clinical impression of fibroadenosis. All these cases were excluded from the present study.

In present study, 21.56 % cases were non-neoplastic lesions. Our results are close to 22.30 % case as non-neoplastic [13]. The other studies also showed similar results.

The Baptist *et al*. study however showed a 39 % incidence of non-neoplastic breast lesions, which is higher to others studies and present study as well.

FNAC of the breast has its primary role to differentiate between benign and malignant lesions. Predicting the chance of malignancy in a particular lesion is more important in optimizing further patient management. This has been termed the "Probabilistic approach" to the diagnosis of breast carcinoma. The aim of the probabilistic approach is to identify malignancy [12].

In the 151 neoplastic lesions studied, benign neoplasms constituted the largest group being 83 cases followed by malignant tumors in 64 cases and 4 cases were reported as suspicious of malignancy.

Thus our findings were comparable. We diagnosed a single case of bilateral Juvenile fibroadenomas in a young girl of 12 years age on cytology. There is considerable cytological overlap between fibroadenomas and Juvenile fibroadenomas.

Fibroepithelial tumors occurring most often in adolescence and associated with a large size and hypercellularity of stromal and glandular elements have been identified as a distinct entity referred as Juvenile fibroadenomas [13]. We diagnosed JFA on the basis of high cell yield, microscopic features of fibroadenoma and clinical presentation. Our patient presented with large well circumscribed lobulated masses which were bilateral (measuring 17X15 and15X15 cms each) stretching the skin and distorting the nipple.

We encountered two cases as lipoma on cytology in our study. One case was 40 years old female patient who presented with a well defined, rounded, soft mass which gave an "empty" sensation on aspiration. Multiple aspirate yielded only fat. Smears showed mature adipose tissue fragments. The patient had multiple lipomas all over her body. Hence a definitive diagnosis of lipoma was given. As lipomata are so common elsewhere in the body, it is not surprising that they are also frequently found in the breast. Some authors say the lesions of this type in the breast are not true lipomas, but are focal hypertrophy of the fat tissue or "fatty lobules" contained within a fibrous compartment.

Total 64 cases were reported as positive for malignancy on cytology. 63 cases were sub typed as Duct carcinoma and one case was diagnosed as Mucinous carcinoma on cytology. Surgical resection and histopathological were available in 49 out of these 64 cases.

All 49 cases (100%) diagnosed as positive for malignancy on cytology were confirmed on histopathology and further sub typing was done was done. There was no false positive case reported in our study. Overall diagnostic accuracy rate as studied from cytohistological correlation available in 103 out of 193 cases was 93.20%. However, for diagnosis of malignant lesions the accuracy of FNAC was observed as 97.64%. Literature quotes the accuracy rate as ranging from 91.3% to 94% depending on experience of the aspirator and the interpreter.

Conclusion

In our study, sensitivity of FNAC in diagnosing a breast malignancy was 96%.Specificity was 100% as there was no false positive case reported. The positive predictive value was 100% and negative predictive value was 94.44%. The accuracy of FNAC as a diagnostic procedure was 97.64%.FNAC is a simple, rapid and cost effective procedure with minimal discomfort to the patient, almost free of complications and thus is an ideal first line diagnostic procedure.

Conflict of Interest: No Conflict of interest

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