COMPARISON AND ANALYSIS OF RESULTS OF FNAC AND FROZEN SECTION IN DIAGNOSIS OF BREAST LESIONS

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Article Info: Received 20 July 2019; Accepted 18 August 2019
DOI: https://doi.org/10.32553/ijmbs.v3i8.482
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Conflict of interest: No conflict of interest.

Abstract

Background: Breast lesions encompass a wide spectrum of diseases, both neoplastic and non-neoplastic. However, effective treatment of breast lesions necessitates early and conclusive diagnosis. This calls for a multidisciplinary approach which includes clinical assessment, radiological examination and pathological tools like FNAC, Frozen section and Histopathology. The present study was conducted to determine and compare the accuracy of FNAC and intraoperative frozen sections in diagnosis of breast lesions by keeping histopathology as gold standard.

Method: This comparative study included 50 samples of breast lesions during the period of two year and that were subjected to FNAC, frozen section and histopathological evaluation.

Results: Among 50 cases, 21 (42%) were benign and 29 (58%) were malignant cases according to gold standard. According to FNAC diagnosis, 24 cases were benign and 26 were malignant while according to frozen section diagnosis, 22 cases were benign and 28 were malignant. Among benign category, maximum cases (15;30%) were of fibroadenoma whereas among malignant category maximum cases (27;54%) were of infiltrating duct carcinoma according to gold standard, one case each of tubular and lobular carcinoma. The sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV) and accuracy of FNAC was 89.66%, 100%, 100%, 87.5% and 94% respectively while the sensitivity, specificity, PPV, NPV and accuracy of frozen section was 96.55%, 100%, 100%, 95.45% and 98% respectively.

Conclusion: Both FNAC and frozen section have a high diagnostic accuracy in the evaluation of breast lesions; therefore both should be used as tools for the assessment of breast lesions.

Keywords: Breast Lesions, Diagnosis, FNAC, Frozen section, Histopathology, Benign, Malignant, Fibroadenoma, Carcinoma

Introduction:

Breast is host to many diseases which range from benign and malignant neoplasm’s, inflammatory conditions to infections, most of which present as lumps in the breast [1]. Breast lumps are a common finding in women of all ages, particularly during the reproductive years (from first menstruation until menopause). A breast lump may or may not be noticeable to the patient; normal breast tissue can be quite lumpy in some women and some lumps can be small or located deep in the breast [2]. The majority of breast lesions are not malignant, and most benign lesions do not progress to cancer. But current upward trend in incidence of malignant breast lesions has been accompanied by development of hormone receptor based targeted therapy. However, effective treatment of breast lesions necessitates early and conclusive diagnosis. This calls for a multidisciplinary approach which includes clinical assessment, radiological examination and pathological tools like fine needle aspiration cytology (FNAC), frozen section and histopathology [3].

FNAC has grown in popularity and became the first initial used procedure after history taking and clinical examination for diagnosis of solid and cystic breast lumps. To differentiate benign from malignant lesions is one of the major goals of FNAC. Its numerous advantages over open biopsy in terms of fast and easy approach, cost-effectiveness, low-complication and high diagnostic accuracy, sensitivity and specificity have made it the method of choice as a preliminary pre-operative diagnostic modality for breast lesions [4].
Although other methods have been developed to reach a preoperative diagnosis but frozen section still plays an important role in aiding the surgeon to choose the best therapeutic approach. Frozen section examination of breast biopsy specimens has the advantages of high reliability with an acceptable low percentage of false-negative results and practically no false-positive diagnosis. The results are available quickly, the diagnostic information is not limited to malignant or negative but additional information regarding tumor type and degree of differentiation may also be obtained in surgical oncology particularly in breast pathology. Frozen section allows the surgeons to take an immediate therapeutic decision, possibly sparing the patient a second operation and reducing hospitalization costs [5].

In view of sizeable number of FNA samples of breast lesions being received at Tertiary Care Hospital and Referral Centre, much confidence is placed by the clinicians on various pathological investigations to decide patient management. Hence, present study was proposed and conducted to determine and compare the accuracy of FNAC and intraoperative frozen sections in diagnosis of breast lesions by keeping histopathology as gold standard. Also, assess the influence of FNAC and frozen sections findings on the decision making during the breast surgery.

**Materials and Methods**

After obtaining permission from the Institutional Ethical Committee and written informed consent from each patient, this comparative study was carried out in Department of Pathology at Tertiary Care Hospital and Referral Centre during the period of two year. Total 50 patients were included in the study. The inclusion criteria were all the patients who were referred for cytological evaluation from surgical OPD or admitted to surgery wards with the complaints related to breast. The proforma was formulated and data was collected from each patient including detailed clinical history, clinical examination, any other related investigations and details regarding the nature of specimen.

Various techniques were used for obtaining specimens for cytological and frozen section evaluation:-

1. Fine needle aspiration/FNA technique of the patients with breast lumps coming to the OPD at the Tertiary Care Hospital and Referral Centre,
2. Frozen section on MRM specimen, specimen of excisional biopsy, lumpectomy specimen operated in our institution.

The equipment required for FNAC were 10 or 20 ml disposable syringes, 22-23gauge disposable needles, 95% ethanol, spirit swabs and glass slides. Technique for FNAC [6-8]: the breast lump was fixed between 2 fingers. After observing aseptic precautions, a 22-23gauge disposable sterile needle with 10 or 20 ml disposable syringe was used to enter the swelling and multiple passes given. Smears were made, air dried and wet fixed, stained with Haemotoxylin & Eosin (H and E) and Papanicolaou stains, and 1 air dried smear was stained with MGG stain. Remaining air dried smears were kept for any special stains if required such as AFB or PAS. The staining was done as per the standard procedure [9].

All the breast specimens received in normal saline (0.9%) solution immediately from the operation theatre without fixation in formalin were subjected for frozen section. Frozen sections were stained by H and E stain. Following this they were fixed in 10% formalin for 24 hrs and processed for H&E staining for histopathological examination. The diagnostic accuracy of FNAC and intraoperative frozen section were determined and compared with histopathological findings. The sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV) was calculated by Wilson Score method.

**Observations and Results**

Total 50 female patients were enrolled in the study. The maximum numbers of cases (22%) were in the age group of 31-40 years followed by 51-60 years (18%), (Table 1). The youngest patient was 15 years old and oldest patient was 83 years old. Mean age of patients was 40.56 years.

<table>
<thead>
<tr>
<th>Age group</th>
<th>No. of Cases</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;20</td>
<td>8</td>
<td>16</td>
</tr>
<tr>
<td>21-30</td>
<td>8</td>
<td>16</td>
</tr>
<tr>
<td>31-40</td>
<td>11</td>
<td>22</td>
</tr>
<tr>
<td>41-50</td>
<td>7</td>
<td>14</td>
</tr>
<tr>
<td>51-60</td>
<td>9</td>
<td>18</td>
</tr>
<tr>
<td>61-70</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td>71-80</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>81-90</td>
<td>2</td>
<td>4</td>
</tr>
</tbody>
</table>

Out of 50 cases, 21 (42%) cases were benign or non-malignant and 29 (58%) cases were malignant according to the gold standard. The mean age of

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patients in benign and malignant breast lesions was 28.2 and 51.86 years respectively. Among benign category, maximum cases (15;30%) were of fibroadenoma whereas among malignant category maximum cases (27;54%) were of infiltrating duct carcinoma according to gold standard, one case each of tubular and lobular carcinoma, (Table 2).

**Table 2: Distribution of cases in various conditions studied**

<table>
<thead>
<tr>
<th>Condition</th>
<th>FNAC</th>
<th>Frozen section</th>
<th>Histopathology</th>
</tr>
</thead>
<tbody>
<tr>
<td>IDC</td>
<td>26 (52%)</td>
<td>28 (56%)</td>
<td>27 (54%)</td>
</tr>
<tr>
<td>Fibroadenoma</td>
<td>14 (28%)</td>
<td>15 (30%)</td>
<td>15 (30%)</td>
</tr>
<tr>
<td>PBD with atypia</td>
<td>3 (6%)</td>
<td>2 (4%)</td>
<td>1 (2%)</td>
</tr>
<tr>
<td>PBD without atypia</td>
<td>3 (6%)</td>
<td>1 (2%)</td>
<td>1 (2%)</td>
</tr>
<tr>
<td>Phyllodes tumour</td>
<td>4 (8%)</td>
<td>4 (8%)</td>
<td>4 (8%)</td>
</tr>
<tr>
<td>Lobular Carcinoma</td>
<td>-</td>
<td>-</td>
<td>1 (2%)</td>
</tr>
<tr>
<td>Tubular Carcinoma</td>
<td>-</td>
<td>-</td>
<td>1 (2%)</td>
</tr>
</tbody>
</table>

PBD=Proliferative breast disease

According to FNAC diagnosis, out of 50 cases, 24 cases were benign or non-malignant and 26 were malignant. The sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV) and accuracy of FNAC was 89.66%, 100%, 100%, 87.5% and 94% respectively. P value according to mcnemarks statistics=0.3173.

According to frozen section diagnosis, among the 50 case, 22 cases were benign or non-malignant and 28 were malignant. The sensitivity, specificity, PPV, NPV and accuracy of frozen section was 96.55%, 100%, 100%, 95.45% and 98% respectively. P value according to mcnemarks statistics=1

According to combined FNAC + Frozen section diagnoses, out of 50 cases, 24 cases were benign or non-malignant and 26 were malignant. P value according to mcnemarks statistics=1. Table 3 compares the statistical parameters of FNAC, Frozen section individually as well as combined FNAC + Frozen section. The sensitivity, NPV and accuracy of frozen section were better than FNAC. Hence the diagnoses of frozen section were more accurate than FNAC.

**Table 3: Comparison of statistical parameters of FNAC, Frozen section and combined FNAC + Frozen section**

<table>
<thead>
<tr>
<th>Stat. Parameters</th>
<th>FNAC</th>
<th>Frozen section</th>
<th>FNAC + Frozen section</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensitivity</td>
<td>89.66%</td>
<td>96.55%</td>
<td>96.3%</td>
</tr>
<tr>
<td>Specificity</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>PPV</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>NPV</td>
<td>87.5%</td>
<td>95.45%</td>
<td>95.83%</td>
</tr>
<tr>
<td>Accuracy</td>
<td>94%</td>
<td>98%</td>
<td>98%</td>
</tr>
</tbody>
</table>

**Discussion**

Breast carcinoma is one of the commonest cancers among females in India preceded only by cervical cancer [10, 11]. Numerous studies have shown that majority of breast lesions are benign and require only reassurance [12]. Early screening and diagnosis of breast lesions can aid in prevention as well as accurate management of the patients thus alleviating discomfort and anxiety in the process [13, 14].

In the present study, most of the patients were in the age group of 31-40 years followed by 51-60 years which was comparable with the study done by Shrestha et al [15]. The benign or non-malignant breast lesions were found in the 42% cases and malignant breast lesion in 58% cases according to the gold standard, this result was similar to the study done by Sheikh et al [3]. According to previous studies [16-18] benign breast lesions predominated in the younger age groups (<30years) while malignant breast lesions were more common in the older age groups (5th and 6th decades). In current study, the mean age of patients in benign and malignant breast lesions was 28.2 and 51.86 years respectively which was comparable with the other studies [19,20 ].

Among the benign breast lesions fibroadenoma was the commonest lesion while among malignant breast lesions, infiltrating duct carcinoma being the most common malignant lesion, this was in accordance with Sheikh et al study [3].

Sensitivity of FNAC was 89.66% which was similar to the findings of Shah et al [21]. Specificity and PPV in current study was 100%, this was equaled to the findings reported by Hebbar et al [17] and Giri et al [22]. NPV was 87.5%; this result was similar to Giri et al [22]. The diagnostic accuracy of FNAC was 94% which was closely matched the diagnostic accuracy reported by Ishikawa et al (93.2%) [23]. The reported sensitivities, specificities and positive and negative predictive values for FNB vary depending on how insufficient samples are considered (as positive, negative or excluded) and how atypical samples are categorized (positive or negative). The variability in reported sensitivities and specificities depend on the expertise and skill of the aspirator and of the interpreter.

The most important indications for frozen section are to confirm the diagnosis of carcinoma if the FNAC or core needle biopsies are inconclusive prior to major radical surgery and to provide an assessment of resection margins in carcinoma. In present study we
came across a few cases where the diagnosis of FNAC was inconclusive or gave false negative diagnosis, in these cases, to avoid under diagnosis or if there is high clinical suspicion of malignancy, there comes the role of frozen section. It was also found that, in cases where FNA diagnosis is inconclusive; there frozen section is very useful to reach a definitive diagnosis. Many cases with inconclusive FNA turned out to be malignant on frozen section and helped the surgeon to plan the surgery. In this way, frozen section helps to avoid second and third operation. The sensitivity of frozen section in present study was 96.55% which was similar to the findings of Andreas et al [24]. Specificity and PPV was 100% while NPV was 95.45% which was equaled to the findings reported by Tarek et al [20] and Kumar et al [25]. The diagnostic accuracy of frozen section was 98%, similar to that of Dos Santos et al [26]. When FNAC and frozen section were compared, it found that the accuracy of frozen section was more than FNAC which is same as in previous studies [20, 25].

**Conclusion**

When positive, aspiration of a palpable mammary tumour is a definitive procedure with results equivalent to frozen section and equally suitable for choosing and undertaking definitive therapy. Negative results, viewed in an appropriate clinical context, also proved conclusive. Atypical or suspicious results at aspiration must be followed by repeat aspiration or excision followed by intraoperative frozen section, since these frequently prove positive and frozen section being accurate in most cases, helps to prevent a second operation.

As both FNAC and frozen section have a high diagnostic accuracy (94% and 98% respectively) in the evaluation of breast lesions; therefore both should be used as tools for the assessment of breast lesions, as they can prove to be helpful in the early diagnosis and planning the line of management and for alleviating unnecessary anxiety.

**References**

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