Introduction

Palpable breast mass is the commonest presentation at surgical OPD. Breast malignancy is one of the commonest malignancy in women worldwide and its incidence increases with age.\(^1\) It is very essential to evaluate palpable breast mass before any surgical intervention. Most of the countries are now adopting “triple test” diagnostic approach for breast lesions i.e. clinical, radiological and pathological which include fine needle aspiration cytology as first line of investigation modality.\(^2\)

FNAC carried out by a well-trained, experienced hand, has high accuracy rate observed in many series.\(^3,4\) This makes it most reliable element of the triple test in cases where the three modalities are not concordant.\(^5,6\)

Moreover, FNAC is a cost-effective, simple diagnostic procedure for palpable breast lumps,\(^7\) which can be used on OPD basis without hospitalization of the patient. It is a minimally invasive procedure, less painful and having less chances of development of hematoma as compared to core needle biopsy. Patient compliance is best with this procedure even if it has to be repeated.

However, fine needle aspiration cytology can be presumptive in some cases. It is not a substitute of core needle biopsy. Final diagnosis can be obtained by histological examination of biopsy tissue. So present study is done to evaluate efficacy of FNAC in cases of palpable breast lesions, which is done by correlating cytological findings with histological diagnosis.

**Aim of study:** 1) To analyse various cytological findings of aspirates from palpable breast masses presented to cytology department and categorised them according to five-tier reporting system of breast cytology. 2) To correlate cytological diagnosis with histological examinations of breast lesions. 3) To evaluate sensitivity, specificity and positive predictive value of fine needle aspiration cytology in diagnosis of breast lesion.

Materials and Methods

The present study is performed in a tertiary health care centre in central Gujarat, from December 2014 to December 2016. During this period total 1560 patients referred from various outdoor patient departments were registered in cytology section of pathology department. Out of total 1560 patient, 378 female patients with palpable breast lesions were included in present study. Male patients with breast lump are not included in this study.

All the study participants were subjected to FNA examination after obtaining a written consent. The procedure of FNA was performed in supine position in a well-lighted, properly ventilated room with maintaining privacy of the patients. The aspirations were taken using 23
lesions are found. Total number of undiagnosed cases on FNAC was considered under C1 category which includes 32 cases in present study.

The bar diagram also shows maximum numbers of benign breast lesions (C2 category) have been found in age range of 20 to 30 years. Commonest benign breast lesion found in present study was fibroadenoma.

Maximum number of malignant breast lesions was found between 5th and 6th decade of life. All the six cases above 70 years of age were diagnosed malignant. Not a single benign case found in this age group. Maximum number of suspicious lesions (category C3,C4) were found between 35 to 50 years of age.

Out of total 378 cases diagnosed cytologically, 300 cases subsequently subjected to histopathological intervention. Cytological and histological diagnosis correlated in all the 300 cases. From the obtained data, statistical analysis was done.

Result
Data recorded from all the 378 female patients with palpable breast mass, entered in Microsoft Excel sheet. The age of the female patients in included in the present study ranged from 12 to 73 years. The age wise distribution of all the five categories (C1 to C5) is shown in a bar diagram, which shows more than 50% patients with palpable breast mass falls in age range of 20 to 40 years. This is the age range where maximum number of patients with palpable breast

Table 1: Cytology categories according to five tire reporting system for breast cytology.

| Cytology categories | Explanation          |
|---------------------|----------------------|
| C1                  | Inadequate           |
| C2                  | Benign               |
| C3                  | Suspicious but probably benign |
| C4                  | Suspicious but probably malignant |
| C5                  | Malignant            |

Table 2: shows age wise distribution of various pathological categories.

| Age in years | c1 | c2 | c3 | c4 | c5 |
|--------------|----|----|----|----|----|
| <20          | 8  | 38 | 1  | 1  | 3  |
| 21-30        | 10 | 81 | 6  | 2  | 2  |
| 31-40        | 6  | 47 | 8  | 6  | 16 |
| 41-50        | 8  | 24 | 3  | 8  | 22 |
| 51-60        | 5  | 4  | 4  | 4  | 35 |
| 61-70        | 2  | 6  | 2  | 1  | 9  |
| >70          | 0  | 0  | 0  | 0  | 6  |

Table 3: Cyto-Histological correlation of 300 cases of Breast lesions.

| Cytological categories* | No. of patients | Benign | Malignant |
|-------------------------|-----------------|--------|-----------|
| C1                      | 32              | 31     | 01        |
| C2                      | 170             | 169    | 01        |
| C3                      | 10              | 09     | 01        |
| Cytological categories* | No. of patients | Histology diagnosis |
|------------------------|-----------------|---------------------|
|                        |                 | Benign | Malignant |
| C4                     | 10              | 02     | 08        |
| C5                     | 78              | 00     | 78        |
| Total                  | 300             | 210    | 90        |

*C1 for inadequate; C2 for benign; C3 for suspicious, probably benign; C4 for suspicious, probably malignant; and C5 for malignant breast lesions

Table 4: Statistical analysis of data obtained in present study.

| Cytological diagnosis | Histological diagnosis | Total no. Of cases |
|-----------------------|------------------------|--------------------|
|                       | Positive for malignancy| Negative for malignancy |
| Positive for malignancy(C5 +C4)* | TP= 86 | FP= 2 | 88 |
| Negative for malignancy (C2+C3)# | FN=2 | TN=178 | 180 |
| **Total no. Of cases diagnosed** | 88 | 180 | 268 |

*C5- Malignant breast lesions; C4- suspicious probably malignant  
#C2-Benign breast lesions, C3-suspicious probably benign  
TP- True positive; FP- false positive; FN- false negative; TN- true negative  
Sensitivity of the test (FNAC)- \( \frac{TP}{TP+FN} \times 100 = 97.7\% \)  
Specificity of the test (FNAC)- \( \frac{TN}{TN+FP} \times 100 = 98.8\% \)  
Positive predictive value -\([TP/ (TP+FP)] \times 100 = 97.7\% \)  
False positive rate- \([FP/FP+TP] \times 100 = 2.27\% \)  
False negative rate- \([FN/FN+TN] \times 100 = 1.11\% \)

Table 5: Comparison of statistical results of present study with other studies:

| Parameter                  | Results in present study | Chavda J (2013) | A.Daramola et al (2015) | N.Chauhan et al (2012) |
|---------------------------|--------------------------|----------------|-------------------------|------------------------|
| Sensitivity               | 97.7%                    | 95.2%          | 95.4%                   | 96.6%                  |
| Specificity               | 98.8%                    | 100%           | 88.9%                   | 100%                   |
| Positive predictive value | 97.7%                    | 100%           | 99.6%                   | 100%                   |
| False negative rate       | 1.11%                    | 4.76%          | 0.8%                    | 1.9%                   |
| False positive rate       | 2.27%                    | 0%             | 0.4%                    | --                     |

Fig. 1: cytology smear of Malignant breast lesion, showing loosely cohesive clusters of ductal epithelial cells with moderate anisonucleosis, H & E stain, 400X.

Fig. 2: Cytology smear- Benign Breast lesion- Fibroadenoma, Giemsa stain, 400X.
Discussion

FNAC of palpable breast masses is considered as a quick, inexpensive, painless and safe procedure. Also, it gives reliable results as far as early detection of breast cancer is considered. This technique is very well accepted by the patient even if it had to be repeated. The only complication arises that is development of hematoma; which can be very well prevented by applying gentle pressure over the site of procedure for short duration.

Most countries have now adopted triple assessment approach (clinical, radiological, and pathological) for palpable breast masses, with FNAC as the first-line pathological investigation in both screening and symptomatic populations.\(^{(5)}\)

In present study, we observed that maximum number of benign lesions were found in 2\(^{nd}\) decade of life. Among these benign lesion, most common benign lesion was fibroadenoma. Similar findings have been observed by Ferguson et al. which shows commonest benign breast lesion is fibroadenoma occurring before age of 25 years.\(^{(8)}\)

Assessing malignant breast lesions in present study, we observed that peak incidence of malignant breast lesion is in 5\(^{th}\) to 6\(^{th}\) decade of life. Similarly peak age of breast malignancies is 50.8 years in a study done by Murali and
In present study, we obtained that most frequent malignant lesion was invasive ductal carcinoma of Not Otherwise Specified type (IDC-NOS). Such findings are comparable with a study done by Sigh et al, in which they found ductal carcinoma was most frequently diagnosed breast malignancy.(10)

In present study, total 32 cases where FNAC smears were inadequate / unsatisfactory. That gave proportion of inadequate cases in present study was 10.5%. This rate is higher than that obtained in a study done by Daramola et al. (11) This proportion of undiagnosed cases on cytology can be reduced by immediate evaluation of cytology smear by pathologist using a rapid staining technique. This “on-site” evaluation makes FNAC even more cost effective modality and reducing chances of recalling patients for re-aspiration. (12)

Technical skills of a cytopathologist performing FNAC are having very much influence of diagnostic yield. Unsatisfactory cytological smears can be due to insufficient experience of a pathologist, poor technique in performance of FNAC or due to the nature of lesion itself. Provision of adequate sample by an experienced pathologist can prove FNAC as highly reliable diagnostic tool. (13)

In present study, total two false negative cases were diagnosed. In one of that, we obtained heavily blood stained smears with mixed cytological features. Cytologically, this was diagnosed as a cystic lesion. On histological evaluation, it turned out to be an invasive ductal carcinoma of NOS type. Yeoh and Chan have also observed such pitfalls in cytodiagnosis. In their study, they got 6 false negative cases including 4 cases misdiagnosed as cystic lesions. (14) Such type of ‘missed diagnosis’ on cytology can be obtained due to either heavily blood stained smear hindering cytological features or the smear contains mixed cytological findings.

Table 5 shows comparison of statistical data obtained in this study with the results obtained in those of other three study done by J Chavda, A. Daramola et al and N. Chauhan et al. (11,15,16). The table shows the results obtained in this study is quite comparable regarding sensitivity, specificity and positive predictive values of FNAC as a diagnostic modality in detective malignant breast pathologies.

**Conclusion**

Palpable breast mass is one of the common presentation at surgical OPD. Chances of a breast lump being malignant are definitely present. So the proper evaluation of a breast lump is very essential part of patient management. FNAC of breast lump is now proved to be a rapid, reliable, cost effective diagnostic procedure with high degree patient compliance. Present study observed that the findings of breast FNACs are well correlated with histological diagnosis of respective breast lesions. This proves that cytodiagnosis by FNAC when in experienced hand are extremely useful in the evaluation of breast lumps.

Moreover, a benign diagnosis on FNA allows a time period in which a surgery can be planned or delayed, while a positive diagnosis of carcinoma on cytology allows preoperative discussion/ counselling of the patient and further planning of the therapy and reduces morbidity.

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